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Investigating the action-inaction asymmetry within the TPB framework: An exploration of the belief-based model and extended direct measure models

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Investigating the action-inaction asymmetry within the TPB framework: An exploration of the belief-based model and extended direct measure models

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Author’s Declaration

Yr wyf drwy hyn yn datgan mai canlyniad fy ymchwil fy hun yw’r thesis hwn, ac eithrio lle nodir yn wahanol. Caiff ffynonellau eraill eu cydnabod gan droednodiadau yn rhoi cyfeiriadau eglur. Nid yw sylwedd y gwaith hwn wedi cael ei dderbyn o’r blaen ar gyfer unrhyw radd, ac nid yw’n cael ei gyflwyno ar yr un pryd mewn ymgeisiaeth am unrhyw radd oni bai ei fod, fel y cytunwyd gan y Brifysgol, am gymwysterau deuol cymeradwy.

I hereby declare that this thesis is the results of my own investigations, except where otherwise stated. All other sources are acknowledged by bibliographic references. This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree unless, as agreed by the University, for approved dual awards.

Abstract

Notwithstanding choices across alternatives, every behavioural choice may be reduced to the decision to perform or not perform a given behaviour. Theory of planned behaviour (TPB) studies are often conducted with a complementarity assumption—the view that cognitions about action and inaction are conceptually mirrored. It is also assumed that the TPB framework operates in the same way when applied to action and inaction. However, a considerable body of literature identifies that information processing is not equivalent in regard to action and inaction. Recent research suggests that anticipated regret (AR) influences intention to perform a behaviour differently depending on whether the behaviour may be categorised as a distal benefit behaviour or an immediate hedonic behaviour. No previous research has established whether AR exerts a differential influence on intention to perform and not perform target behaviours.

This thesis tests the complementarity assumption by evaluating the psychological distinctness of action and inaction within the TPB framework; determines whether the belief-based and extended direct measure TPB models operate differently when applied to action and inaction; and establishes whether AR exerts a differential influence on intentions to perform and not perform target behaviours. The research therefore provides the first in-depth evaluation of the TPB framework when applied to action and inaction.

Three studies were undertaken into blood donation (study 1), sunscreen use (study 2), and high-calorie snack consumption (study 3). All data were collected using cross-sectional surveys and utilised student (study 1) and Amazon's Mechanical Turk (studies 2 and 3) samples. Each study was comprised of a belief-elicitation study followed by a main TPB study. Main TPB surveys captured the standard TPB constructs in addition to measure(s) of AR. Studies 2 and 3 included measures of actual behavioural control and behaviour. Studies 2 and 3 also captured belief-based measures relating to both action and inaction. Belief-elicitation study data were analysed using content analysis. The belief-based models were compared using SEM, path analysis, and regression analysis; whereas the extended direct measure TPB models were evaluated using SEM and moderation analysis (examining the moderating role of actual capacity and actual autonomy on the intention-behaviour relationships).

This thesis makes several important contributions to knowledge regarding the nature of action and inaction within the TPB framework. Firstly, identifying that action and inaction are not conceptually mirrored concepts highlights that inferences made about the determinants of inaction based on those about action may be invalid and lead to an inaccurate understanding of the motivating factors that influence inaction. Researchers should therefore not draw conclusions about the motivating factors that influence inaction from research into the determinants of action, and vice versa. The research also identifies a dearth in knowledge regarding the determinants of inaction within the TPB literature. Secondly, the thesis demonstrates that the belief-based and direct measure TPB models operate differently when applied to action and inaction. Future research is necessary to establish whether enhancing the accessibility of beliefs in regard to the less-accessible behavioural alternative leads to the models functioning with similar efficacy for action and inaction. Finally, this thesis identifies that AR exerts a differential influence on intention to perform and not perform a target behaviour which may be because action and inaction constitute different types of behaviour. The distal benefit behaviour category identified by Sandberg and Conner (2008) does not adequately account for the way in which anticipated action regret influences intention to not perform distal benefit behaviours. Behaviour type categories of AR should be extended accordingly. Behaviour type categories should be extended to include a type that accounts for the regret people anticipate in regard to errors of omission.

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Dedication

This thesis is dedicated to my brother Dan, my inspiration for studying social marketing.

This thesis is further dedicated to my Grandad who was always there to give encouragement and support when I needed it most.

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List of Abbreviations

AA – actual autonomy

AAR – anticipated action regret

ABC – actual behavioural control

AC – actual capacity

AIC – akaike information criterion

AIR – anticipated inaction regret

AR – anticipated regret

ATT – attitude

AVE – average variance extracted

BB – behavioural beliefs

Beh – behaviour

CB – control beliefs

CFA – confirmatory factor analysis

CFI – comparative fit index

CI – confidence interval

CR – construct reliability

GFI – goodness-of-fit statistics

Int – intention

MTurk – Amazon's Mechanical Turk

NB – normative beliefs

NFI – normed fit index

PB – past behaviour

PBC – perceived behavioural control

RMSEA – root mean square error of approximation

SD – standard deviation

SEM – structural equation modelling

SN – subjective norm

TLI – Tucker-Lewis index

TPB – theory of planned behaviour

TRA – theory of reasoned action

Chapter 1 Introduction

Every behaviour involves a choice between alternative courses of action. At its most basic level, behavioural choice may always be reduced to the decision to perform or not perform a given behaviour (Jaccard, 1981). A common assumption in theory of planned behaviour (TPB: Ajzen, 1985, 1991) research is that action and inaction are psychologically inverse concepts. This has led some researchers to draw inferences about the determinants of inaction from information on the determinants of action, and vice versa (Sutton, 2004). A growing body of literature shows that actions and inactions are not always conceptual opposites (e.g. Dodge & Jaccard, 2008) and different determinants may underlie the decision to perform and not perform a behaviour (e.g. Ajzen & Sheikh, 2013; Middlestadt, Macy, & Geshnizjani, 2014; Richetin et al., 2012; Richetin, Conner, & Perugini, 2011). Furthermore, these studies suggest that the predictive efficacy of the TPB may differ when applied to action and inaction. A substantial body of literature evidences an action-inaction asymmetry whereby information relating to action and inaction is not processed equivalently (e.g. Beckmann & Young, 2007; Carpenter, Just, Keller, Eddy, & Thulborn, 1999; Glenberg, Robertson, Jansen, & Johnson-Glenberg, 1999; Hearst, 1991). This suggests that the TPB framework may operate differently when applied to predict and understand the decision to perform and not perform a target behaviour. Recent research into the role of anticipated regret (AR) within the TPB also suggests that AR may exert a differential impact on intentions to perform and not perform a behaviour when action and inaction constitute different behaviour types (Sandberg, Hutter, Richetin, & Conner, 2016). This thesis presents the first in-depth evaluation of the TPB framework when applied to understand the decision to perform and not perform a behaviour. Across 3 behavioural contexts the thesis explores the psychological distinctness of action and inaction, identifies differences in the operationalisation and efficacy of the belief-based and direct measure TPB models when applied to action and inaction, and clarifies that AR influences intention to perform and not perform a given behaviour differently.

1.1 Thesis background

The TPB is one of the most influential and widely applied models in social psychology (Ajzen, 2011). The model is used by academics and practitioners alike to understand the motivating factors that influence people's intention to perform or not perform a target behaviour and subsequent behavioural performance. As a general model of behavioural prediction, the TPB has been applied to a wide range of behaviours. Such behaviours include those that are desirable and beneficial to the individual or society such as exercising (e.g. Norman, Conner, & Bell, 2000), participating in health screenings (e.g. Drossaert, Boer, & Seydel, 2003; Rutter, 2000), and purchasing fair trade products (e.g. Ozcaglar-Toulouse, Shiu, & Shaw, 2006). Other contexts examined using the TPB are of interest because they are undesirable and may cause harm to individuals or society such as binge drinking (e.g. Cooke, Sniehotta, & Schüz, 2007; Johnston & White, 2003) and texting while driving (Gauld, Lewis, & White, 2014). Numerous meta-analyses have demonstrated the efficacy of the TPB, reporting that on average attitude, subjective norm, and perceived behavioural control (PBC) explain 29-44% of the variance in intention and 16-35% of the variance in behaviour (Armitage & Conner, 2001a; Godin & Kok, 1996; Hagger & Chatzisarantis, 2002; McEachan, Conner, Taylor, & Lawton, 2011; Rivis & Sheeran, 2003; Rivis, Sheeran, & Armitage, 2009; Sandberg & Conner, 2008; Schulze & Wittmann, 2003; Paschal Sheeran & Taylor, 1999; Trafimow, Sheeran, Conner, & Finlay, 2002). The TPB is, therefore, an important and effective model for understanding human social behaviour.

Many applications of the TPB investigate the decision to perform a target behaviour whereas a smaller stream of research is focused on examining the decision to not perform the behaviour. Studies that investigate a single behavioural alternative tend to be conducted with a complementarity assumption—the belief that cognitions about action and inaction are conceptually mirrored (Sutton, 2004). This assumption stems from the notion that when action and inaction are mutually exclusive and exhaustive (such as the choice between performing and not performing a specified behaviour) it is possible to understand the determinants of both alternatives by examining the determinants of only one of the two behaviours (Ajzen, 2017; Ajzen & Fishbein, 1980; Fishbein, 1980; Fishbein & Middlestadt, 1987). An indication that actions and inaction are underpinned by different beliefs is evident in the literature where behavioural beliefs (Dodge & Jaccard, 2008) and the reasons people give (Chatzidakis, Hibbert, & Winklhofer, 2016; Richetin et al., 2011: study 2) for performing and not performing a behaviour are shown to differ. No known research has conducted a full

belief-elicitation study for both action and inaction within the same TPB study to identify the salient beliefs people hold about each alternative. The extent to which beliefs about performing and not performing a given behaviour are conceptually mirrored or distinct is therefore unknown.

The complementarity assumption often leads researchers to make assumptions about the determinants of inaction based on research into the determinants of action, and vice versa. This approach does not take into account that an individual may be motivated to not perform a behaviour due to a distinct set of motivating factors from those that motivate them to perform the behaviour. In many contexts, one behavioural alternative is the default option that requires no prerequisite resources or abilities and entails little or no physical or mental effort. In contrast, the other alternative often requires prerequisite resources or abilities and entails greater physical or mental effort. Different factors are, therefore, likely to influence intention to engage and not engage with the target behaviour. As such, inaction is not simply the absence of motivation to perform a given behaviour. Investigating the determinants of one alternative may not capture all important motivating factors that influence the other alternative. Making assumptions about the determinants of inaction based on the determinants of action may consequently lead to faulty inferences, a dearth of understanding on the determinants of inaction, and ineffective behaviour change interventions. In support of this view, several theory of reasoned action (TRA: Fishbein & Ajzen, 1975) and TPB studies suggest that the determinants of intention to perform and not perform a behaviour differ (Ajzen & Sheikh, 2013; Dodge & Jaccard, 2008 (TRA); Middlestadt et al., 2014; Richetin et al., 2012, 2011).

The belief-based TPB model is largely underutilised in the literature and no known studies have investigated action and inaction within the same study. Furthermore, very few studies have explored the application of the direct measure TPB model to both action and inaction. Studies that have done so have focused on establishing the discriminant and incremental validity of constructs across action and inaction models (Richetin et al., 2011; Richetin et al., 2012) and that action and inaction may be motivated by different determinants (Ajzen & Sheikh, 2013; Dodge & Jaccard, 2008 (TRA only); Middlestadt et al., 2014). Across these studies (7 applications overall) a pattern is observed whereby the TPB exhibits greater explanatory power when applied to predict intention to act than to not act. This suggests that the TPB may not operate in the same way for action and inaction. No research has yet

investigated whether the TPB model functions differently when applied to predict intention and behaviour for action and inaction.

A common observation in the psychology literature is that action and inaction are asymmetric in nature. Information containing negation tends to be processed less effectively than information that contains only affirmation. Negated information is more ambiguous (Bianchi, Savardi, Burro, & Torquati, 2011), more likely to result in the generation of incongruent concepts (Gawronski, Deutsch, Mbirkou, Seibt, & Strack, 2008; Mayo, Schul, & Burnstein, 2004), and are associated with less accurate information recall than affirmed information (e.g. Cornish & Wason, 1970; Fiedler, Walther, Armbruster, Fay, & Naumann, 1996). It is also more difficult to draw logical inferences using negated information than affirmed information (e.g. Evans & Lynch, 1973). Furthermore, research into the feature positive effect shows that associations are formed more readily when they are between two present stimuli (e.g. performing a behaviour leads to a particular outcome) than between a present and an absent stimulus (e.g. not performing a behaviour leads to a particular outcome) (e.g. Hearst, 1991; Rassin, 2014). Information relating to inaction may be less noticeable (e.g. Hearst, 1991) and perceived as less important than information about action (Eerland & Rassin, 2012; Snyder & Swann, 1978). Self-inferences are also weaker when they are based on inaction than action (e.g. Allison & Messick, 1988; Fazio, Sherman, & Herr, 1982a). The feature positive effect and the asymmetry between affirmation and negation have both been explained in regard to the differential salience of action and inaction. Information processing is argued to be more effective for action (affirmation) when it is of higher salience than inaction (negation) (Beckmann & Young, 2007; Glenberg et al., 1999; Rassin, 2014). When inactions (negations) are of a similar salience to actions (affirmations), however, information processing should be effective for both behavioural alternatives. The differential salience of action and inaction may, therefore, influence the function and efficacy of the belief-based and direct measure TPB models.

AR is one of the most frequent additional constructs utilised in TPB research. Several researchers argue that the TPB is overly instrumental in nature and does not adequately capture important affective influences in the decision-making process (e.g. Conner et al., 2015; Sandberg & Conner, 2008). Many studies have extended the direct measure TPB model to include a measure of AR to account for this shortcoming. Meta-analyses show that AR exerts a significant influence on intention to perform a range of behaviours and also

significantly raises the extracted variance in intention over and above that explained by the standard TPB constructs (e.g. Rivis et al., 2009; Sandberg & Conner, 2008). Ajzen and Sheikh (2013) argue that the influence of AR on intention can be attributed to the incompatible measurement of the standard TPB constructs and those of AR often utilised in the literature. Across two studies AR is shown to significantly predict intention to perform and not perform a behaviour when measured incompatibly, but not compatibly, with the other TPB constructs (Ajzen & Sheikh, 2013). Contrary to these findings, recent research by Sandberg et al. (2016) demonstrates that AR does sometimes significantly influence intention to perform a behaviour when measured compatibly with the standard TPB constructs. The authors posit that AR may influence intention to perform a behaviour differently depending on whether the behaviour is a distal benefit behaviour (performed primarily in pursuit of positive future outcomes) or immediate hedonic behaviour (performed mainly for enjoyment in the short-term). Within a given choice context the decision to perform and not perform a behaviour often constitute different behaviour types. AR may, therefore, exert a differential influence on intention to perform and not perform a target behaviour. Further research is necessary to clarify whether AR exerts a differential influence on intention to perform and not perform a behaviour within the same context.

Several important theoretical and practical gaps in knowledge are identified. The extent to which beliefs about action and inaction are conceptually mirrored remains unknown. If beliefs that underpin action and inaction are not conceptually mirrored, inferences made about the determinants of inaction based on research into the determinants of action may be invalid. This would reveal a considerable gap in knowledge about the determinants of inaction across behavioural contexts. Addressing this gap in knowledge would be an important next step in TPB research because the determinants of inaction can be as important as the determinants of action (Michaelidou & Hassan, 2014). Before exploring the determinants of inaction, however, it is necessary to verify that the belief-based and direct-measure TPB models operate in the same way and exhibit good predictive validity when applied to both action and inaction. Differences in the function or efficacy of the models should be identified so that future research may take these into account, or indeed, address them when investigating inaction within the TPB. Finally, no known research has examined whether AR exerts a differential impact on intention to perform and not perform a behaviour when action and inaction constitute different behaviour types (i.e. where action is an immediate hedonic behaviour and inaction is a distal benefit behaviour, and vice versa). Clarifying the role of AR within the TPB would facilitate the identification of the most relevant

type of regret within a given behavioural context for future TPB research. More pertinent to the central aims of this thesis, identifying that AR exerts a differential influence on intention to perform and not perform a target behaviour would provide further insight into the psychological distinctness of action and inaction within the TPB framework.

1.2 Statement of contribution

The research reported in this thesis contributes to the TPB literature in three key ways. Previous studies have highlighted that action and inaction are underpinned by different behavioural beliefs (Dodge & Jaccard, 2008) and that people perform and do not perform target behaviours for different reasons (Chatzidakis et al., 2016; Richetin et al., 2011 study 2). Building upon these findings, this thesis is the first to directly compare the modal salient behavioural, normative, and control belief sets across action and inaction to evaluate the degree to which these belief sets are conceptually mirrored (study 1.1, 2.1 and 3.1). The complementarity assumption is further tested by the belief-based (study 2.2 and 3.2) and direct measure (study 1.2, 2.3 and 3.3) TPB models which identify whether different determinants predict intention (study 1.2, 2.2, 2.3, 3.2 and 3.3) and behaviour (study 2.2, 2.3, 3.2 and 3.3 only) when applied to action and inaction. Furthermore, the structural equivalence of belief-based and direct measure models is also explored to determine whether there are significant differences in the relationships of each model when applied to action and inaction. By doing so, the research challenges the notion that when a choice is between two mutually exclusive and exhaustive alternatives their belief-based foundations will be conceptually mirrored (Ajzen, 2017; Fishbein, 1980; Fishbein & Middlestadt, 1987).

Work on the TPB stipulates that the framework may be applied to predict and understand the decision to perform and not perform a target behaviour (Ajzen, 1991; Fishbein & Ajzen, 2010). It is assumed that the TPB operates in the same way when applied to action and inaction. Literature into the affirmation-negation asymmetry shows that negations tend to be processed less effectively than affirmations when they are not of equal salience (Glenberg et al., 1999; Lüdtke & Kaup, 2006). Similarly, the feature positive effect shows that information about non-occurrences is more difficult to process than that of occurrences, but this effect may be reduced or eliminated when inactions are highly salient (e.g. Beckmann & Young, 2007; Rassin, 2014). The action-inaction asymmetry may impact how the TPB functions when applied to predict performing and not performing a target behaviour. Some support for

this position is evident in studies that have examined both action and inaction within the same study. Whilst not explicitly explored, these studies tend to report that the direct measure TPB model explains greater variance in intention to perform the target behaviour than intention to not perform it (Ajzen & Sheikh, 2013; Middlestadt et al., 2014; Richetin et al., 2011; Richetin et al., 2012). This thesis is the first to explore whether the belief-based and direct measure TPB models operate differently when applied to action and inaction. Indicator and construct validity are compared when the belief-based model is applied to action and inaction. The relative model fit and psychometric properties of the extended direct measure model are compared when used to predict performing and not performing the target behaviour. The research also explores whether greater variance in intention and behaviour is explained when the belief-based and extended direct measure models are applied to the behavioural alternative for which people are likely to hold more highly accessible beliefs. Furthermore, the thesis investigates whether the moderating role of actual capacity and actual autonomy differ when the extended direct measure TPB model is applied to action and inaction. In sum, this thesis presents an in-depth exploration of the application of the belief-based and extended direct measure TPB models to action and inaction.

Two competing perspectives on the role of AR within the TPB have emerged in recent years. Ajzen and Sheikh (2013) argue that AR significantly enhances the prediction of intention within the TPB in many studies because the construct is commonly assessed incompatibly with the standard TPB constructs. Sandberg et al. (2016) instead contend that the influence of AR is dependent on the type of regret measured and the type of behaviour investigated. Anticipated action regret (AAR) is thought to exert a strong influence on intention to perform immediate hedonic behaviours, but not on intention to perform distal benefit behaviours. On the other hand, anticipated inaction regret (AIR) is posted to influence intention to perform both distal benefit and immediate hedonic behaviours. This thesis contributes to the ongoing debate in the literature regarding the role of AR within the TPB in two important ways. Across three behavioural contexts, the direct measure TPB models are extended to include AR. Two studies explore the influence of AIR on intention in contexts where performing the behaviour constitutes a distal benefit behaviour and not performing it constitutes an immediate hedonic behaviour (study 1.2 and 2.3). A third study explores both anticipated action and inaction regret in a context for which performing the behaviour represents an immediate hedonic behaviour and not performing it is a distal benefit behaviour (study 3.3). The two main explanations for the role of anticipated regret on intention within the TPB are,

therefore, examined. Furthermore, the thesis establishes whether AR exerts a differential influence on intention to perform and not perform distal benefit and immediate hedonic behaviours within an extended direct measure TPB model.

1.3 Aims and objectives of the thesis

Table 1.1 presents the overarching aims and objectives of this thesis which are addressed across 3 empirical studies into blood donation (study 1), sunscreen use (study 2) and high-calorie snack consumption (study 3). Each of these studies contains a belief-elicitation study (studies 1.1, 2.1 and 3.1) and a direct measure TPB study (studies 1.2, 2.3, and 3.3). Studies 2 and 3 also include an analysis of the belief-based TPB model (studies 2.2 and 3.2).

Table 1.1 - Overarching aims and objectives of the thesis

Research Aims and objectives	**Study**
Aim 1 - To test the complementarity assumption by establishing the extent to which action and inaction are distinct concepts within the TPB framework	
1.1 To establish the degree to which beliefs about action and inaction are conceptually mirrored	Elicitation study 1.1, 2.1 and 3.1
1.2 To explore the extent to which mirrored and distinct beliefs significantly predict intention for action and inaction in the belief-based models	Belief-based study 2.2 and 3.2
1.3 To determine whether distinct beliefs relevant to action and inaction significantly add to the prediction of intention to perform and not perform the target behaviour over and above that explained by the mirrored beliefs for each alternative alone	Belief-based study 2.2 and 3.2
1.4 To test measurement invariance across action and inaction models	Direct measure study 1.2, 2.3 and 3.3
1.5 To identify whether different belief-based determinants underlie intentions and behaviour for action and inaction	Belief-based study 2.2 and 3.2
1.6 To explore the structural equivalence of the belief-based action and inaction models	Belief-based study 2.2 and 3.2
1.7 To identify whether different determinants underlie intentions and behaviour in the extended direct measure action and inaction models	Direct measure study 1.2, 2.3 and 3.3
1.8 To evaluate the equivalency of structural relationships across direct measure action and inaction models	Direct measure study 1.2, 2.3 and 3.3
Aim 2 – To assess whether the belief-based TPB model operates differently when applied to action and inaction	

2.1. To identify whether the belief-based constructs in the action and inaction models exhibit similar construct validity	Belief-based study 2.2 and 3.2
2.2. To examine the relative predictive efficacy of the belief-based model in the prediction of intention and behaviour when applied to action and inaction	Belief-based study 2.2 and 3.2
Aim 3 – To assess whether the extended direct measure TPB model operates differently when applied to action and inaction	
3.1. To compare the relative model fit of the extended direct measure model when applied to action and inaction	Direct measure study 1.2, 2.3 and 3.3
3.2. To examine the psychometric properties of the extended direct measure model when applied to action and inaction	Direct measure study 1.2, 2.3 and 3.3
3.3 To establish whether the moderating role of actual capacity and actual autonomy on the intention-behaviour relationship is different when the extended direct measure model is applied to action and inaction	Direct measure study 1.2, 2.3 and 3.3
3.4 To examine the relative predictive efficacy of the extended direct measure model in the prediction of intention and behaviour when applied to action and inaction	Direct measure study 1.2 (intention only), 2.3 and 3.3 (intention and behaviour)
Aim 4 - To determine whether AR exerts a differential influence on intention and behaviour when the extended direct measure TPB model is applied to action and inaction	
4.1. To examine whether AAR exerts a differential influence on intention to perform and not perform the target behaviour	Direct measure study 3.3
4.2. To examine whether AAR exerts a differential influence action and inaction behaviour	Direct measure study 3.3
4.3. To examine whether AIR exerts a differential influence on intention to perform and not perform the target behaviour	Direct measure study 1.2, 2.3 and 3.3
4.4. To examine whether AIR exerts a differential influence action and inaction behaviour	Direct measure study 2.3 and 3.3
4.5 To evaluate whether the structural relationships between AR and intention and AR and behaviour are significantly different when the extended direct measure TPB model is applied to action and inaction	Direct measure study 2.3 and 3.3

The first research aim is to test the complementarity assumption by establishing the extent to which action and inaction are distinct concepts within the TPB framework. The belief-elicitation studies (study 1.1, 2.1 and 3.1) examine the extent to which modal salient belief sets for action and inaction are composed of conceptually mirrored and distinct beliefs (objective 1.2). The importance of distinct beliefs in gaining an accurate understanding of the determinants of action and inaction is established by identifying whether distinct beliefs

about action and inaction significantly enhance the prediction of intention to perform and not perform the target behaviour, over and above that explained by mirrored beliefs about action and inaction alone (objective 1.3; studies 2.2 and 3.2). Measurement invariance is tested in the extended direct measure models (study 1.2, 2.3 and 3.3) to identify whether respondents conceptualise and respond to questionnaire items relating to action and inaction in the same way (objective 1.4). To further explore the psychological distinctness of action and inaction within the TPB framework, comparisons are made in regard to the determinants of intention and behaviour when the belief-based (objective 1.5; study 1.2 and 2.2) and extended direct measure (objective 1.7; study 1.2, 2.3 and 3.3) models are applied to action and inaction. Furthermore, the structural equivalence of the belief-based (objective 1.6; study 2.2 and 3.2) and extended direct measure (objective 1.8; study 1.2, 2.3 and 3.3) models is determined to identify whether there are significant differences in the determinants of intentions (study 1, 2 and 3) and behaviour (study 2 and 3 only) when the models are applied to performing and not performing the target behaviour.

The second research aim is focused on exploring whether the belief-based TPB model functions equivalently when applied to action and inaction (study 2.2 and 3.2). Construct and indicator validity are compared to establish the degree to which the belief-based measurement models operate equivalently when applied to action and inaction (objective 2.1). Comparisons are also drawn in regard to the predictive power of the belief-based model when applied to action and inaction (objective 2.2). Aim 3 is concerned with investigating the application of extended direct measure TPB models to action and inaction. Comparisons are drawn in regard to the relative model fit (objective 3.1) and psychometric properties (objective 3.2) of the extended direct measure models when applied to action and inaction. This facilitates the evaluation of whether measurement models are equivalent when the extended direct measure models are applied to action and inaction. Study 2.3 and 3.3 extend the direct measure TPB model to incorporate measures of actual capacity and actual autonomy. These studies investigate if actual capacity and actual autonomy moderate the intention-behaviour relationship differently when the extended direct measure model is applied to action and inaction (objective 3.3). The relative explanatory power of the extended direct measure models in the prediction of intention and behaviour is also compared when the model is applied to action and inaction. This facilitates the exploration of whether the extended direct measure TPB model affords superior predictive efficacy when applied to action or inaction (objective 3.4).

The fourth research aim is to determine whether AR exerts a differential influence on intention and behaviour when the extended direct measure TPB models are applied to action and inaction. Studies 1.2 and 2.3 explore the influence of AIR on intention to perform and not perform the target behaviour (objective 4.3). Study 2.3 also compares the influence of AIR on behaviour (objective 4.4) across action and inaction models. Study 3 goes on to explore whether anticipated action and inaction regret significantly predict intention (objective 4.1) and behaviour (objective 4.2) in regard to action and inaction. Finally, the structural relationships of the extended direct measure TPB models are examined to determine if there are significant differences in the way AR influences intention and behaviour across action and inaction models (objective 4.5).

1.4 Overview of the research methodology

The methodology and methods utilised in this thesis are consistent with those typically adopted in the TPB literature. The research is conducted within a positivist paradigm and with descriptive and exploratory purposes. Cross-sectional survey designs are utilised throughout the research. Samples cover British university students (study 1) and workers on Amazon's Mechanical Turk platform (studies 2 and 3). All studies were designed and implemented in accordance with the guidelines set out by Fishbein and Ajzen (2010).

1.5 Organisation of the thesis

This thesis consists of seven chapters. Following the present introductory chapter, a review of the literature is provided in chapter 2. The literature review presents an in-depth discussion of the reasoned action approach and TPB model, the action-inaction asymmetry, and the role of AR within the TPB. Chapter 3 discusses the overarching methodology of the thesis and covers the research paradigm, methodological approach, and research methods. Chapters 4, 5 and 6 present the blood donation, sunscreen use, and high-calorie snack consumption studies, respectively. Chapter 7 discusses the overarching findings across the 3 empirical studies of the thesis, the main thesis contributions, limitations of the research, and opportunities for future research.

1.6 Conclusion

This chapter has introduced the central themes of the thesis and provided a background to the research undertaken. The main contributions of the research are specified, and the aims and objectives outlined. An overview of the research methodology was also presented before the organisation of the thesis was provided. The following chapter explores the literature on the reasoned action approach and TPB model, the action-inaction asymmetry, and the role of AR within the TPB framework.

Chapter 2 Literature Review

This chapter presents a discussion of the literature most pertinent to the four aims of the thesis. Section 2.1 presents an overview of the reasoned action approach and the way in which action and inaction behaviours have been investigated in TPB research. Section 2.2 covers the action-inaction asymmetry. This section discusses the definition of action and inaction utilised in this thesis, the affirmation-negation asymmetry, and the feature positive effect. Section 2.3 explores the role of anticipated affect within the TPB framework. Section 2.4 concludes this chapter by highlighting several important gaps in the literature that the thesis will address.

2.1 The reasoned action approach

The reasoned action approach refers to the overarching logic of the theory of reasoned action (TRA: Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) and its extension the TPB (Ajzen, 1985, 1991). The TRA and TPB are expectancy-value models used to predict and understand human social behaviour. The TRA was developed under the assumption that most behaviours of interest to social psychologists and marketers are under complete volitional control and that people usually act in accordance with their intentions (Ajzen & Fishbein, 1980). As depicted in Figure 2.1, the TRA stipulates that behaviour is determined by an individual's intention (i.e. motivation) to perform it. Intention is influenced by the individual's attitude toward the behaviour and their subjective norm. Attitude toward the behaviour is the individual's overall evaluation about whether performing or not performing the behaviour will be positive or negative, and subjective norm refers to the social pressure an individual perceives in regard to the behaviour. Attitude toward the behaviour is, in turn, determined by underlying salient behavioural beliefs which are concerned with the outcomes of a behaviour. Subjective norm is determined by salient normative beliefs that refer to perceptions and behaviour of important referents. Background factors such as demographics, personality characteristics, ethnicity, and past experiences are assumed to influence beliefs, but beliefs and background factors are not necessarily connected. The influence of a particular background factor on beliefs is dependent on the behavioural context and sample investigated (Fishbein & Ajzen, 2010).

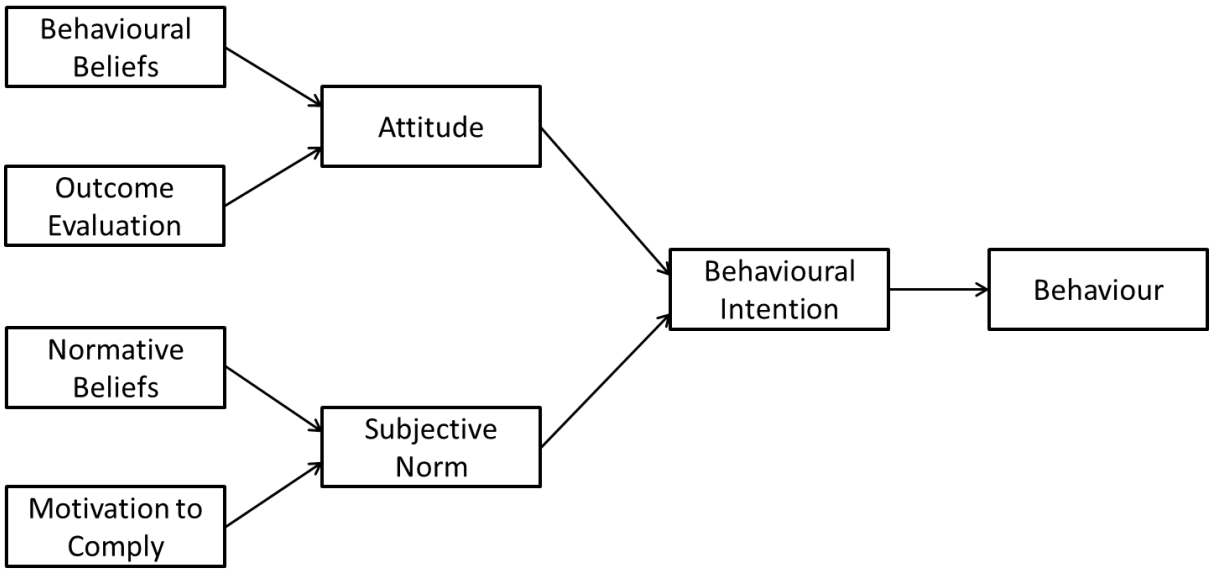

Figure 2.1 - The Theory of Reasoned Action (adapted from Fishbein and Ajzen 1975)

The predictive validity of the TRA has been demonstrated across a range of behavioural contexts under a high degree of volitional control (Sheppard, Hartwick, & Warshaw, 1988). However, reviews show that many studies utilise the TRA to predict behaviours that are not under complete volitional control. This prompted some researchers to criticise the boundary conditions of the model for being too restrictive (Sheppard et al., 1988). Acknowledging that most behaviours are influenced by non-volitional elements to a degree, Ajzen (1985, 1991) proposed the TPB as a means to predict and explain behaviours where the individual has incomplete volitional control over performing the behaviour. Figure 2.2 presents the TPB which incorporates perceived behavioural control (PBC: perceptions about one's ability to perform a given behaviour) as an additional predictor of both intention and behaviour. Perceived behavioural control is itself determined by the individual's salient control beliefs (beliefs about the presence of factors which may facilitate or impede the performance of the behaviour).

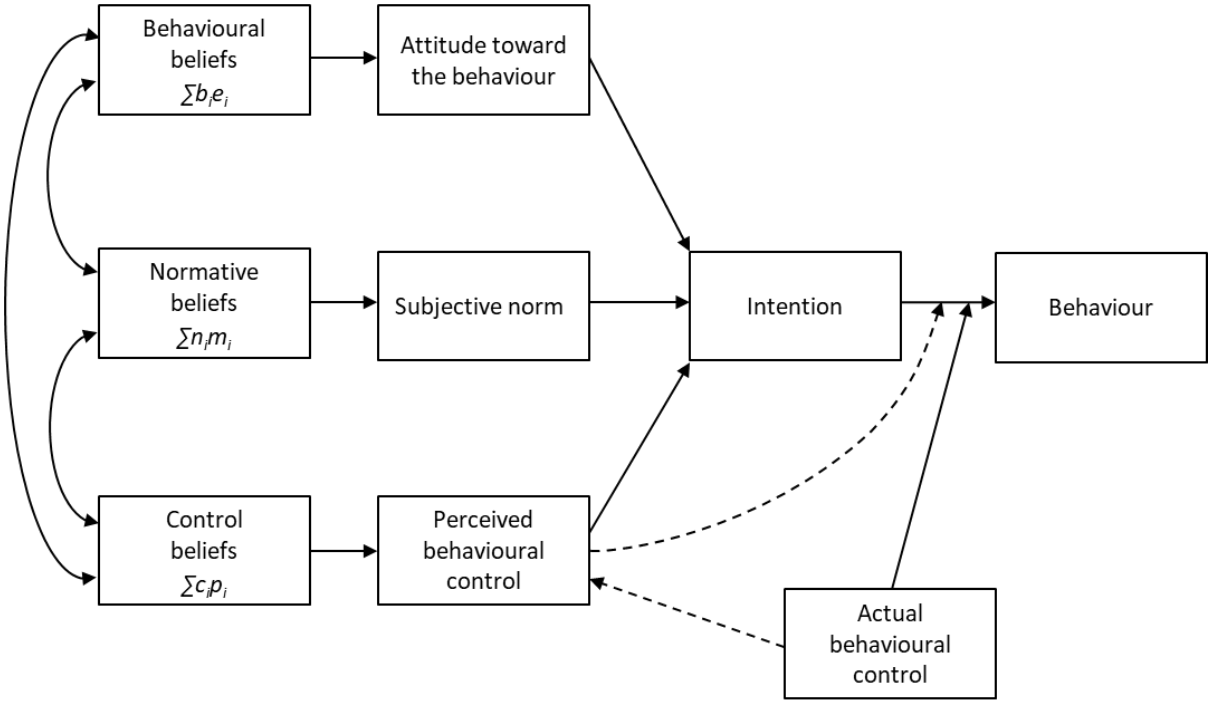

Figure 2.2 - Theory of Planned Behaviour Model (adapted from Ajzen, 2012)

Madden, Scholder, and Ajzen (1992) compared the TRA and TPB models across 10 behavioural contexts with varying levels of perceived behavioural control[1]. On average the TPB was found to explain 11% more variance in intention than the TRA. Further, path analyses showed that the PBC-intention relationship was significant for behaviours with low, medium, and high perceived behavioural control. On average PBC accounted for 10% of the variance in behaviour across the 10 behavioural contexts investigated. When PBC was high little change was found in the variance explained in behaviour across TRA and TPB models. On the other hand, the inclusion of PBC substantially added to the prediction of behaviour for behaviours with low PBC. Several meta-analyses demonstrate that the TPB affords superior prediction of intention and behaviour than the TRA model in many behavioural domains (e.g. Downs & Hausenblas, 2005; Hagger & Chatzisarantis, 2002; Hausenblas, Carron, & Mack, 1997).

[1] In order of increasing perceived volitional control these behaviours include: getting a good night's sleep, going to the shops with a friend, exercising regularly, washing your car, doing laundry, avoiding caffeine, talking to a close friend, renting a videocassette, listening to an album, and taking vitamin supplements.

2.1.1 TPB Model

The TPB has been applied to a wide range of behaviours such as health risk (e.g. binge drinking: Cooke et al., 2007; speeding while driving: Elliott & Thomson, 2010; swimming while under the influence of alcohol: Hamilton & Schmidt, 2014), health protection (e.g. participation in cancer screening: Godin et al., 2001; performing self-examinations: McGilligan, McClenahan, & Adamson, 2009; using sunscreen: White et al., 2008), health promotion (e.g. exercise: Abraham & Sheeran, 2004; fruit and vegetable consumption: Kothe, Mullan, & Butow, 2012), ethical and sustainable consumerism (e.g. purchase of fair trade products: Ozcaglar-Toulouse et al., 2006; recycling: Rhodes et al., 2015; Shaw, Shiu, & Clarke, 2010; organic food: Yadav & Pathak, 2016), and academic behaviours (e.g. academic dishonesty: Beck & Ajzen, 1991; academic performance: Phillips, Abraham, & Bond, 2003) amongst others. Numerous meta-analyses have provided support for the efficacy of the TPB when applied to such varied behavioural domains, reporting that on average attitude, subjective norm, and PBC explain 29-44% of the variance in intention whereas intention and PBC account for 16-35% of the variance in behaviour (Armitage & Conner, 2001a; Godin & Kok, 1996; Hagger & Chatzisarantis, 2002; McEachan et al., 2011; Rivis & Sheeran, 2003; Rivis et al., 2009; Sandberg & Conner, 2008; Schulze & Wittmann, 2003; Paschal Sheeran & Taylor, 1999; Trafimow et al., 2002). In the following sections a discussion of each of the TPB model's constructs is presented.

2.1.1.1 Beliefs

According to the reasoned action approach, beliefs are the psychological foundation for human action. Beliefs are defined as the "subjective probability of a relation between the object of the belief and some other object, value, concept, or attribute" (Fishbein & Ajzen, 1975, p. 131). People are assumed to consider the information they hold about a behaviour and explicitly or implicitly consider the implications of the action before deciding whether or not to perform it. Therefore, behaviour is thought to follow spontaneously and in a reasonable and consistent manner from the beliefs the individual holds about the behaviour (Ajzen & Fishbein, 2000). Beliefs are not assumed to be rational, however, as they may be based on inaccurate or incomplete information.

Fishbein and Ajzen (1975) distinguish between three categories of belief formation including observational, inferential and informational beliefs. Observational descriptive beliefs are formed via direct experience or through the first-hand observation that performing or not performing a behaviour leads to a particular outcome. Observational beliefs relevant to normative referents may occur in two ways. Injunctive normative beliefs are formed when a referent explicitly informs the individual that they should or should not perform a behaviour, whereas descriptive normative beliefs may be formed when the individual witnesses a referent performing or not performing a behaviour. Observational control beliefs are formed when an individual encounters facilitating or impeding factors when attempting to perform or not perform the behaviour themselves. Inferential beliefs are formed through inference processes from information not directly observed or experienced by the individual. Inferential beliefs may be based on existing descriptive beliefs, informational beliefs, or prior inferences (Fishbein & Ajzen, 1975). Bruner (1957) identified two types of inference processes. Firstly, belief formation may occur through the application of previously learned relationships to new situations and experiences. For example, based on the experience of feeling faint after having a blood test in the past, an individual may form the belief that donating blood will make them feel faint. Secondly, beliefs may be formed through formal coding systems. For example, an individual may form the belief that Ribena has a high sugar content based on information that Ribena contains a similar amount of sugar as Coca-Cola, even if they are unaware of the sugar content of either drink. Rather than being viewed as distinctly different bases for belief formation, direct and inferential beliefs are thought to represent two ends of a continuum (Fishbein & Ajzen, 1972). Informational beliefs may be formed when an individual accepts information from an external source such as TV, internet, lectures or books etc. They establish the link that a source has provided information that an object has a particular attribute. Secondary information does not always lead to the formation of an informational belief, however. Instead, descriptive beliefs (i.e. that an object has a particular attribute) are often formed based on the information from an external source (Fishbein & Ajzen, 1975).

Whilst an individual may hold many different beliefs about a behaviour relatively few are readily accessible (salient) at any given time. Readily accessible beliefs are

"activated spontaneously without much cognitive effort in the actual or symbolic presence of the attitude object. This activation may occur below conscious awareness, but accessible beliefs come readily to mind when a person has reason to retrieve them" (Fishbein & Ajzen, 2010, p. 98).

Consistent with this position, readily accessible beliefs have been shown to correlate more highly with independent measures of attitude than beliefs that are not readily accessible (Petkova, Ajzen, & Driver, 1995; van der Pligt & Eiser, 1984)

2.1.1.2 Attitude toward the behaviour

Attitude toward the behaviour is the degree to which an individual positively or negatively values their own performance or non-performance of a behaviour (Ajzen, 2005). Attitude follows directly from the individual's total set of salient behavioural beliefs which link the performance of the behaviour to various outcomes and attributes (Fishbein & Ajzen, 2010). A favourable attitude should result from a positive evaluation of the attributes in regard to performing the behaviour whereas an unfavourable attitude will result from a more negative evaluation of attributes regarding the behaviour (Fishbein & Ajzen, 2010).

As shown in the equation below, an individual's attitude (A) is directly proportional to the summative belief index produced when the strength of each readily accessible belief (b) is weighted by the subjective evaluation (e) of the belief's attribute, and the resulting products are summed over the n readily accessible beliefs (Ajzen, 1991).

$$A \propto \sum_{i=1}^{n} b_i \, e_i$$

Factor analytic studies show that attitude is comprised of two distinct yet related components (Ajzen & Driver, 1991; Mummery & Wankel, 1999). The instrumental component captures the individual's evaluation of the consequences associated with performing the behaviour and is measured using items such as beneficial-harmful. The experiential component taps into the affective experience that is expected to arise whilst performing the behaviour and is assessed with items such as enjoyable-unenjoyable (Fishbein & Ajzen, 2010). Whilst the experiential component captures affect it should be noted that both experiential and instrumental aspects of attitude are evaluative in nature (Fishbein & Ajzen, 2010).

2.1.1.3 Subjective norm

The reasoned action approach ascribes to the view that people's actions are influenced by their social environment. Within the TPB this social influence is captured by subjective norm which is the perceived social pressure encountered in regard to performing or not performing a particular behaviour (Fishbein & Ajzen, 1975). An individual's subjective norm is derived from the readily accessible normative beliefs they hold about the performance or non-performance of the behaviour. Normative beliefs and subjective norms differ in that the former refers to social pressure exerted by specific important referents (e.g. my partner thinks I should perform the behaviour) whereas the latter refers to social pressure from generalised social agents (e.g. most people who are important to me think I should perform the behaviour) (Fishbein & Ajzen, 1975). The TPB assumes that greater perceived pressure to perform the behaviour will lead to a higher intention to perform that behaviour (Fishbein & Ajzen, 2010).

Subjective norm is formulated as shown in the equation below wherein the strength of each normative belief (n) is multiplied by the motivation to comply with the referent (m). The subjective norm (SN) is directly proportional to the aggregated products of the n readily accessible referents.

$$SN \propto \sum_{i=1}^{n} n_i m_i$$

The inclusion of motivation to comply in the equation means that important referents have proportionately greater weight in the prediction of subjective norm than unimportant referents to which the individual has little motivation to comply (Fishbein & Ajzen, 2010).

Subjective norm is comprised of injunctive and descriptive norm sub-components. Injunctive norms capture the individual's perception that important referents think they should or should not perform the behaviour. Descriptive norms are perceptions about whether or not important referents perform or do not perform a particular behaviour themselves. Deutsch and Gerard (1955) distinguished between injunctive and descriptive norms on the basis that they are driven by different motivational systems. Whereas injunctive norms have the potential to motivate behaviour through the possibility of gaining approval or disapproval from important referents, descriptive norms influence behaviour by showing the individual what is acceptable or normal behaviour (Sheeran & Orbell, 1999). Individuals are motivated

to do what they believe others do themselves because it provides “evidence as to what will likely be effective and adaptive action” (Cialdini, Reno, & Kallgren, 1990, p. 1015). Further to this, injunctive and descriptive norms influence intention and behaviour to a different degree for different contexts and populations. For example, a teenager may be motivated to take up smoking because they have seen their parents smoke (descriptive), even though they know that their parents do not ascribe to their smoking (injunctive). On the other hand, an individual may be motivated to donate blood because they perceive their partner would approve (injunctive), even though their partner is not eligible to donate blood (descriptive). Injunctive and descriptive norms, therefore, capture different sources of social influence which may both contribute to the prediction of behavioural intentions. Several studies have evidenced the discriminant and convergent validity of the descriptive and injunctive norm components of subjective norm (Grube, Morgan, & McGree, 1986; Nucifora, Kashima & Gallois, 1993; Paschal Sheeran & Orbell, 1999; White, Terry, & Hogg, 1994).

2.1.1.4 Actual and perceived behavioural control

Actual behavioural control (ABC) refers to the extent to which an individual has the prerequisite resources and abilities necessary to perform a given behaviour. Intention is expected to be a strong predictor of behaviour only in situations where the individual has actual control over the performance of the behaviour. As such, ABC moderates the intention-behaviour relationship (Fishbein & Ajzen, 2010). Because it is rarely possible to identify and measure all internal and external factors which may facilitate or impede the performance of a behaviour, PBC serves as a proxy for ABC in the TPB model. PBC can be used to improve the prediction of behaviour to the extent that PBC is an accurate reflection of ABC (Ajzen, 2002a; Paschal Sheeran, Trafimow, & Armitage, 2003).

PBC refers to the degree to which an individual perceives that they have control over, and are capable of, performing a given behaviour (Fishbein & Ajzen, 2010). PBC is assumed to take into account internal and external factors to the individual that may facilitate or impede their performance of the behaviour, such as availability of information, opportunity, skills, and other requisite resources (Fishbein & Ajzen, 2010). The more an individual believes they have adequate resources and opportunities to perform the behaviour and the fewer the anticipated obstacles, the higher the PBC over performing the behaviour should be (Ajzen, 1991). Where attitudes and subjective norm support the performance of the behaviour, a greater PBC will result in a stronger intention. On the other hand, when PBC is low the

individual may not have a strong intention to perform the behaviour (Fishbein & Ajzen, 2010). Ajzen (2002a) notes that even when PBC is not an accurate representation of ABC it may still influence intention because a high degree of PBC should strengthen the individual's intention and increase their effort and perseverance toward the behaviour. With regard to behaviour, PBC is assumed to moderate the intention-behaviour relation so that intentions are better predictors of behaviour when PBC is higher rather than lower. Ajzen (2012) highlights that few TPB studies have examined the moderating role of PBC on the intention-behaviour relationship. Most often studies that have explored PBC as a moderator report that the interaction between intention and PBC is insignificant or that it adds little or no additional variance in the prediction of behaviour (Ajzen, 1991; Armitage & Conner, 2001a). Instead, studies typically include PBC as a direct predictor of behaviour (Ajzen, 2012). The likelihood that an individual will perform a given behaviour is expected to increase with PBC to the extent that the individual intends to perform it. Where an individual does not intend to perform a behaviour a negative correlation between PBC and behaviour is expected (Ajzen, 2012).

PBC is determined by the set of readily accessible control beliefs held by the individual at a particular time in regard to performing or not performing the behaviour. As shown in the equation below, each control belief (c) is weighted by its respective perceived power (p) to facilitate or inhibit performance of the behaviour. The resulting products are summed across the n readily accessible control beliefs to produce the perception of behavioural control.

$$PBC \propto \sum_{i=1}^{n} c_i p_i$$

In much the same way as attitude and subjective norm are each composed of two components, factor analysis has demonstrated that PBC is also comprised of two components (Hagger & Chatzisarantis, 2005). The capacity component refers to the individual's belief that they are capable of performing the behaviour in addition to their perceptions about how easy or difficult this would be. The autonomy component refers to the degree to which the performance of the behaviour is up to the individual themselves.

2.1.1.5 Intention

Intention is an indicator of an individual's readiness to perform a behaviour (Fishbein & Ajzen, 2010). It captures the motivational factors that influence the performance of the behaviour such as how much effort the individual is willing to exert and how hard they will try to perform it (Ajzen, 1991). The core underlying dimension of intention is the individual's perceived probability of performing the behaviour. In general the stronger the intention to enact the behaviour the more likely it is to be performed (Fishbein & Ajzen, 2010). Performance of the behaviour is dependent on both intention and behavioural control, however, so an intention may not lead to the enactment of the behaviour in circumstances where the individual does not have sufficient control over performing it (Ajzen, 1991).

Intention is the most proximal determinant of behaviour and is, itself, determined by attitude toward the behaviour, subjective norm, and perceived behavioural control. Each predictor of intention is weighted by its relative importance for the particular behavioural context investigated (Fishbein & Ajzen, 2010).

2.1.1.6 Behaviour

The TPB aims to answer the central question of why people perform or do not perform a behaviour of interest (Fishbein & Ajzen, 2010). Fishbein and Ajzen (2010) define behaviour as an observable event which consists of four elements; a target, action, context, and time. A change in any one of the TACT elements represents a change in the behaviour investigated. Therefore the investigation of performing and not performing a behaviour constitute two distinct behaviours within the TPB.

Behaviour may be measured using dichotomies, frequencies, and magnitudes. Dichotomies are measured in terms of whether an individual performed or did not perform a given behaviour, such as donating blood or not donating blood in a given time frame. Magnitude criterion capture the extent to which an individual has engaged with a behaviour (e.g. volume of blood units donated). Frequency criterion can take various forms such as numerical estimates (e.g. 3 blood donations in the last year), verbal scales (never donated to donated many times), or proportions (e.g. 80% of blood donations this year were of whole blood) (Fishbein & Ajzen, 2010). Fishbein and Ajzen (2010) explain that the use of magnitude,

frequency, and proportional criterion presents important challenges to understanding the determinants of a behaviour because different determinants may underpin the performance or non-performance of a behaviour at different levels of these measures. It is not feasible that a researcher can explore the determinants of a behaviour at all levels. Because of this, many studies that specify behaviour using quantities do so in a way that reduces the criterion to a dichotomy. For example, a study investigating charitable donation may specify behaviour as donating more than £50 to a particular charity over the next year. Using dichotomies enables the researcher to explore the most fundamental questions about behavioural choice—why people perform or do not perform the target behaviour.

2.1.1.7 Past behaviour

Past behaviour is one of the most common constructs used to extend the TPB (Fishbein & Ajzen, 2010). Often the relation between past and later behaviour is not fully mediated by the constructs of the TPB (e.g. Ajzen, 1991; Albarracín, Johnson, Fishbein, & Muellerleile, 2001). Past behaviour is not assumed to directly cause the performance (or non-performance) of the behaviour in the future. Rather, the frequency of past behaviour is used as a proxy to capture habit strength. When a behaviour is repeatedly performed in a particular context it is posited to come under the direct control of stimulus cues and therefore bypasses intention and PBC (Ajzen, 2002b). Two explanations may account for the enhanced prediction of behaviour afforded by past behaviour, above that already accounted for by the TPB constructs. Firstly, measures of both behaviour and past behaviour are usually assessed in regard to the number of times the individual has performed the target behaviour in a given time frame (e.g. the last two weeks). In contrast attitudes, subjective norms, and PBC are not typically assessed with a frequency measure. Ajzen (1991) argues that this approach is likely to result in shared method variance between behaviour and past behaviour which is not also shared by the other TPB constructs. The higher compatibility between scales assessing past and subsequent behaviour may result in past behaviour having greater validity than the other TPB constructs in the prediction of behaviour (Ajzen, 2002b). The second explanation is that when an individual attempts to perform a behaviour but finds that it is less beneficial or harder than anticipated they may fall back into their typical pattern of behaviour. This change in intention will result in a poor intention-behaviour relation whereas past behaviour would provide a more accurate prediction of behaviour (Ajzen, 2002b).

The frequency of past behaviour has also been shown to enhance the prediction of intentions over and above that explained by the TPB constructs. A meta-analysis covering a range of behaviours by Sandberg and Conner (2008) found that attitude, subjective norms, and PBC explained 30% of the variance in intention. When entered into the regression model after AR, past behaviour accounted for an additional 6% of the variance in intention. Similar findings were evident in another meta-analysis by Rise, Sheeran, and Hukkelberg (2010) in which the TPB variables explained 31% of the variance in intention and past behaviour explained a further 5%. These findings bring into question the validity of the sufficiency assumption (the assumption that additional factors will not enhance the prediction of intention or behaviour within the TPB (Fishbein & Ajzen, 2010)) by showing that intentions may be determined by variables not included in the TPB model. According to this explanation past behaviour will no longer add to the prediction of intention if the additional determinant is identified and accounted for (Ajzen, 2011). By review of the literature, Ajzen and Fishbein (2010) highlight that the inclusion of anticipated affect and self-identity do not eliminate the effect of past behaviour on intentions. The authors suggest that another unidentified variable may mediate the past behaviour-intention relation. Alternatively the authors contend that past behaviour may instead have a direct unmediated causal effect on intentions.

2.1.2 Action and inaction within the reasoned action approach

2.1.2.1 Choice amongst alternative courses of action

The reasoned action approach is used to predict and understand the performance or non-performance of a specific behaviour (Ajzen, 1991; Fishbein & Ajzen, 1975). It is, however, acknowledged that every behaviour involves a choice amongst alternative courses of action (Jaccard, 1981). This choice may be between multiple qualitatively or quantitatively different alternatives (Ajzen & Fishbein, 1980). For example, when considering how to travel to work an individual may choose between driving their own car, participating in a car-share, or using a taxi, train or bus (qualitative alternatives). On the other hand, they may choose to use a taxi on any number of occasions this week (quantitative alternatives). At its most simple a choice involves the decision to perform or not perform a particular behaviour (Jaccard, 1981), such as to catch the bus to work on Monday or not.

Researchers exploring the attitude-intention and attitude-behaviour relations have examined the utility of simultaneously measuring variables in regard to multiple alternative choices (e.g. Ajzen & Fishbein, 1969; Dabholkar, 1994; Jaccard, 1981; Shepherd, Sparks, Bellier, & Raats, 1991). These studies have often sought to identify the most appropriate methods to examine why individuals decide to perform one behaviour over the others available to them. Attitudes and normative beliefs are shown to afford better prediction of behavioural intention when assessed in regard to multiple behavioural alternatives than with dichotomous alternatives and single criterion (Ajzen & Fishbein, 1969). Similarly, attitudes toward multiple alternatives have been shown to better predict behaviour than attitudes toward a single act (Jaccard, 1981).

The reasoned action approach utilises an across-subjects approach to behavioural prediction. Relative to other respondents in the sample those with more favourable attitudes, subjective norms, and PBC are expected to report a greater intention and, in turn, be more likely to perform the behaviour (Davidson & Morrison, 1983). This approach has been criticised for failing to account for the relative importance of other behavioural alternatives in the decision-making process (van den Putte, Hoogstraten, & Meertens, 1996). For example, an individual with a high intention to run a marathon this weekend would be considered likely to go on and perform the behaviour. The TRA and TPB would not take into account that this individual may possess a higher intention to socialise with friends, despite the individual being more likely to socialise with friends. In an effort to capture the relative importance of behavioural alternatives within the reasoned action approach several studies have explored methods of assessing these alternatives (e.g. Candel & Pennings, 1999; Lin, Chan, & Wei, 2009; Prestholdt, Lane, & Mathews, 1987; Van den Putte et al., 1996). For example, direct rank order scales have been shown to explain greater variance in intention and behavioural prognosis (measured in lieu of behaviour) than indirect rank order scales and standard scales (assessing a single criterion). In turn, both direct and indirect rank order scales tend to better predict intention than standard scales (Van den Putte et al., 1996). Differential measures of attitude and subjective norm have also been found to better describe choice when compared to ratio and dummy measures in a binary choice of two financial trading options (Candel & Pennings, 1999).

Other studies have compared the predictive utility of assessing TRA and TPB constructs using differential measures rather than toward a single behaviour. For example, Prestholdt,

lane and Mathews (1987) examined the use of single and differential scores for the prediction of nurses' choice to remain or resign from the hospital at which they worked. Each construct was measured in regard to both 'remaining on the staff at this hospital' and 'resigning from this hospital'. A differential score for each construct was calculated by subtracting the score for resigning from the score for remaining. The differential model accounted for significantly more variance in intention (65%) than the model in which constructs were assessed in regard to only resigning from the hospital (60%). Compared with standard models of two instant messaging applications, however, the differential model afforded better prediction of intention for only one of the two applications (Lin et al., 2009). Studies that examine the relative importance of behavioural alternatives within the TRA and TPB have focused on identifying which approach offers the greatest prediction of intention and behaviour. It is important to note that the reasoned action approach is concerned not only with behavioural prediction but also with understanding the determinants of behavioural choice. Identifying the relative importance of one behavioural alternative over another provides insight into the decision-making process but does not provide information about the determinants of that choice. Fishbein (1980) argues that to accurately predict and fully understand a behavioural decision, it is often necessary to consider a person's beliefs, attitude, and intention with regard to all of the available alternatives. Studies that adopt this practice have focused on examining the determinants of multiple behavioural alternatives whilst failing to incorporate the decision to not perform each of these behaviours. Therefore, these studies do not take into account all of the main courses of action available to the individual (Bamberg, Ajzen, & Schmidt, 2010; Berg, Jonsson, & Conner, 2000)

Ajzen and Fishbein (1980) argue against the assessment of multiple behavioural alternatives because all behavioural criteria can be reduced to one or more single behaviours. These behaviours consist of a choice between performing and not performing the behaviour (i.e. binary alternatives consisting of action and inaction). When the choice is between two mutually exclusive and exhaustive alternatives capturing intention toward one alternative should be sufficient to predict the individual's choice (Fishbein & Middlestadt, 1987).

2.1.2.2 Conceptual distinction of beliefs for action and inaction

There is a lack of clarity regarding the psychological distinctness of action and inaction within the TPB. On one hand, when a choice is between two mutually exclusive and exhaustive alternative options (such as to perform or not perform a particular behaviour) the

assessment of one alternative may be sufficient to explain the determinants of both action and inaction (Ajzen, 2017; Fishbein, 1980; Fishbein & Middlestadt, 1987). On the other hand, action and inaction consist of different TACT elements and therefore constitute two separate behaviours that may be associated with considerably different accessible beliefs (Ajzen, 2015; Fishbein & Ajzen, 2010). Therefore, in some behavioural contexts the beliefs an individual holds about inaction could be the mirror images of the beliefs they have about action. For such behaviours, it is only necessary to examine the beliefs relating to action or inaction to understand the determinants of both behaviours. When beliefs about action and inaction are not mirror images the assessment of beliefs relating to action cannot be used to understand the determinants of inaction, and beliefs about inaction do not provide an accurate insight into the determinants of action. To establish whether beliefs about action and inaction are conceptually mirrored within a given context and sample it is necessary to conduct a belief-elicitation study for both behavioural alternatives, a practice that is not commonplace in TPB research.

Studies that have explored the beliefs people hold about performing and not performing a target behaviour suggest action and inaction are underpinned by a combination of distinct beliefs and beliefs that are related yet not conceptually mirrored. Chatzidakis et al. (2016) conducted a belief-elicitation study into the reasons people give and do not give to charity. Content and factor analyses identified distinct reasons for action and inaction in regard to charitable giving. Factors that emerged for giving to charity include moral values and donor efficiency, self-enhancement, social rewards and self (ego) protection. Factors for not giving to charity covered the charity's ineffectiveness, denial of donor responsibility/other priorities, restricted giving options, that the individual helps in other ways, and a lack of awareness of charitable needs. Furthermore, the discriminant validity of reasons for giving and not giving to charity was established which shows that beliefs about action and inaction are not always simple opposites of each other. Similarly, Richetin et al. (2011) asked respondents to report a reason for doing and not doing vigorous physical activity in the next 7 days. Reasons reported for not doing vigorous physical activity were not mirrored opposites of the reasons that were reported for doing the behaviour. Instead a largely distinct set of reasons emerged, supporting the notion that different beliefs underpin action and inaction. A limitation of both of these studies is that they elicit the reasons for performing or not performing a behaviour rather than capturing the beliefs people hold about performing or not performing a behaviour.

Evidence that the decision to perform and not perform a behaviour can be motivated by different factors has prompted exploration into the beliefs that underlie action and inaction. Dodge and Jaccard (2008) examined whether behavioural beliefs differ for using and abstaining from illegal performance-enhancing substances, and for using and abstaining from legal performance-enhancing substances. Four separate regression analyses were conducted, each of which regressed attitudes onto the belief items for each behavioural alternative. The results showed that beliefs were largely distinct rather than conceptually opposing for using and abstaining alternatives. A limitation of this study is that it explored behavioural beliefs in regard to performing and not performing the target behaviours but did not investigate normative and control beliefs. Such an exploration is necessary to gain a better understanding of the conceptual nature of beliefs that underpin TPB constructs for performing and not performing a range of behaviours. When Chatzidakis et al. (2016) examined the beliefs which predict attitudes to give and not to give to charity only one common belief was significant for action and inaction. Not donating to charity was explained by different underlying goals and reasons when compared to giving to charity.

Together past studies show that for a number of behavioural contexts, reasons that underpin action and inaction are not simply conceptual opposites of each other. It has also been shown that different behavioural beliefs can inform attitude toward performing and not performing a behaviour. Due to the small number of studies that have compared the underlying reasons and beliefs for action and inaction, it is not possible to ascertain whether such findings will be replicated across the diverse range of behavioural contexts investigated in TPB research.

2.1.2.3 Examining action and inaction within the TRA and TPB

Most applications of the TPB investigate the performance of a single target behaviour such as binge drinking (Cooke et al., 2007; Johnston & White, 2003), donating blood (Giles, McClenahan, Cairns, & Mallet, 2004; Masser, White, Hyde, Terry, & Robinson, 2009), and participating in medical screenings (Frost, Myers, & Newman, 2001; Sheeran & Orbell, 2000). Other research has instead focused on examining the determinants of not performing a behaviour such as not smoking (Godin & Lepage, 1988; Moan, Rise, & Andersen, 2005), abstaining from alcohol (Vézina-Im & Godin, 2011), avoiding sweatshop apparel (Shaw,

Shiu, Hassan, Bekin, & Hogg, 2007), and avoiding driving through flood water (Hamilton, Price, Keech, Peden, & Hagger, 2018). Studies that investigate a single behaviour are often conducted with a complementarity assumption which is the belief that cognitions about performing and not performing a behaviour are conceptual opposites (Sutton, 2004). Sutton (2004) argues that this complementarity assumption may be reasonable for intentions because an individual who reports a high intention to perform a behaviour could reasonably be expected to also report a low intention to not perform the behaviour. It is less plausible that other cognitive constructs are psychologically inverse. Within the TPB the complementarity assumption is not logical for attitudes or PBC. For example, when an individual holds an ambivalent attitude toward blood donation they may evaluate the act of donating blood as positive because doing so will help other people. This does not necessarily mean that the individual will have a negative attitude toward not donating blood. Rather, they may hold a positive attitude toward not donating blood because it would mean they have more time to do other things. It is also feasible that a high PBC over performing a behaviour does not automatically mean an individual has a low PBC over not performing it. For example, an individual may feel that donating blood is largely up to them because they perceive few factors which might prevent them from doing so (e.g. they are eligible, registered, have booked an appointment, and made travel arrangements). This does not mean that the individual would feel that not donating blood is largely beyond their control. Indeed, the individual may have a high PBC over not donating blood because they do not perceive any factors that would inhibit their ability to not donate blood. In regard to subjective norms, the complementarity assumption is more plausible. Descriptive norms are typically measured by asking the respondent whether important referents themselves perform a behaviour. An individual is unlikely to report that important referents both perform and don't perform a target behaviour within a given context. Injunctive norms are usually measured by asking the respondent the degree to which important referents think they should or should not perform a behaviour. As such injunctive norms are an explicit evaluation of opposing options. However, an individual may consider different referents when they think about performing and not performing a target behaviour. This could mean that injunctive norms are not conceptually mirrored for action and inaction.

Due to the complementarity assumption, some researchers make inferences about the factors that influence inaction based on research into factors that influence action. For example, Forward (2010) identified positive beliefs as important determinants of speeding intentions. It was suggested that behaviour change interventions may target these positive

beliefs about speeding in order to prevent speeding. Whilst this may indeed be an effective strategy it fails to take into account that the decision to not speed may be motivated by conceptually distinct beliefs. These positive beliefs about speeding may not, in fact, influence the decision to not speed, or may have a much weaker influence than other beliefs held by the individual in regard to not speeding. As a result, challenging positive beliefs people hold about speeding may not effect change in not speeding related intention and behaviour. Letirand and Delhomme (2005) argue that to enact a change in intention to perform a behaviour it is necessary to change evaluations in regard to performing that behaviour rather than evaluations about not performing it, and vice versa.

The complementarity assumption posits that the measurement of cognitions related to both action and inaction will not provide further information about the determinants of a behaviour than when cognitions about action or inaction are assessed alone (Sutton, 2004). A growing body of literature disputes this view. The discriminant validity of all TPB constructs for performing and not performing a behaviour have been evidenced across a range of contexts (Richetin et al., 2012, 2011). This shows that cognitions regarding action and inaction are not always strictly conceptual opposites. Several studies have also identified that action and inaction can be motivated by different factors, with the relative importance of TPB constructs varying across alternatives (Ajzen & Sheikh, 2013; Dodge & Jaccard, 2008; Middlestadt et al., 2014; Richetin et al., 2011; Richetin et al., 2012). For example, Ajzen and Sheikh (2013: study 1) investigated eating and avoiding fast food. The same questionnaire was used to capture responses in regard to action and inaction with only the behaviour specification different. In the prediction of intention to drink alcohol attitude and subjective norm were significant predictors but PBC was not. Significant predictors of intention to avoid alcohol were attitude and PBC but not subjective norm. The determinants of intention are therefore shown to differ between action and inaction in the same behavioural context. Furthermore, some TPB constructs have been shown to exhibit incremental validity in the prediction of behaviour when assessed in regard to both performing and not performing a behaviour (Richetin et al. 2011: study 1). Together, these studies provide further evidence that action and inaction are not conceptual opposites. However, no previous research has sought to identify the extent to which action and inaction are conceptually mirrored within the TPB framework. This represents an important gap in knowledge because if the complementarity assumption does not hold, inferences made about the motivating factors that influence inaction based on the determinants of action may be faulty and lead to ineffective behaviour change interventions. It would also identify a dearth of understanding on the determinants of

inaction because relatively few studies have used the TPB to understand not performing target behaviours. This thesis addresses this gap by testing the complementarity assumption across 3 behavioural contexts to evaluate the psychological distinctness of action and inaction within the TPB framework.

As previously noted, no known studies have applied the belief-based model to action and inaction within the same study. A small number of studies have, however, utilised the direct measure TPB model to examine both action and inaction within the same study. A curious finding across such studies is that the direct measure TPB model accounts for greater variance in intention when applied to action than to inaction. This finding is evident across a range of behavioural contexts including eating and not eating plenty of meat (R^2 .77 and .70), doing and not doing vigorous physical activity (R^2 .48 and .22) (Richetin et al., 2011), reducing and not reducing resource consumption (reducing study 1: R^2 .51, study 2: R^2 .44, not reducing study 1: R^2 .31; study 2: R^2 .35) (Richetin et al., 2012), continuing to smoke cigarettes and taking measures to not smoke cigarettes (R^2 .38 and .35) (Middlestadt et al., 2014), drinking and avoiding alcohol (R^2 .60 and .31), and eating and avoiding fast food (R^2 .45 and .38) (Ajzen & Sheikh, 2013). Together, these findings suggest that the TPB may operate differently when applied to action and inaction. The following section (1.2) discusses the action-inaction asymmetry in information processing and provides insight into why the TPB may operate differently when applied to action and inaction.

2.2 Action and inaction asymmetry

Section 2.1.2.3 discussed the way in which the direct measure TPB model is shown to afford superior prediction of intention when applied to action than inaction within the same study (i.e. where action and inaction are measured in the same way, with the same materials, and in the same sample: Ajzen & Sheikh, 2013; Dodge & Jaccard, 2008; Middlestadt et al., 2014; Richetin et al., 2011; Richetin et al., 2012). Further research is necessary to examine the possible explanations and boundary conditions of the effect.

Many biases and asymmetries are discussed in the literature showing that action and inaction are psychologically non-equivalent. Action and inaction are governed by different motivational systems (Gray, 1981; Gray, 1987), evaluated from different reference points

(e.g. Heath, Larrick, & Wu, 1999; Kahneman, 1992), performed in pursuit of different goals (e.g. Richetin et al., 2012; Richetin et al., 2011), and have varying degrees of goal orientation (Albarracin, Hepler, & Tannenbaum, 2011). People also exhibit a preference for remaining at the status quo or default position (Ritov & Baron, 1992; Samuelson & Zeckhauser, 1988), and prefer inaction over action when there is a possibility of a negative outcome, even when a negative outcome may be worse as a result of inaction (Ritov & Baron, 1990; Spranca, Minsk, & Baron, 1991). These asymmetries are assumed to constitute background factors within the reasoned action approach and their influence captured in the beliefs people hold about performing and not performing a given behaviour. Discussing these asymmetries is, therefore, beyond the scope of this thesis. There are, however, several asymmetries which may influence action and inaction within the TPB more directly and will be discussed in the following sections. Prior to this, the next section outlines the definition of action and inaction utilised in this thesis.

2.2.1 Defining action and inaction

For over 35 years there has been considerable academic interest in the asymmetric way action and inaction influences judgement and decision-making. Whilst this interest continues to grow the conceptualisation of action and inaction remains poorly defined with many different definitions utilised across research domains (Feldman, Kutscher, & Yay, 2018). In their review of action-inaction biases, Feldman et al. (2018) propose a typology for action and inaction in an effort to bring clarity to this important issue. The authors highlight that action has been conceptualised as deliberately doing something, changing status, deviating from routine, selecting the non-default option, making a decision, the decision or inclination to make a decision, making a timely decision, physical activation, and disinhibition. Inaction has been conceptualised as deliberately doing nothing, not changing status, routine habitual action, selection of the default option, not making a decision, decision avoidance, decision deferral, lack or reduced physical activation, and inhibition.

Within the reasoned action approach behaviours are observable events that consist of four elements: the action performed, target to which the action is directed, context within which the action occurs, and a time during which the action is performed. While not all elements must be specified a behaviour will always include an action element (Fishbein & Ajzen, 2010). The action element may involve performing a behaviour (i.e. action) or not performing

a behaviour (i.e. inaction). Actions are behaviours for which the performance of the behaviour can be observed whereas inactions are behaviours for which it is observed that a given behaviour was not performed.

Table 2.1 presents the definition of action and inaction utilised in the present research based on the factors recommended by Feldman et al. (2018). Both actions and inactions may occur in a deliberate manner and require effort. They may both also occur in an automatic manner that is not deliberate and requires little to no effort. Behaviours will always fit into either the action or inaction category as there is no neutral status.

Table 2.1 - Overview of the definitions of action and inaction utilised in this thesis

Factors	Explanation	Examples
Definition of action	Performing a specified observable behaviour, whether conscious, deliberate, effortful or not	Donating blood in the next two weeks (observed or self-report)
Definition of inaction	Not performing a specified observable behaviour, whether conscious, deliberate, effortful or not	Not donating blood in the next two weeks (observed or self-report)
Neutral status	No neutral status that constitutes a position in which a behaviour is categorised as neither action nor inaction	Individual either performs the behaviour according to the specified TACT elements (action) or does not (inaction)
Variable type	Behaviour	Choice between action (performing the behaviour) or inaction (not performing the behaviour)
Target	Whether or not the individual performs the specified observable behaviour or not	Does the individual's behaviour meet the requirements of action specified in the TACT elements? If yes: action, if no: inaction. Does the individual's behaviour meet the requirements of inaction specified in the TACT elements? If yes: inaction, if no: action.

Actions are perceived to be more intentional and causally related to outcomes than inactions. Individuals who act are also regarded as more morally responsible for their behaviour than those who do not act (Hayashi, 2015; Kordes-de Vaal, 1996; Zeelenberg,

van der Pligt, & de Vries, 2000). This is because actions are most often associated with active behaviours that are performed intentionally and require effort whereas inactions are often perceived to be non-decisions that occur passively (Albarracín, Sunderrajan, & Dai, 2018; Hayashi, 2015). In some behavioural contexts actions are indeed performed intentionally and entail effort whereas inactions occur as a result of a lack of intention and do not require effort. For example, 'performing vigorous physical activity for at least 30 minutes 3 times a week' requires physical effort to perform in addition to mental effort to motivate oneself to engage in the behaviour. On the other hand, 'not performing vigorous physical activity for at least 30 minutes 3 times a week' requires no physical or mental energy and does not require an intention to be formed to not perform the behaviour. Conversely, inactions can also occur deliberately and require effort whereas actions may be performed passively. As such, for some behavioural contexts not performing the behaviour can be more intentional and require greater motor and/or cognitive energy than not performing the behaviour (Feldman et al., 2018). For example, purchasing unhealthy foods may occur automatically while in the supermarket with little effort and a low degree of intention. Refraining from purchasing unhealthy foods may be intentional and involve considerable inhibitory processes which are cognitively demanding.

Unlike action and inaction which are clearly defined in terms of a dichotomy, the degree to which a behaviour is regarded as active or passive is best described as a continuum ranging from highly active to highly inactive (passive) based on the energy expenditure and intentionality involved in its performance or non-performance (Albarracín et al., 2008). Interestingly, within a given context action and inaction may both occur actively or passively or both may fall somewhere in the middle of the continuum. As such, it is not possible to draw a clear distinction between many action-inaction behavioural alternatives in terms of activity or passivity.

2.2.2 Affirmation and negation

The meaning of affirmed information (e.g. using sunscreen will reduce the risk of skin cancer) and negated information (e.g. using sunscreen will not reduce the risk of skin cancer) are encoded and processed differently. Studies using functional neuroimaging have shown that processing negated information increases activation in different regions of the brain than when affirmed information is processed (e.g. Carpenter et al., 1999; Christensen,

2009; Hasegawa et al., 2002). This is attributed to the greater computational demand required to process the complexities of negated information (Carpenter et al., 1999). Two main models of negation processing are discussed in the literature; the schema plus-tag model and the fusion model.

In the schema plus-tag model negations are processed within a schema that refers to the core supposition of a message (Clark & Chase, 1972). Negated terms are processed in two stages where the core message is processed first and is then labelled as a negation. For example, the statement “B is not above A” is represented as the proposition (Not (B above A)). To encode the message it is necessary to process the core supposition (B is above A) and then label it with the negation tag ‘not’ (Hasson & Glucksberg, 2006). The fusion model posits that encoding negation involves the activation of a negation-congruent schema. The core supposition of a message and the negation are processed and stored together in memory as an affirmative statement (Mayo et al., 2004). For example, the statement ‘not eating high-calorie snacks is healthy’ may be encoded as ‘eating high-calorie snacks is unhealthy’. The model is based on the assumption that for every negated term there is an affirmative term that accurately captures its meaning.

2.2.2.1 Differential meaning and levels of ambiguity for affirmations and negations

Affirmations and negations are used to convey different meanings and possess different levels of ambiguity. Affirmation indicates the presence of a particular concept in a given situation (Bianchi, Savardi, Burro, & Torquati, 2011). When processing an affirmed statement there is a clearly specified concept for the individual to consider. Cognitions related to this specific concept are likely to be readily accessible. On the other hand, negations can be used to express two different sentiments. Negations may denote that a given concept is the opposite of another concept. The meaning of the negated item is, therefore, only relevant in the context of the affirmed concept. Because relevant cognitions are anchored on the affirmed information they are likely to provide a clear concept for the individual to focus on when making a judgement or evaluating a decision (Bianchi et al., 2011). If cognitions related to action and inaction are not strictly conceptual opposites the evaluations of inaction may not be entirely accurate. Negations are often used to signify that a given concept does not possess a particular feature, but do not provide information about

the features that the concept does have (Bianchi et al., 2011). Such negations are comparatively ill-defined and unclear because there is no specific concept for the individual to refer to. Instead, cognitions may be accessible that relate to the many potential alternative features the concept could possess.

When examined within the TPB framework both affirmed and negated behaviours are clearly specified by a set of TACT elements. Despite this, affirmed and negated behaviours differ in regard to their ambiguity. Affirmed behaviours clearly specify the target behaviour to which the individual must consider and their associated cognitions will, therefore, be focused on that specific behaviour. Conversely, negated behaviours specify exactly what the individual should think about not doing, but do not inform the individual about what they should think of doing instead. As such, inaction may be more abstract and ambiguous than action. This may mean that when evaluating the decision to not perform a behaviour cognitions related to various other potential courses of action may be considered in the decision-making process. This is less likely to be the case when considering performing the behaviour.

2.2.2.2 Negation and ironic effects

Compared to affirmations, negations are more likely to result in the activation of incongruent concepts (e.g. Gawronski et al., 2008; Mayo et al., 2004). Affirmations tend to be processed effectively because they consist of only one item of information that fully conveys its intended meaning. The schema plus-tag and fusion models are used to process different types of negation (Mayo et al., 2004). The fusion model is the dominant form of processing negations with bipolar attributes because the core supposition is clearly defined and appropriate cognitions are readily activated in response to it. Bipolar concepts have a well-defined opposite schema which is readily accessible and used to interpret the negation. For example ‘not hot’ brings to mind ‘cold’, ‘not rich’ brings to mind ‘poor’, and ‘not tidy’ brings to mind ‘messy’ (Mayo et al., 2004). It is important to note that bipolar attributes are not necessarily antonymic pairs. ‘Not hot’ is likely to elicit thoughts about ‘cold’ yet it could also be interpreted to mean warm. In the same way, ‘not rich’ may spontaneously bring to mind the concept ‘poor’ but could be used to refer to any state of wealth that is not poor, including well-off. MacDonald and Just (1989) theorise that the negation operator serves to inhibit the activation level of the concepts in the core supposition. This means that processing bipolar negations are likely to result in associations that are congruent with the intended meaning of

the negation because people automatically derive the intended meaning from the affirmed statement.

The schema plus-tag model is the dominant form of processing negations with unipolar attributes because it is unclear what the core supposition of the message is and which cognitions should be activated to process the information (Mayo et al., 2004). Concepts with unipolar attributes do not have a clearly defined opposite construct readily available for the individual to utilise in decision-making (e.g. creative/not creative, moral/not moral, efficient/not efficient). This means that concepts with unipolar attributes are more likely to activate associations in relation to the core supposition, and therefore, incongruent to the intended meaning of the negation. For example, when asked to consider not donating blood the association 'donating blood will make me feel faint' may become accessible in memory and is then negated or denied. There are three reasons why processing unipolar negation may cause incongruent concepts to be activated. Firstly, if an individual does not have sufficient cognitive resources to fully encode the core supposition and the negation tag then only the core supposition may be processed effectively. Ineffective processing of the negation tag leads to the stored memory corresponding to the affirmation rather than the negation. Secondly, the core supposition and the negation tag can become dissociated in memory after they are stored accurately. This leads to the memory only referencing the core supposition that is contrary to the meaning of the negated message. Thirdly, the act of considering the core supposition may evoke associations that are congruent with the core supposition before the negation tag is processed. Residual cognitions relating to the incongruent associations may be accessible when the individual thinks about the original message (Mayo et al., 2004).

Some behavioural contexts examined using the reasoned action approach have bipolar attributes. When investigating the differential cognitions underpinning action and inaction, Richetin et al. (2011) investigated breastfeeding versus formula feeding on the basis that the two behaviours are logically equivalent. When considering breastfeeding, cognitions relating to formula feeding are expected to be readily available, and vice versa. Most behaviours investigated within the TPB constitute unipolar concepts because the specific meaning of the core supposition is not readily apparent and there is no clearly defined opposite behaviour to refer to. When considering not performing a behaviour the decision-maker may take into account the possible outcomes of inaction as well as those related to enacting any number

of possible actions, rather than simply its affirmative counterpart. This is because negated behaviours are more ambiguous and less clearly defined concepts than affirmed behaviours. The evaluation of negated behaviours is, therefore, more likely to involve the activation of incongruent beliefs than when evaluating affirmed behaviours.

Affirmation and negation can also have a differential influence on the success of behaviour change interventions. Several studies have shown that automatic stereotype activation can be reduced using non-stereotypic association training. Research by Gawronski et al. (2008) shows that training involving affirmation of positive counter-stereotypes reduced automatic negative evaluations. In contrast, training that involved the negation of negative stereotypes lead to increased activation of automatic negative evaluations. Implementation intentions including negation have also been found to result in ironic effects whereby the situation-response association is strengthened rather than weakened (Adriaanse, Oosten, Ridder, Wit, & Evers, 2011). Wegner (1994) explains that such ironic effects can be explained by the two processes that are involved in suppressing thought. The operating process promotes the intended change by searching for mental information that is consistent with the intended state. The monitoring process tests whether the operating process is required by searching for mental content that is inconsistent with the intended state. When the two processes work effectively together the intended state is achieved. When cognitive capacity is reduced the monitoring process can become more pronounced than the operating process and lead to an enhanced sensitivity to mental content that is incongruent with that intended.

Studies on ironic effects provide insight into the way in which affirmations and negations may be processed differently within the TPB. Performing and not performing a behaviour may possess different degrees of desirability. One alternative may involve effortful disinhibition to suppress desire whereas its counterpart does not. This may result in cognitions about the inhibited behaviour becoming readily accessible in memory. Therefore, when considering performing a behaviour cognitions related to action would be readily accessible and influence the decision. For inactions, cognitions relating to the suppressed behaviour could become readily accessible due to the cognitive effort required to disinhibit the desired behaviour. This would mean that the decision to not perform the behaviour may be influenced by a combination of cognitions relating to both action and inaction.

2.2.2.3 Response latencies and task performance

Negation is associated with longer response latencies and poorer performance in tasks involving sentence completion and verification than affirmation (e.g. Carpenter & Just, 1975; Clark & Chase, 1972; Just & Carpenter, 1971; Trabasso, Rollins, & Shaughnessy, 1971; Wales & Grieve, 1969; Wason, 1961). Such differences in task performance have been attributed to the greater difficulty of processing negated than affirmed information. Using electroencephalographic recordings and event-related-potential methods, Herbert and Kübler (2011) show that the evaluation of the truth-value of negations are a time and cognitively demanding process that cannot be solved automatically. Instead, such evaluations entail conscious processing.

Glenberg et al. (1999) observe that studies exploring the differential processing of affirmation and negation typically utilise materials wherein the negated statements are more ambiguous than their respective affirmative counterparts. The greater ambiguity of negation means they are associated with a greater variety of situations that are taken into account when processing the statement and, therefore, take more time to process. In their study, Glenberg et al. (1999) show that when produced with little context, statements including negation are interpreted as conveying less specific information than affirmed statements. When negations are presented with relevant context they do not take longer to process than affirmations. The importance of contextual factors has also been identified in a study using computer-mouse trajectories to track the time course of cognitive processing for affirmed and negated information. Processing negations within a dialogue results in less abrupt response trajectories and faster response times. On the other hand, when insufficient context is presented with the negation it results in abrupt changes in the unfolding thought processes. Context facilitates negation processing both when it is explicit or when strongly implied (Lüdtke & Kaup, 2006). The provision of context may facilitate the processing of negations in two ways. Firstly, context may provide the decision-maker with a clearer understanding of the meaning of the negated concept or behaviour. This may mean that cognitions are more focused on the intended meaning of the negation and less potential alternative courses of action are taken into account when making the decision. Secondly, providing context may make cognitions related to the negation more salient. This implies that the TPB framework may operate less effectively when applied to predict not performing a behaviour in contexts where people hold fewer readily accessible beliefs about not performing than performing the behaviour. In behavioural contexts where people hold readily accessible beliefs about both

performing and not performing the behaviour, the TPB may operate effectively when applied to both performing and not performing the behaviour.

2.2.2.4 Logical inferences involving affirmation and negation

Making logical inferences is more difficult when based on negated information than affirmed information. People have been shown to be illogically inattentive to negation (Evans & Lynch, 1973). In the Wason (1966) selection task participants are presented with four conditional rules (if p then q, if p then not q, if not p then q, if not p then not q), one at a time. Four cards are presented, each with a number on one side and a letter on the other. The task requires participants to select only the cards that are required to verify or falsify the conditional rule. Wason (1966) gives the example of the conditional rule 'if a card has a vowel on one side, then it has an even number on the other side' accompanied by the cards 'A', 'D', '4', and '7'. Cards 'A and 4' and 'only A' are selected most often; however, Johnson-Laird and Wason (1970) explain that these selections are incorrect. Instead the selection 'A and 7' should be made because when presented together the rule is proven false but otherwise it would appear to be true. The authors argue that this error in processing is explained by a failure to identify the importance of falsification versus verification (i.e. verification bias). A feature of these studies, however, is that logical cases were always presented so that selection of true cases always required matching (where features of cards selected to complete the task are the same as those included in the conditional rule). False cases always required mismatching (where features of cards selected to complete the task are different than those included in the conditional rule).

Evans (1972) utilised a matching task in which participants were instructed to verify or falsify cases of condition rules wherein the presence and absence of negated components were varied. A 4 X 4 matrix of cards depicting one of 4 shapes and one of 4 colours were used in the study. Participants were also given four logical rules one at a time. The task required participants to select and position two cards that either verified or falsified the logic rule in any way possible. An example of the 'if p then not q rule' is 'if there is a red triangle on the left, then there is not a green square on the right'. All responses could be categorised into one of four cases, the truth-truth case (e.g. red triangle on left, yellow cross on right), truth-false (e.g. red triangle on left, green square on right), false truth (e.g. blue circle on left, blue triangle on right), or false-false (e.g. blue circle on left, green square on right). The results highlighted a tendency for people to prefer to construct cases by choosing values that have

the same lexical content as the conditional rule (i.e. to make affirmative components true and negative components false) rather than to alter the values, even when they include negation. This tendency is termed the matching bias (Evans, 1972).

Greater difficulty in making inferences about negations suggests that the belief-based foundations of affirmations may be more sound than those of negations. As discussed in section 2.1.1.1 beliefs about performing and not performing a behaviour may be formed through direct observation of the behaviour, by accepting information provided by an external source, or via inferential processes. Fewer inferential beliefs may be formed in regard to negated behaviours than in regard to affirmed behaviours. Additionally, the inferential beliefs held in regard to a negated behaviour may be more likely to be faulty than those of its affirmed counterpart.

2.2.2.5 Memory recall and accuracy

Negations influence the recall and accuracy of memory. In their study, Cornish and Wason (1970) informed participants that they were tasked with guessing an imaginary object from the clues given. Participants were presented with sixteen clues presented in a random order (8 affirmative and 8 negated) and were required to recall as many of the clues as possible. A significantly greater number of affirmed clues were correctly recalled (177) than negated cues (124). The majority of errors involving negation were in the form of syntax changing clues such as when ‘not dull’ is recalled as ‘bright’ (i.e. where a conversion is made from negative to affirmative information, independent of its meaning). In another study (Howard, 1975) participants were presented with sets of letters and assigned to either a plus or minus condition. Participants in the plus condition were required to decide whether cards belonged to the set whereas participants in the minus condition were to decide whether the cards did not belong to the set. The study showed that participants in the minus condition took longer to respond and produced less accurate responses than participants in the plus condition. Howard (1975) concluded that this is because representing negated information is more difficult than representing affirmative information.

Remembering negated information can lead to negated-related false memories where the individual believes that a negated item actually existed. In their study, Fiedler et al. (1996)

presented participants with a video recording of the interior of a house. Immediately after watching the recording participants were required to answer questions about the presence of objects within the house and the properties of those objects. Some of the objects were present in the recording and others were not. Participants were then required to complete a 20-minute filler task before undertaking the first task again. Participants were highly effective in discriminating between present and non-present objects in the first task, but much less so when the task was repeated. The authors argue that by processing the non-existing object in the first task a transient representation of the object was generated. This transient representation of the object was subsequently activated in the second memory test, thus prompting a false memory. Similar erroneous recall of negated information has also been identified over longer periods of time (Maciuszek and Polczyk, 2017). These studies show that affirmative information is recalled more accurately and result in fewer processing errors than negations. False memories are more likely to be generated for negations than affirmations. These findings suggest that the TPB framework may not operate equivalently when applied to performing and not performing a target behaviour. This is because beliefs about negated behaviours may be more likely to be formed based on associations containing inaccurate information than affirmed behaviours.

2.2.3 The feature positive effect

The feature positive effect refers to a robust characteristic of human and animal discrimination learning where using non-occurrences as the basis for efficient and appropriate information processing is more difficult than when using occurrences (Hearst, 1991). There are several core ways in which the feature positive effect is manifested in information processing. Firstly, associations are learned more readily when they occur between two present stimuli (i.e. ‘if a then b’) than when they occur between an occurrence and non-occurrence (i.e. ‘if a then not b’ or ‘if not a then b’) (Rassin, 2014). This asymmetry in learning associations has been found across a variety of animal species where discrimination problems tend to be solved more quickly and accurately when they are based on the presence of a feature, but slowly and less accurately when they are based on the absence of a feature (e.g. honey bees: Abramson et al., 2013; rats: Crowell & Bernhardt, 1979; Jenkins & Sainsbury, 1969, pigeons: 1970; humans: Newman, Wolff, & Hearst, 1980; monkeys: Pace, McCoy, & Nallan, 1980; Sainsbury & Jenkins, 1967).

Newman et al. (1980) were the first researchers to provide strong evidence for a feature positive effect in human association learning. In the experiments, undergraduate students were presented with a series of cards containing a number of symbols and were asked to guess whether a card was ‘good’ or ‘not good’. Using the feedback provided participants were tasked with identifying the rule that predicted the ‘goodness’ of a card. Results consistently showed that participants were much more able to identify the rule when it was signalled by the presence of a feature than when it was signalled by the absence of the feature. In experiment 6, for example, participants were tasked with predicting the occurrence or non-occurrence of a light based on the features present or absent on a series of cards that were divided into quadrants. Three of the quadrants contained an image (a house, train, and ship) while the fourth was always blank. The presence or absence of the light was indicated via the feature of smoke lines on the image of the ship. Participants were asked to indicate whether the light would illuminate following each card display by pulling either a leaver labelled ‘yes - light’ or ‘no - light’. A poker chip was awarded following each correct response as reinforcement. A strong feature positive effect was identified whereby the mean number of trials required to correctly verbalise the solution (i.e. the presence or absence of smoke is indicative of the light illumination) was 28 for the feature positive group and 85.3 for the feature negative group. Further, seven out of the 8 participants in the feature positive group provided the correct solution by the end of the trial whereas only one out of the 8 participants in the feature negative group did so. Across the 6 experiments with human subjects in Newman et al.’s (1980) study, results suggest that the feature positive effect is broadly generalizable across different feature types (i.e. shapes, letters, and types of image), simultaneous and sequential presentation of stimuli, immediate and delayed feedback, appetitive and aversive reinforcement procedures, large differences in the set of potential irrelevant and common elements that appear on displays, and in various experimental settings.

2.2.3.1 Differential use of information relating to action and inaction

The feature positive effect influences the way in which people notice and use information. Eerland et al. (2012) identified that students tasked with judging a suspect’s guilt after reading a case file and additional information about the crime have been shown to recall present evidence (e.g. ‘fingerprints of the suspect were present on the victim’) more effectively than absent evidence (e.g. ‘fingerprints of the suspect were absent on the victim’). Compared to present information, absent information was used less often to determine a

suspect's guilt and ignored more during decision-making. In another study law students assigned more weight to finding evidence (both incriminating and exonerating) than the failure to secure it even though the absence of evidence is, in some circumstances, as diagnostically useful as the presence of evidence (Eerland & Rassin, 2012). People are also shown to overlook the importance of information indicating the non-occurrence of a predicted outcome in social interaction hypothesis testing exercises (Snyder & Swann, 1978).

2.2.3.2 Processing of additions and deletions

The feature positive effect is also evidenced in the asymmetric processing of additions and deletions in a given environment. Changes in environment that involve deletion are more difficult to detect and quickly respond to than changes involving addition. When a stimuli is added to an environment it often generates a more persistent neural response than when something is omitted, including heightened cognitive activity, increased alertness, and greater arousal (Hearst, 1991). For example, when an object is added to an environment people are often able to identify the specific feature that has been added. In comparison, identifying an object that has been removed from an environment can be much more difficult. People may be aware that something has changed but experience greater difficulty in identifying precisely what that change is (Hearst, 1991). One plausible explanation for this phenomenon is that addition is more predictive of an event than deletion. However, Hearst and Wolff (1989) showed that when addition and deletion were equally predictive of a reward, pigeons consistently performed better on discrimination tasks when the cue for reward was the addition rather than deletion of a stimulus. The feature positive effect for addition and deletion has also been found to occur in human subjects. Miranda et al. (1992) presented children with a series of trials involving pairs of pictures and required them to identify exactly what differed between each pair. Participants were given time to study the first picture of a pair before it was taken away and they were presented with the second picture. The first and second pictures were exactly the same other than that a single item had either been added or removed from the first picture. Results show that significantly more addition trials were solved correctly than deletion trials and that addition trials were also solved significantly faster (Miranda et al., 1992: experiment 1a). A similar effect has been demonstrated in proofreading tasks where people are shown to overlook typographical errors more often when they occur in letters with missing versus added features (e.g. where C is substituted for G but not when G is used instead of C) (Healy, Volbrecht, & Nye, 1983).

2.2.3.3 Self-inferences for active and passive action and inaction

The feature positive effect is evident in the asymmetric self-inferential processes of action and inaction. Bem's self-perception theory (1965, 1972) stipulates that people make inferences about their attitudes and internal states using observations of their own overt behaviour and the situation within which the behaviour occurs. People use this behaviour as a basis for attitudinal inferences when internal cues are ambiguous or weak and when situational constraints are minimal (Fazio, Sherman, & Herr, 1982b). Self-perception theory suggests that actions and inactions (whether active or passive) are equally meaningful when making such inferences. Research by Harvey and Mills (1971) and Zanna (1972) has shown that the decision to not perform a behaviour can influence subsequent related attitudes to be more consistent with that action. Numerous studies contest this view by evidencing that self-inferences are stronger when they are based on action than on inaction. Fazio et al. (1982b) examined whether freely chosen behaviours are used more when making attitudinal inferences than freely chosen non-behaviours. In their experiment participants were required to rate a series of cartoons as very funny or very unfunny. Participants had rated all cartoons in the series as neutral on a previous occasion. In one condition participants were to indicate that the cartoon was very funny by pressing a button (i.e. an active behavioural response) and to indicate that the cartoon was very unfunny by not pressing the button (i.e. an absence of a behavioural response). In the other condition, participants were required to signal unfunny cartoons by pressing the button and funny cartoons by not pressing the button. More extreme attitudes were inferred following the active behavioural response than the absence of an overt response. Therefore, whilst active and passive behavioural responses were equally informative for the inference of attitude people inferred less from inaction than actions. In a similar vein, Allison and Messick (1988) examined the influence of self-inferences on subsequent attitudes in a sample of university students. One group of respondents were required to indicate their opinion about increased student enrolment by darkening a box whereas the other group were asked to signal their agreement by doing nothing. Students who actively showed their opinion held stronger attitudes than those that signalled their opinion passively. Furthermore, active responders believed that a greater portion of their peers shared their view than passive responders did.

2.2.3.4 Self-inference and commitment

The asymmetric nature of self-inference for action and inaction has important implications for subsequent commitment toward performing or not performing a target behaviour. Cioffi and Garner (1996: experiment 2) asked respondents to indicate their willingness to volunteer two hours of their time to an AIDS awareness project. Several days later a subset of the study population were asked to pick up materials and fill out a form. Students who actively agreed to volunteer expressed greater willingness to volunteer, were more certain of their decision, and endorsed more reasons for volunteering than those who passively indicated their agreement to volunteer. Participants who actively indicated their unwillingness were more unwilling to volunteer than those who passively signalled their choice, but no differences were found between groups in regard to decision certainty or number of endorsed reasons. Of the participants required to pick up materials, 74% had indicated their decision to volunteer actively. Therefore, actively indicating an intention led to greater commitment and intention-congruent behaviour than passively indicating intention. In another study hotel guests who made a specific commitment to practice sustainable behaviour and received a pin to symbolise that commitment exhibited significantly greater eco-friendly behaviour than guests that did not make a specific commitment and receive such a symbol (Baca-motes, Brown, Keenan, & Nelson, 2013).

2.2.3.5 Explanations for the feature positive effect

Most research into the feature positive effect is concerned with examining the phenomena rather than exploring the psychological mechanisms that may explain its occurrence. Because of this the phenomena is not well understood (Lotz, Uengoer, Koenig, Pearce, & Lachnit, 2012). Several potential explanations have emerged in the literature, however. One explanation is that the feature positive effect occurs due to resource limitation (Fiedler, Eckert, & Poysiak, 1989). To identify a present stimulus the individual must simply recognise that it is present in a given environment. The nature of the stimulus is readily apparent to the individual to refer to which aids recognition. In contrast, identification of an absent stimulus is a much more cognitively demanding task because the individual must recall the stimulus from memory from a potentially vast number of other stimuli in order to determine that it is not present in the current environment. Additionally, the nature of an absent feature is not readily apparent to the individual and so its attributes must be inferred using abstract knowledge about the kind of attributes that might have been present but are now not

(Rassin, 2014). An alternative explanation purports that people will consider present stimuli more readily than absent stimuli simply because they are more familiar with associations between present stimuli than between present and absent stimuli (Lotz et al., 2012). Similarly, the effect has been attributed to people being more familiar with positive causation where one event causes another than negative causation where a non-occurrence is the cause of an event (Wolff, Barbey, & Hausknecht, 2010).

The most widely accepted explanation for the feature positive effect is that occurrences are more salient than non-occurrences (Hearst, 1991; Hearst & Wolff, 1989; Newman et al., 1980). Actions tend to be clear, concrete concepts with readily available cognitions whereas inactions are more likely to be less salient and cognitively available. Because of this, negated information may be perceived as less relevant to the object or behaviour it refers to and is therefore underutilised during information processing. Dickinson and Burke (1996) argue that the absence of a stimulus is only relevant when an individual comes to expect it to be present in a particular context. This expectation is established when two stimuli are initially experienced together in a given context and create an interstimulus relation. For example, if stimuli A and B are encountered separately in a given context the individual is not likely to notice that B is absent when A is present alone in a similar context. In contrast, if A and B were initially paired but later A is present and B is not, the individual is likely to notice because one aspect of the expected pair of stimuli is noticeably absent. Building upon this assumption, Beckmann and Young (2007) sought to establish whether differential salience of presence and absence is responsible for the feature positive effect. The study hypothesised that weakening the interstimulus relation between the feature and common elements would result in the feature negative task (which depends on the absence of a stimulus being noticeable) becoming more difficult whereas the feature positive task would be unaffected. Contrary to expectation, participants were shown to consistently perform better on the feature negative tasks than the feature positive tasks. Rather than identify that the absence of a feature is predictive of an outcome of interest, participants instead used the presence of an abstract novel feature as the predictor. As such, participants completed the feature negative task as a feature positive task because the novel feature was more salient than the common feature it was paired with. The authors explain that this result can be attributed to the tendency people have to not effectively utilise absent stimuli when learning unless the absent stimuli is made highly salient. The findings of this study are consistent with the novel pop-out effect where people are found to attend to novel stimuli more readily than familiar ones because novel stimuli are more salient (Johnston, Hawley, Plewe, Elliott, &

Dewitt, 1990). In further support for the differential salience explanation, Rassin (2014) found that the feature positive effect is weakened when participants are alerted to the possibility that the solution to a problem may lie in the absence rather than presence of a stimuli. Furthermore, Astley et al. (2015) observe that the feature positive effect occurs in computer game tasks when participants are required to discriminate between an outcome and no outcome, but not when they are to discriminate between one outcome and another.

2.2.4 The action-inaction asymmetry within the TPB framework

It has previously been discussed that the direct measure TPB model is shown to explain greater variance in intention when applied to action than to inaction (Ajzen & Sheikh, 2013; Middlestadt et al., 2014; Richetin et al., 2011; Richetin et al., 2012). Literature on the action-inaction asymmetry suggests that this pattern of prediction may be due to the differential salience of action and inaction . The TPB may, therefore, be expected to operate more effectively when applied to action when cognitions about action are relatively more accessible than those about inaction (e.g. Rassin, 2014; Glenberg et al. 1999; Beckmann & Young, 2007). However, the TPB may operate equivalently or more effectively when applied to inaction when cognitions about inaction are more accessible in memory than those about action. Establishing whether the belief-based and direct measure TPB models operate differently when applied to action and inaction constitutes an important advancement in our understanding of the decision-making process within the TPB framework. In particular, understanding why people do not perform a behaviour is as important as understanding why they do perform it (Michaelidou & Hassan, 2014). It is, therefore, necessary to verify that the belief-based and direct measure TPB models operate effectively when applied to inaction. The research presented in this thesis addresses this gap in knowledge by exploring whether the belief-based and direct measure TPB models operate differently when applied to action and inaction.

2.3 TPB and anticipated regret

AR is one of the most frequent extensions to the TPB and is shown to enhance the prediction of intention across many contexts (see Sandberg & Conner, 2008 for a review). Debate is ongoing about the role of anticipated affect within the TPB, most notably in regard to whether AR significantly adds to the prediction of intention when measured compatibly with the standard TPB constructs (e.g. Ajzen & Sheikh, 2013; Sandberg et al., 2016). Recent research has also shown that the influence of AR on intention to perform a behaviour varies as a function of whether the action is an immediate hedonic (performed mainly for immediate gratification but may be detrimental in the future) or distal benefit behaviour (performed in pursuit of possible valued positive outcomes in the future but may be unattractive in the short term) (Sandberg & Conner, 2008). This section discusses the influence of affect on decision-making, the concepts of regret and AR, and AR within the TPB framework.

2.3.1 Affect and decision-making

The TPB's sufficiency assumption stipulates that a sufficient model includes measures of all important determinants of the behaviour investigated and thus accounts for all non-error variance in the behaviour (Ajzen, 1991). This means that attitude, subjective norm, and PBC should predict intention whereas intention and PBC should predict behaviour. All other influences on intention and behaviour are assumed to be mediated through the components of the TPB (Ajzen, 1991). Inclusion of additional variables should not enhance the prediction of either intention or behaviour (Fishbein & Ajzen, 2010). Random error occurs even when well-constructed measures are used which exhibit convergent and discriminant validity, are reliable, and adhere to the principle of compatibility. Due to this random error reliabilities rarely exceed .8 whereas the predictive validity of the model is assumed to not exceed 50-65% of the variance in intention and 30-40% of the variance in behaviour (Ajzen, 2011; Fishbein & Ajzen, 2010). The lower predictive limit postulated for behaviour takes into account random error, that intentions may change prior to the opportunity to enact the behaviour, and that factors beyond the individual's control may prevent them from performing it (Ajzen, 2011).

The sufficiency of the TPB has been questioned by researchers who argue that the reasoned action approach is overly focused on cognitive factors and fails to adequately

capture affective influences in the decision-making process. In their recent review Lerner, Li, Valdesolo, and Kassam (2015, p. 816) state:

"Emotions constitute potent, pervasive, predictable, sometimes harmful and sometimes beneficial drivers of decision making. Across different types of decisions, important regularities appear in the underlying mechanisms through which emotions influence judgment and choice."

Loewenstein and Lerner (2003) distinguish between two types of emotion. The first type are immediate emotions that are evoked at the time the decision is made. The second type are expected emotions (often referred to as anticipated affect or anticipated affective reactions) which are expectancies about the emotion that may be encountered in the future should a particular choice alternative be selected. Within the TPB generalised moods (emotions without a defined object of reference such as happiness or sadness) and specific emotions (e.g. anger or pride) are assumed to exert an indirect influence on intention and behaviour through beliefs. Behavioural beliefs are purported to capture the influence of affect on evaluations about the favourability and likelihood of outcomes of a choice option (Fishbein & Ajzen, 2010). Emotions may also influence the normative referents which are salient at a given time as well as the motivation to comply with these referents. In a similar manner, emotional states may influence which control factors are readily accessible in memory and the individual's perceptions about the degree to which they have adequate capacity and autonomy to perform a particular choice option. The influence of immediate emotions on beliefs are not expected to be consistent over time (Fishbein & Ajzen, 2010).

In all rational choice situations individuals make predictions about the likely consequences of the options available to them (March, 1978). These predictions include anticipated affective reactions which inform the individual about the likelihood that a choice option will result in positive or negative affect. By taking these anticipated affective reactions into account when making a decision the individual can maximise the affective outcome by selecting the option which minimises the possibility of experiencing post-behavioural negative affect (Zeelenberg, 1999). Anticipated affective reactions is a broad term used to encapsulate a range of different anticipated emotional consequences of a choice such as guilt, disappointment, regret, excitement, and elation, amongst many others. The precise nature of anticipated

affective reactions varies between studies depending on the items used to assess the construct. For example, some studies assess anticipated affective reactions in regard to both positive and negative affect, whereas others focus solely on emotions of one or the other valence. There are also between-study differences in the specific emotions included in measures of anticipated affective reactions. Emotions, including those of the same valence, can be distinguished in regard to their accompanying thoughts, feelings, appraisals, physiological reaction, expression, action tendencies, and behavioural actions (Frijda, Kuipers, & ter Schure, 1989; Roseman, Wiest, 1994). Because of this several authors emphasise the need to investigate specific and clearly defined emotions in attitude and decision-making research (van der Plight, Zeelenberg, van Dijk, de Vries, & Richard, 1998; Zeelenberg, van Dijk, & Manstead, 1998).

2.3.2 Regret

Regret is the emotion which has received the greatest attention from decision theorists (Connolly & Zeelenberg, 2002) and AR is one of the most common additional variables included in TPB studies. According to Zeelenberg and Pieters (2007, p. 3):

"Regret is the emotion that we experience when realizing or imagining that our current situation would have been better, if only we had decided differently. It is a backward looking emo- tion signaling an unfavorable evaluation of a decision. It is an unpleasant feeling, coupled with a clear sense of self- blame concerning its causes and strong wishes to undo the current situation"

Regret has been referred to as an “unusually cognitively-laden or cognitively-determined emotion” that is “more than a simple appraisal or judgment; it is typically loaded with *feeling* and therefore qualifies as a true emotion” (Gilovich & Medvec, 1995, p. 379). This cognition is a type of counterfactual thinking whereby people compare non-factual mental representations of alternatives to past actions or situations. Counterfactual thought is evaluative in nature and signals whether an actual situation is better or worse than other potential outcomes (Kahneman & Tversky, 1982b). Upward counterfactuals describe alternatives that are better than the actual outcome and tend to induce negative emotion,

whereas downward counterfactuals are those in which alternatives are worse than the actual outcome and typically induce positive emotions (Markman, Gavanski, Sherman, & McMullen, 1993). Counterfactual thinking influences decision-making by enabling people to understand past outcomes and use this information to prepare for the future (Byrne, 2016).

Regret is distinct from other emotions in terms of its antecedents, appraisal patterns and phenomenology (Zeelenberg, Van Dijk, Manstead, & Van Der Pligt, 2000). Self-blame is an important distinguishing factor between regret and other emotions (Inman & Zeelenberg, 2002; Pieters & Zeelenberg, 2005; Zeelenberg, Van Dijk, Manstead, & Van Der Pligt, 1998; Zeelenberg, Van Dijk, et al., 2000) as regret is the only negative emotion that cannot be experienced without personal choice. In all other aversive emotions such as shame, disappointment, fear, or anger, personal agency is either undetermined or attributed to another agent (Zeelenberg & Pieters, 2007). Regret is also associated with appraisals of self-agency and control potential (i.e. the belief that one can do something about the event) (Van Dijk et al. 1998 in Zeelenberg et al. 2000). In regard to phenomenology, regret is related to action tendencies such as feeling the need to kick oneself and the need to correct the mistake. Regret is experienced as a feeling that one should have known better in addition to emotivational goals such as wanting to undo the event and have a second chance (Zeelenberg, Van Dijk, et al., 2000).

2.3.2.1 The action and inaction asymmetry on regret

A recurrent finding in early regret research is that people experience greater regret over negative outcomes that have resulted from action (commissions) than for equally negative outcomes that result from inaction (omissions). Evidence for this pattern of regret is seen across cultures (e.g. Chen, Tam, & Lau, 2006; Komiya, Watabe, Miyamoto, & Kasumi, 2013) and has been replicated in numerous studies (Baron & Ritov, 1994; Gleicher et al., 1990; Kahneman & Tversky, 1982b; Landman, 1987; N'gbala & Branscombe, 1997; Ritov & Baron, 1995). Indeed, Gilovich and Medvec (1995, p. 380) referred to this action-effect as "perhaps the clearest and most frequently replicated finding in the entire literature on counterfactual thinking". The action-effect is rooted in norm theory, a theoretical framework which posits that affective responses to an outcome are influenced by the perceived normality of the outcome (Kahneman & Tversky, 1982a). Actions (such as exchanging a lottery ticket one already has for another ticket) are viewed as abnormal when there are no strong reasons to

act. Inactions (retaining the original lottery ticket one bought) are viewed as normal unless there are important reasons to act. According to norm theory alternatives to abnormal outcomes have greater mutability (i.e. are easier to mentally revise by thinking about possible alternatives) and are more salient than normal outcomes which means that abnormal outcomes lead to greater counterfactual thinking and, in turn, regret (Kahneman & Miller, 1986).

Feldman and Albarracin (2017) observe that norm theory does not discuss the way in which normality differs between action and inaction. In response to this the authors propose three types of normality which may influence the action-effect. These include the degree to which the behaviour is similar to past behaviour; the extent to which the behaviour is expected or typical; and how far the behaviour resembles or conforms to that of important others. The action-effect is expected when these types of normality are to not act whereas the action-effect is expected to be weakened or reversed when the normality types are in regard to action. In support of these assumptions the action-effect was replicated in 3 experiments (experiments 1, 2 and 4) where control groups perceived greater regret for action when inaction was regarded as the social norm. When social norms were for action, however, the action-effect was weakened (experiments 1 and 4) or reversed (experiments 2 and 3). This reversal of the action-effect is termed the inaction-effect (Zeelenberg, van den Bos, van Dijk, & Pieters, 2002).

Regret is a functional emotion which serves to inform the individual about whether a decision was good or bad. The experience of a negative prior outcome can prompt a tendency to act in an effort to reduce further failure, thus making action more normal than inaction. In such situations the inaction-effect is expected whereby inaction invokes greater regret than taking action (i.e. after experiencing a negative outcome a decision to not take action that results in further losses is expected to result in a more intense feeling of regret than if the individual had taken action to prevented further losses but failed). In their study, Zeelenberg et al. (2002) observe that the action-effect was evident when past outcomes were positive or unknown whereas an inaction-effect occurred when prior outcomes were negative. Responsibility was also shown to mediate the past outcome-regret relationship. The authors explain that because prior negative outcomes make action more normal and justifiable people feel more responsible for negative outcomes that stem from inaction than for equally

negative outcomes which are the result of action. This greater perceived responsibility over inaction results in a more intense experience of regret than if they had not acted.

The temporal pattern of regret has been shown to change over time. A consistent finding in the literature is that inaction regrets are more prevalent in the long-term than action regrets (Gilovich & Medvec, 1994; Gilovich, Wang, Regan, & Nishina, 2003; Hattiangadi, Medvec, & Gilovich, 1995; Morrison & Roese, 2011). Conflicting results have instead been found for the pattern of short-term regrets. Some researchers have evidenced greater regret for action in the short-term than for inaction (e.g. Gilovich & Medvec, 1994, 1995; Savitsky, Husted Medvec, & Gilovich, 1997), whereas a growing body of literature supports the view that people regret actions and inactions to a similar extent in the short-term (Morrison & Roese, 2011).

Gilovich and Medvec (1995) propose three types of psychological process which cause inactions to be regretted more than actions in the long run. Firstly they argue that several factors work to reduce the discomfort of regrettable actions more than the discomfort of inactions. These include more compensatory steps taken to ameliorate action, the consideration of more 'silver linings' for regrettable action, and greater dissonance reduction is induced for action regret. Several factors also serve to increase the experience of regrettable inactions more than regrettable actions over time. Regrettable inactions lead to greater retrospective confidence that earlier failures to act were inexplicable and inexcusable. Failures seem increasingly inexplicable in time because the reasons for inaction become less salient than those related to action. The consequences of regrettable actions also tend to be finite whereas those of inaction are psychologically infinite. Finally, Gilovich and Medvec (1995) purport that the Zeigarnik effect makes regrettable failures to act more memorable and enduring than regrettable actions. The Zeigarnik effect contends that incomplete events (of which inaction is a form) are thought about more often than complete events which cause them to be superior in memory (Zeigarnik, 1967). Using timed responses and reaction times, Rajagopal et al. (2006) found no significant differences in the accessibility of actions and inactions in the short-term, however, inactions were more accessible in the long-term. The accessibility of actions were found to decrease over time whereas the accessibility of inactions increased. This pattern of accessibility is explained through the increase in breadth (number of different life areas affected by action or inaction) and depth (number of outcomes attributed to action and inaction) of inaction over time, but

not for action. Furthermore, inactions were shown to be thought about more frequently than actions in both the long and short-term. These findings lend support for the explanations provided by Gilovich and Medvec (1995).

Considering the temporal pattern of regret from a different perspective, Kahneman (1995, p. 391) argues that short and long-term regrets constitute two distinct types of regret. Hot regret is the direct emotional reaction to an outcome experienced in the short-term whereas wistful regret is the less intense feeling of "pleasantly sad fantasies of what might have been" experienced in the long-term. In support of this distinction an examination of the emotional profile of action and inaction regrets evidenced that action regrets do indeed mainly elicit hot emotions such as anger. However, inaction regrets were found to elicit both hot and wistful feelings such as nostalgia and misery (Gilovich, Medvec, & Kahneman, 1998). Further, for some situations inaction regret is shown to elicit more hot regret than actions (Zeelenberg et al., 2002).

2.3.3 Anticipated regret

Research into decision-making and judgement has tended to focus on AR because it takes into account the evaluation of one's own decisions in a given choice situation (Loewenstein, Hsee, Weber, & Welch, 2001). A meta-analysis of health behaviours has shown that AR is generally a stronger predictor of intentions and behaviour than other anticipated negative emotions and risk appraisals (Brewer, DeFrank, & Gilkey, 2016).

Several studies have demonstrated that more justified decisions result in less regret than when suboptimal outcomes result from a less justified choice (Zeelenberg, 1999). In some situations there is no clearly superior option, such as when alternative options are of a similar utility, when there are many alternatives, when the decision-maker has no explicit knowledge of the probabilities and outcomes of the available options, and when the decision involves a trade-off between important attributes (Zeelenberg, 1999). Trade-offs are particularly difficult when they involve approach-avoidance conflict (i.e. when options possess both a desired and undesired attribute) and this conflict is intensified as the trade-off becomes larger due to the increase in relative positive and negative attributes involved (Chatterjee & Heath, 1996). In such situations the decision-maker will likely spend more time

weighing up their decision and take greater account of AR. With less justification for choosing one alternative over another, a suboptimal outcome is more likely to be considered a bad decision which, in turn, results in greater regret (Zeelenberg, 1999).

Greater AR occurs when the outcome of a decision is available soon after a decision than when the outcome will not be known until a later time (Chen, Modzelewski, Nussaum, Lehn, & Valeti, 2013). Research into intertemporal choice shows that people tend to base their decisions on expected proximal outcomes whilst more distal outcomes are often discounted (Loewenstein, 1992; Roelofsma, 1996). People tend to have a preference for current over delayed rewards of a similar magnitude. For example, a monetary gain of £15 today is favoured over a £15 gain next year even though the value of the total gain is the same. In their experiment, Thaler (1981) informed participants that they had won money in a lottery which could either be accepted now or at a given time in the future. When asked how much money they would require to make waiting as attractive as taking the money now, respondents reported considerably higher values for future payments. For example, a $1200 prize was valued as equal to $1500 in 6 months, $2400 in 1 year, and $5000 in 5 years' time. A commonly held view is that people can accurately anticipate the affect they will experience in response to outcomes in the future but are unwilling or unable to assign an appropriate weight to this knowledge in the decision-making process (e.g. Ainslie & Haslam, 1992; Berns, Laibson, & Loewenstein, 2007; Soman et al., 2005). Studies using neuroimaging have instead suggested that time discounting may be explained by the differential activation of two separate systems which control decision-making. The limbic system promotes impatience and a focus on immediate rewards whereas the prefrontal cortex and its associated structures govern the consideration of trade-offs between different potential rewards in the future (McClure, 2004). Consistent with these findings, Kassam et al. (2008) argue that people experience future anhedonia—the expectation that an outcome in the future will lead to less intense affect than the same outcome in the present. Their studies show that people predicted that a monetary gain would lead to more positive affect when it occurred in the present than at a later time.

Decision importance is concerned with how significant an outcome of a decision may be to the individual. A decision is regarded as important when it is concerned with the values or identity of the decision-maker or when it has the potential to make a relatively high impact on their own or other people's lives (Krijnen, Zeelenberg, & Breugelmans, 2015). A decision

may also be regarded as important when the decision-maker believes their choice or the decision process must be justified (Chaiken, Fee Iii, & John, 1980; Hagafors & Brehmer, 1983). Important decisions have been shown to be deferred more often than unimportant ones as they involve greater time and effort to deliberate the available alternatives (Krijnen et al., 2015). Greater AR is likely to occur for important than unimportant decisions because a negative outcome resulting from a suboptimal decision will lead to more intense regret. Zeelenberg (1999) argues that greater AR will occur when a decision is irreversible or when changing the decision will be difficult due to social forces. As such, when an important referent expects the decision maker to pursue a particular decision they may feel unable to then change that decision in the future. This inability to change the decision would then evoke greater AR.

A further condition in which AR may be experienced is when new information concerning potential gains and losses can be obtained after a decision is made. Post-decisional feedback in regard to the outcomes of rejected options is central to the experience of regret (Pieters & Zeelenberg, 2007). Feedback provides a means within which selected and unselected outcomes can be compared. When feedback about a decision is not expected to be known regret is unlikely to play a significant role in the decision process (Zeelenberg, 1999). AR requires the decision-maker to compare the possible outcomes of each option available. Ritov (1996) explains that it is more likely that this comparison process will occur when people expect to learn the outcome of the unselected options because it makes the possibility of post-decisional regret salient. This is evident in a study by Simonson (1992) in which consumers were more likely to select a product that reduced the possibility of regret over a potentially better, but risker product when asked to consider the regret they may experience after making the wrong decision. Furthermore, in the context of gambling choice people have been shown to select options which minimise their exposure to feedback about unselected options in gain and loss contexts both when this involves selecting a safer or a more risky option (Zeelenberg, Beattie, van der Pligt, & de Vries, 1996).

2.3.4 Anticipated affect and the TPB

Within the reasoned action approach expectations about the likely emotional consequences of performing or not performing a behaviour are types of behavioural beliefs (Fishbein & Ajzen, 2010). Readily accessible beliefs relevant to anticipated affective outcomes are assumed to be elicited by the standard belief-elicitation questions which require respondents to list the advantages and disadvantages of performing the behaviour. Anticipated affective outcomes, therefore, contribute to the formation of attitude toward the behaviour (Ajzen, 2011). Several researchers have questioned the belief-elicitation procedure set forth by Fishbein and Ajzen (1980) arguing that they lead to the elicitation of an excessively instrumental belief set that does not adequately take into account important affective consequences (e.g. Conner & Armitage, 1998; Wolff, Nordin, Brun, Berglund, & Kvale, 2011). These affective consequences are postulated to be more difficult to articulate than cognitive consequences (Sparks, 1994). In response to this criticism, Ajzen (2011) highlights that the reasoned action approach does not stipulate that behavioural beliefs are captured only in regard to the advantages and disadvantages of performing a behaviour. Rather, other questions may be used to tap into experiential beliefs. For example, Ajzen and Driver (1991) required respondents to list the benefits and costs of a number of leisure activities as well as what they liked or disliked about each activity. Instrumental beliefs were found to better predict an instrumental attitude measure than an experiential attitude measure, whereas the inverse was found for experiential beliefs. Both types of attitude independently contributed to the prediction of intentions. However, the separate measures did not result in a significant improvement in the prediction of intentions. The overall attitude measure produced a multiple correlation of .85 compared to .86 for experiential and instrumental measures. These findings do not adequately address concerns that the reasoned action approach is focused on cognitive rather than affective outcomes. This is because the TPB assumes that measuring experiential beliefs will capture not only the affect that is expected to arise whilst performing the behaviour (experiential beliefs) but also the post-behavioural affective outcomes associated with performing the behaviour (anticipated affective beliefs).

Several studies show that anticipated affective reactions and attitude are distinct concepts (Richard, Pligt, & Vries, 1995; Richard et al., 1996). Conner et al. (2013) explain that research into anticipated affective reactions tends to focus on self-conscious negative emotions (e.g. regret, guilt) which are expected to arise from not performing the behaviour. On the other hand, affective (experiential) attitudes tend to focus on hedonic positive emotions (e.g. enjoyment, excitement) that arise whilst performing the behaviour. In their

study an examination of the factor structure of cognitive (instrumental) attitude, affective attitude, anticipated positive affective reactions, and anticipated negative affective reactions were shown to exhibit discriminant validity when assessed in regard to making extra blood donations.

Two meta-analyses provide support for including measures of anticipated affect into the TPB model. In their review of 25 applications, Rivis, Sheeran, and Armitage (2009) found that anticipated affect explained a further 5% of the variance in intention above that explained by the standard TPB constructs. On the other hand, anticipated affect was not found to predict behaviour when the standard TPB constructs were controlled for in the 7 applications examined. Rather, intentions were shown to mediate the anticipated affect-behaviour relation. Sandberg and Conner (2008) conducted a meta-analysis of TPB studies that assess AR. The study identified that AR enhanced the explained variance in intention by 7% and was a stronger predictor of intention than attitude, subjective norms, and PBC. In the prediction of behaviour, AR significantly increased the explained variance by 1%; however this was no longer significant when past behaviour was entered into the model. Overall these studies provide support for the inclusion of anticipated affect as a causal determinant of intention within the TPB.

Anticipated affective reactions have been incorporated into the TPB in several ways. The most common approach is to assess standard TPB constructs in relation to performing the target behaviour and measures of anticipated affective reactions in relation to not performing the behaviour (e.g. Abraham & Sheeran, 2003). A small number of studies have instead examined TPB constructs in regard to not performing the behaviour and measures of anticipated affective reactions in regard to performing the behaviour (e.g. Elliott & Thomson, 2010; Moan et al., 2005). Few studies have taken the approach of measuring TPB and anticipated affective reactions items compatibly—that is, all in regard to the same behavioural alternative (Conner & Flesch, 2001; Conner, Smith, & McMillan, 2003; also see Ajzen & Sheikh, 2013). Nevertheless, Fishbein and Ajzen (2010) argue that the contribution of anticipated affective reactions often found in the literature may be attributed to the incompatible measurement of the standard TPB and anticipated affective reaction constructs. This is because two attitudes are obtained; a general attitude toward performing the behaviour and a partial (affective) attitude toward not performing the behaviour, or vice versa. Including measures of both performing and not performing a behaviour in the same

model is expected to afford better prediction of intention and behaviour than when measures of only one alternative is included (Fishbein & Ajzen, 2010). Ajzen and Sheikh (2013) examined whether anticipated affect enhanced the prediction of intention when measured compatibly and incompatibly with the TPB constructs. In the first study, TPB constructs measured in regard to drinking alcohol explained 60% of the variance in intention to drink alcohol. The addition of anticipated affect for avoiding alcohol significantly raised the extracted variance to 67%. In the prediction of intention to avoid alcohol, anticipated affect measured in regard to drinking alcohol significantly increased the explained variance in intention by 27%, over and above that explained by TPB constructs assessed in regard to avoiding alcohol (R^2 = .31). Anticipated affect did not account for a significant portion of additional variance in intention when assessed compatibly with the TPB constructs for drinking or avoiding alcohol. The same pattern of results was found in the second study into eating and avoiding eating fast food, with anticipated affect raising the extracted variance in intention when measured incompatibly, but not when measured compatibly, with the TPB constructs.

Some support for the findings of Ajzen and Sheikh (2013) is evident in the literature. For example, Sheeran and Orbell (1999) examined AR when measured incompatibly (studies 1-3) and compatibly (study 3) with the TPB constructs. AR for not playing the lottery was found to significantly predict intention to play the lottery across all 3 studies and for behaviour in study 3 (the only study which measured behaviour). Conversely, when AR and TPB constructs were all assessed in regard to playing the lottery, AR was not a significant predictor of intention or behaviour (study 3). In another study, AR was found to not significantly add to the prediction of intentions or behaviour when measured compatibly in regard to engaging in concealed texting while driving (Gauld et al., 2014). However, numerous other studies show that anticipated affective reactions can significantly predict intentions when measured compatibly with the standard TPB constructs, although this contribution is often very modest. Anticipated affective reactions have been shown to be a significant predictor of intention when measured compatibly with the other TPB constructs in the contexts of monitoring domestic electricity consumption (anticipated affective reactions: Webb, Benn, & Chang, 2014), drinking and swimming (AR: Hamilton & Schmidt, 2014), drink walking (anticipated affective reactions: Haque et al., 2012), attending a genetic screening for Alzheimer's disease (AR: Frost et al., 2001), cheating in college (both anticipated positive

and negative affect: Hsiao, 2015), and illegal downloading[2] (anticpated guilt: Wang & McClung, 2012).

AR is the most common anticipated affective reaction investigated in the TPB literature. Most studies capture AR in regard to either performing or not performing the target behaviour (Sandberg et al., 2016). As such, they do not take into account that both anticipated action and inaction regret can influence decision-making. Sandberg et al. (2016) assessed both anticipated action and inaction regret across a number of behavioural contexts and showed both types of regret may be important determinants of intention within the TPB framework. Sandberg et al. (2016) argue that intention to perform immediate hedonic behaviours may be influenced by both AAR and AIR, with AAR expected to exert a stronger influence. This is because performing the behaviour may result in important negative future outcomes whereas not performing the behaviour could lead to the loss of positive immediate outcomes. Whilst both AAR and AIR may influence intention to perform distal benefit behaviours, it is AIR that is expected to exert the stronger influence. AIR may influence intention to perform distal benefit behaviours because not acting may lead to the loss of valued positive distal outcomes. On the other hand, AAR may not influence intention to perform distal benefit behaviours to the same extent because associated outcomes are more mixed in valence and are less important (Sandberg et al., 2016).

The findings of two studies by Sandberg et al. (2016) lend support to this pattern of regret across immediate hedonic and distal benefit behaviours. A limitation of Sandberg et al.'s (2016) study, however, is that it does not explore the role of anticipated regret on intentions to not perform target behaviours. AR may influence intention to perform and not perform a behaviour differently in a given context because actions and inactions often represent different behaviour types. For example, donating blood is a distal benefit behaviour often performed to improve the welfare of other people. Not donating blood is an immediate hedonic behaviour sometimes motivated by the avoidance of a negative sensory encounter. However, no research to date has explored whether AR exerts a differential influence on intention to perform and not perform a target behaviour. Furthermore, research is yet to identify whether the behaviour type categories outlined by Sandberg and Conner (2008) and Sandberg et al. (2016) hold when the TPB is applied to inaction. This thesis addresses these

[2] Anticipates guilt was significant for the sample that had illegally downloaded in the past 6 months but not those who had never illegally downloaded, or had not illegally downloaded in the past 6 months.

gaps in knowledge by examining the role of AR when the TPB is applied to action and inaction across three behavioural contexts where action represents one behaviour type category and inaction represents the other.

2.4 Conclusion

This chapter has reviewed the literature on the reasoned action approach, the way in which action and inaction have been investigated within the TPB, the action and inaction asymmetry in information processing, and the role of AR in the TPB. The review highlights several important gaps in the literature that this thesis will address.

Firstly, TPB studies are often conducted with a complementarity assumption—the view that cognitions about action and inaction are conceptually mirrored (Sutton 2004). However, different behavioural beliefs are shown to underpin action and inaction (Dodge and Jaccard 2008), and the reasons people give for performing and not performing a behaviour can also differ (Richetin et al. 2011: study 2; Chatzidakis et al. 2016). No previous research has sought to identify the extent to which action and inaction are conceptually mirrored. This thesis tests the complementarity assumption by evaluating the psychological distinctness of action and inaction within the TPB framework.

Secondly, it is assumed that the TPB framework operates in the same way when applied to action and inaction (Ajzen 1991); however, this assumption is yet to be validated. No previous studies have simultaneously examined action and inaction using the belief-based TPB model. A small number of studies have applied the direct measure TPB model to both action and inaction within the same study (e.g. Ajzen & Sheikh, 2013; Richetin et al., 2011). These studies find that greater variance in intention is explained when the model is applied to action than inaction. This research suggests that the TPB may not operate in the same way when used to predict performing and not performing a target behaviour. Consistent with this notion, a considerable body of literature shows that information relating to actions and inactions are not processed equivalently (Hearst 1991; Mayo et al. 2004; Beckmann and Young 2007; Bianchi et al. 2011). Establishing whether the belief-based and direct measure TPB models operate differently when applied to action and inaction constitutes an important advancement in our understanding of the decision-making process within the TPB framework. In particular, understanding why people do not perform a behaviour is as important as understanding why they do perform it (Michaelidou and Hassan 2014). This

thesis addresses this gap in knowledge by exploring whether the belief-based and extended direct measure TPB models operate differently when applied to action and inaction.

Thirdly, recent research suggests that AR influences intention to perform distal benefit behaviour and immediate hedonic behaviours differently (Sandberg et al. 2016). However, this research does not explore the role of AAR and AIR on intentions to not perform target behaviours. As such, it is not known whether the pattern of AR outlined by Sandberg and Conner (2008) and Sandberg et al. (2016) occurs when the TPB framework is applied to inaction. To address this gap, the thesis establishes whether AR exerts a differential influence on intention to perform and not perform target behaviours. It also tests whether the pattern of regret outlined by Sandberg and Conner (2008) and Sandberg et al. (2016) holds when the TPB is applied to inaction.

Chapter 3 Methodology

This chapter provides a discussion of the overarching philosophical and methodological position of this research in addition to the methods used to meet the research aims of the thesis. The chapter begins by outlining the two main research paradigms and the post-positivist philosophical assumptions which guided the research process (section 3.1). The methodology section (3.2) describes the purpose of the present research, outlines the research objectives of the thesis, and justifies the use of a cross-sectional survey design. Section 3.3 provides rationale for the specific methods used in the 3 empirical studies conducted, including the survey administration and sampling procedures. This section also covers sample size, questionnaire formats, ethical considerations pertinent to the research and analytical methods utilised.

3.1 Research philosophy

Research paradigms are "examples of actual scientific practice-examples which include law, theory, application, and instrumentation together- provide models from which spring particular coherent traditions of scientific research" (Kuhn, 1962, p. 10). This broad definition has led to the emergence of many different interpretations in the literature. For example paradigms have been defined as worldviews, epistemological stances, shared beliefs in a research field, and as model examples of research, amongst others (Morgan, 2007). Consistent with many social science researchers (e.g. Denzin & Lincoln, 2000; Hudson & Ozanne, 1988; Lincoln & Guba, 2000; Neuman, 2014; Patton, 1982; Saunders, Lewis, & Thornhill, 2009; Schwandt, 1989) this thesis takes the position that paradigms are all-encompassing systems of thinking that provide a conceptual and philosophical framework which informs the research process. A paradigm guides the basic assumptions of the researcher, the nature of the inquiry, research techniques and analysis, and what constitutes valid research (Neuman, 2014).

A paradigm is comprised of four axioms: ontology, axiology, epistemology, and methodology (Denzin & Lincoln, 2000). Ontology refers to the assumptions the researcher holds about the nature of reality and of social beings (Hudson & Ozanne, 1988). Axiology is concerned with

the role of the researchers' values in the research process and the prevailing goals of the research. It involves how the researchers' attitudes, beliefs and value systems influence what questions are asked, the type of data collected, the methods used, how the analysis is conducted and how the results are interpreted (Tashakkori & Teddlie, 2010). In turn, epistemology is the issue of what constitutes acceptable knowledge. It covers the nature of the relationship between researcher and subject, the type of knowledge generated, and the view of causality adopted by the researcher. The epistemological stance of a researcher guides what are viewed as important problems, facts and evaluative criteria (Hudson & Ozanne, 1988). The epistemological stance of the researcher is grounded in their ontological and axiological beliefs. In turn, the ontological, axiological, and epistemological stance of the researcher informs their methodology. Methodology refers to the theory of how research should be undertaken and also covers research methods which are the collection of specific techniques used to answer the research questions (Saunders et al., 2009).

Positivism and interpretivism are the two main research paradigms. They may be viewed as poles of a linear continuum based on their contrasting and incommensurable underlying assumptions (Collis & Hussey, 2014; Corbetta, 2003). Whilst there are many different paradigms, most research is conducted somewhere in between 'pure' positivism and 'pure' interpretivism (Collis & Hussey, 2014). It should be noted that whilst there are general differences in the methodologies and methods adopted by the two main paradigms, neither has a single or unique research process (Hudson & Ozanne, 1988). Researchers of competing paradigms may adopt the same techniques but they will utilise them in different ways and therefore produce different data (Hudson & Ozanne, 1988). Despite this, Lincoln and Guba (2016) point out that not all research strategies are useful for all paradigms and some may in fact be incompatible with the research aims.

3.1.1 Positivism

Positivism is "a family of philosophies characterized by an extremely positive evaluation of science and scientific method" (Reese, 1980, p. 450). Table 3.1 presents an overview of the characteristics of the positivist paradigm. Positivism is underpinned by a realist ontology. Realism assumes that there is a single, objective reality that exists independently of what individuals perceive (Hudson & Ozanne, 1988). Research conducted within a realist perspective aims to discover the true nature and meaning of reality (Crotty, 1998; Guba, 1990). Reality is assumed to be made up of "tangible and relatively immutable structures"

consisting of interrelated parts. These parts are believed to exist whether or not they are perceived or measured (Burrell & Morgan, 1979, p. 4). The structures of reality are assumed to have a logical pattern which is stable over time. Parts of a phenomena may be investigated outside of their usual context and examined without the influence of unmeasured variables. A reductionist stance is adopted where problems are believed to be better understood if they are reduced to the most simple elements possible (Easterby-Smith, Thorpe, & Jackson, 2012). Because knowledge is considered to be additive, fragments of knowledge generated can be added together to gain insight about the phenomena as a whole (Neuman, 2014). It is also believed that relationships identified during investigation are representative of those present in their natural context (Hudson & Ozanne, 1988).

Positivist researchers hold a value-free axiological stance. Their prevailing goal is to explain a phenomenon by demonstrating the presence of a systematic association between variables underlying the phenomenon (Kerlinger, 1973). If such a systematic association can be demonstrated then a phenomenon is said to be understood (Kerlinger, 1973). Positivists believe that if an appropriate methodology is adopted the research process will not be influenced by the researcher's value system (Lincoln & Guba, 1985). Consistent with this position, objectivism is the epistemological approach which underpins positivism. It is the view that valid knowledge is objective because it is not influenced by the researcher or the research process. The principle of objectivity stipulates that an individual's observation of an object does not alter the nature of that object (Thietart, 2001). Similarly, positivist research is conducted under a dualist perspective, the view that the subject and researcher are independent entities. It is assumed that a researcher can observe a subject without influencing them or, in turn, being influenced by the subject (Corbetta, 2003). An important prerequisite for legitimate knowledge is that the researcher minimises or controls for their influence on the investigation through careful development of research questions, designs and settings (Hudson & Ozanne, 1988). By maintaining a detached stance the researcher is said to have a privileged position of observation (Hudson & Ozanne, 1988).

Positivist research seeks to identify the mechanisms which influence reality by developing nomothetic knowledge (Thietart, 2001). These universal laws are a-contextual, consistent over time, and exist even if they are not known (Lincoln & Guba, 1985; Thietart, 2001). Understanding universal laws is considered to be a requirement for generating new knowledge (Thietart, 2001). Determinism of relationships refers to the emphasis placed on

investigating how external forces influence the beliefs, attitudes, and behaviour of individuals and groups (Neuman, 2014). Positivist research is focused on identifying causal laws which facilitate the prediction of behaviour rather than understanding the internal mental processes which influence the choices that individuals make. The quality of the knowledge generated depends on how effectively the research design captures 'true' causal relationships (Crotty, 1998)

Table 3.1- Characteristics summary of the positivist paradigm (adapted from Ozanne & Hudson, 1989 and Lincoln & Guba, 2000)

Ontology	
Nature of reality	Single Objective, tangible Fragmentable Divisible
Nature of social beings	Deterministic Reactive
Axiology	
The role of values	Inquiry is value-free
Prevailing goal	Aim to explain
Epistemology	
Knowledge generated	Nomothetic Time-free Context-interdependent
View of causality	Real causes exist Causes are temporally precedent to or simultaneous with their effects
Research relationship	Dualism, separation Privileged point of observation
Methodology	
Research Approach	Fixed structure Deductive Hypothesis testing Predominantly quantitative methods Experimental/manipulative Large sample size

The positivist philosophy adheres to a scientific protocol which enables the researcher to gain 'accurate answers' to their research questions (Hudson & Ozanne, 1988). There is also

a time during the research process wherein the research questions, hypotheses, and design become fixed (Hudson & Ozanne, 1988). Positivists may utilise a range of research designs, however, controlled experiments are viewed as ideal because they provide the most effective basis to identify causal relationships amongst variables (Kerlinger, 1973). Positivist research is also characterised by large sample sizes which are viewed as essential for the research findings to be generalised beyond the population studied (Easterby-Smith et al., 2012).

3.1.1.1 Post-positivism

Post-positivism emerged in response to growing criticism of the positivist paradigm. It is an extension of positivism which challenges the assumption of absolute and objective truth of knowledge (Creswell, 2014). Whilst prediction and control continue to be central aims, post-positivism represents a softening of the core assumptions of the positivist philosophy (Guba, 1990). Post-positivists hold a critical realist ontology. This assumes that whilst a real world exists driven by relatively stable relationships among social phenomena, it is not possible to accurately perceive or measure reality (Tashakkori & Teddlie, 2010). Instead, reality can only be known imperfectly (Guba & Lincoln, 1994). Post-positivists believe that it is not possible for researchers to know with certainty that their findings hold across all contexts and time frames. They, therefore, discuss the probability of research findings rather than their certainty.

Traditionally scientific research has followed an inductive process of falsification. This involves the establishment of generalised laws through the accumulation of findings relating to a particular phenomenon under certain conditions. Positivist researchers, therefore, assume that regularities in social phenomenon observed today will remain unchanged in the future (Crotty, 1998). In his seminal work on post-positivism, Popper (1959) outlined the principle of falsification which stipulates that verification rather than falsification should form the basis of scientific research. He argued that scientific research should follow a hypothetico-deductive process. This involves the researcher first developing hypotheses and then propositions are formed from this theory. The propositions are then tested in an effort to prove them false (Popper, 1959). Regardless of how many examples are found to support a hypothesis, it cannot be proven true in absolute terms. A hypothesis is shown to be false when research findings conflict with the hypothesis (Crotty, 1998). As such, post-positivist

researchers view scientific truths as provisional statements which have so far not been proven false (Crotty, 1998).

A value-laden axiological stance is assumed by post-positivist researchers. It is assumed that the research process is influenced by the researcher's values (value-laden), the theories utilised (theory-laden), and because the same findings can be explained by multiple theories (underdetermination of theory by fact) (Tashakkori & Teddlie, 2010). Consistent with this, a modified objectivist epistemology is adopted which views objectivity as a 'regulatory ideal' that cannot be achieved in an absolute sense. Instead, researchers must strive to work in a neutral manner and maintain an awareness of their own predispositions throughout the research process in an effort to minimise this bias (Guba, 1990).

3.1.2 Interpretivism

The assumptions of the interpretivist paradigm directly contrast with those of positivism (see Table 3.2 for an overview of interpretivism). Constructionism is the ontological basis for interpretivism. It is the view that reality is socially constructed and dependent on the consciousness of the individual observing it (Thietart, 2001). Reality is experienced through systems of interpretation and inner subjectivity which are influenced by subjective-cultural beliefs and past experiences (Neuman, 2014). Interpretivists do not believe that there is a universal social reality. Instead multiple realities are presumed to exist because every individual perceives and interprets information according to a different frame of reference (Corbetta, 2003). People are constantly involved in a process of interaction with their context by perceiving, interpreting and acting on the information available to them. This interaction creates a new pattern of information that changes reality as a whole (Burrell & Morgan, 1979). As such, people are thought to actively shape their environment rather than simply responding to the existing reality (Hudson & Ozanne, 1988). The constructionist perspective views individual realities holistically. Realities are viewed as more than a sum of their parts because the meaning of each system is dependent on other systems (Lincoln & Guba, 1985). It is assumed that for a researcher to gain an understanding of a phenomena they must understand the context within which the meaning is based (Hudson & Ozanne, 1988).

Interpretivist researchers share a value-laden axiological view. The researcher and subject are thought to create a new and shared reality by co-creating knowledge throughout the research process (Lincoln & Guba, 2016). The value systems of the researcher and participants should be uncovered and explored within the context that the research takes place. Interpretivists also believe that the values of other stakeholders, such as those who are influenced by it, will also play a part in the research (Lincoln & Guba, 2016). The goal of interpretivist research is to gain an understanding of the phenomena under investigation rather than predicting it (Rubenstein, 1981). Understanding is viewed as an ongoing process whereby the researcher may gain *an* understanding of the phenomena, but never *the* understanding (Denzin, 1970).

Interpretivism is underpinned by a subjectivist epistemology. This view assumes that valid knowledge is subjective because social reality can only be created and understood from within the contexts that give them meaning (Hatch & Cunliffe, 2013). Interpretivist research aims to understand subjective experiences such as reasons, meanings and motives to achieve a rich description of a phenomenon (Hudson & Ozanne, 1988). Interpretivist researchers do not believe it is possible to identify generalised laws which hold across all people in all situations. Instead interpretivist researchers aim to create idiographic knowledge which carefully considers the multiple realities of specific people in specific settings (Neuman, 2014). To achieve this aim, knowledge is generated through a process of inductively observing, interpreting and reflecting on a specific phenomenon. The researcher must, however also reflect on their own experiences and interpretations throughout the research process (Neuman, 2014).

In interpretivist research there is a cooperative and interactive relationship between the researcher and subjects (Carter & Little, 2007). As social reality is constructed from the perceptions and interpretations of individual people, they must also be a part of the research process (Hudson & Ozanne, 1988). The research process is shaped through the cooperative inquiry that arises when researcher and subject interact with each other (Reason & Rowan, 1981). Interpretivism recognises that the researcher cannot be separated from the sense-making process and, therefore, theories which apply to the subject must also be relevant to the researcher themselves (Easterby-Smith et al., 2012). As such, interpretivists do not view the researcher as having a privileged position of observation.

Table 3.2 - Characteristics summary of the interpretivist paradigm (adapted from Ozanne & Hudson, 1989 and Lincoln & Guba, 2000)

Ontology	
Nature of reality	Multiple Socially constructed Holistic Contextual
Nature of social beings	Voluntaristic Proactive
Axiology	
The role of values	Inquiry is value-free
Prevailing goal	Aim to understand
Epistemology	
Knowledge generated	Idiographic Time-bound Context-dependent
View of causality	Multiple, simultaneously shaping
Research relationship	Interactive, cooperative No privileged point of observation
Methodology	
Research Approach	Flexible structure, emergent process Inductive Predominantly qualitative methods Hermeneutical, dialectical Small sample size

Interpretivist research is an emergent process because the realities investigated are continuously changing and cannot be known prior to the research taking place. As the realities investigated change, the research process evolves (Hudson & Ozanne, 1988). Whilst research is undertaken with a general plan, the questions, meanings, and data collection techniques are developed in response to the realities experienced during the research. Interpretivists aim to create the most informed and in-depth construction of social phenomena possible using hermeneutic and dialectic approaches (Guba, 1990). Hermeneutics involves depicting individual constructions as accurately as possible through interpretation processes whereas dialectics is the practice of comparing and contrasting individual constructions to generate one or a small number of constructions for which there is substantial consensus (Guba, 1990).

3.1.3 Research philosophy of the thesis

Most research utilising the TPB is underpinned by a broadly positivist paradigm (Smith, 2004). The TPB is a general model of behavioural prediction which outlines the causal process whereby beliefs about a behaviour influence the decision to perform that behaviour. As such, research using the model accepts that a single, objective social reality is guided by universal laws that are stable over time and may be generalised across contexts, time periods, and populations. Data for TPB studies are often obtained in contexts removed from those where the behaviour of interest is usually performed. For example, students may complete a questionnaire about drinking alcohol in a lecture theatre after their lecture has finished, whereas students may usually consume alcohol in a pub, night club or at their accommodation. Consistent with positivist assumptions, the relationships identified using the model are believed to also occur in the natural context where the behaviour typically takes place. TPB researchers adopt a detached stance throughout the research process. Careful consideration is paid to undertaking research in a manner that minimises the potential for bias in the research process. A deductive process is also followed whereby hypotheses are developed based on past literature and tested using a structured and scientific approach. Concepts, such as attitude, are defined and operationalised prior to the research taking place rather than being co-created by the researcher and respondents during the research process (see Fishbein & Ajzen, 2010 for guidelines on questionnaire construction). Whilst experimentation is considered ideal in positivist research (Kerlinger, 1973), most TPB studies use non-experimental cross-sectional or prospective designs (Elliott & Ainsworth, 2012; Sutton, 2002). Surveys are most commonly used to collect quantitative data from large samples to which statistical analysis is performed.

Consistent with the positivist paradigm of the TPB, the present research is conducted within a post-positivist philosophy. Whilst it is acknowledged that an objective reality exists external to the researcher, it may not be known with certainty because research itself is inherently fallible. The research process is thought to be influenced by the researcher's values and the theories they use. For example, the conceptualisation of inaction utilised in the thesis is influenced by the workings of the model itself and the researchers' interpretation of past literature regarding the concept of inaction. Various explanations may also be identified to explain a particular phenomenon. By being aware of the potential sources of bias in the research process the researcher can ensure this is minimised.

3.2 Methodological approach

This section discusses the overarching logic that underpins the three empirical studies presented in the thesis. The studies explore the application of the TPB framework to donating and not donating blood (study 1), using and not using sunscreen (study 2), and eating and not eating high-calorie snacks (study 3). The methodological approach adopted is the most suitable for achieving the research aims and reflects that typically used in the TPB literature. Section 3.2.1 discusses the different purposes for which research may be undertaken before clarifying the descriptive and exploratory purposes of the present research. Section 3.2.2 justifies the use of a cross-sectional survey design and their use in TPB research.

3.2.1 Research purpose

Research may be undertaken to explore, describe, or explain a phenomenon (see Table 3.3 for an overview). Whilst there may be more than one purpose for an item of research, one is usually dominant (Neuman, 2014). Blanche (2006) points out that there is little consensus in the literature about what exploratory, descriptive, and explanatory designs are, nor the research processes these designs follow. They do, however, provide a general guide as to the different ways in which research may be approached. Exploratory research is undertaken when little is known about a phenomena or it has not yet been investigated (Neuman, 2014). Researchers may use the design to better understand the nature of the problem they wish to investigate (Saunders et al., 2009). Exploratory research does not set out to find definitive answers. Instead, results can be used to formulate more precise questions for future research to address (Neuman, 2014). A flexible and adaptable approach is taken by the researcher to make the most of new insights which become apparent during the research process (Saunders et al., 2009). This often involves the adoption of an inductive process (Blanche et al., 2006). Descriptive research aims to accurately describe the characteristics of the phenomena investigated and facilitates the comparison of groups within a population (Babbie, 1990; Neuman, 2014). The design is characterised by a deductive research process which starts with clearly defined research questions and leads to the generation of detailed answers (Neuman, 2014). Explanatory research also follows a structured deductive process and is often conducted to establish causal relationships between variables (Saunders et al., 2009). Explanatory research aims to build or extend a theory by examining the causes of a phenomenon (Neuman, 2014). According to Saunders et al. (2009), exploratory and descriptive designs often overlap in practice.

Table 3.3 - Purposes of research types (taken from Neuman 2014)

Exploratory	Descriptive	Explanatory
Become familiar with the basic facts, setting, and concerns	Provide a detailed, highly accurate picture	Test a theory's predictions or principle
Create a general mental picture of conditions	Locate new data that contradict past data	Elaborate and enrich a theory's explanation
Formulate and focus questions for future research	Create a set of categories or classify types	Extend a theory to new issues or topics
Generate new ideas, conjectures, or hypotheses	Clarify a sequence of steps or stages	Support or refute an explanation or prediction
Determine the feasibility of conducting research	Document a causal process or mechanism	Link issues or topics to a general principle
Develop techniques for measuring and locating future data	Report on the background or context of a situation	Determine which of several explanations is best

3.2.1.1 Purpose of this research

The research detailed in this thesis is mainly conducted with a descriptive purpose. The research process began with a set of clearly defined research questions and a highly detailed picture was sought in regard to the psychological distinctness of action and inaction within the TPB framework (aim 1); the operation of the belief-based (aim 2) and direct measure (aim 3) TPB models applied to action and inaction; and the role of AR in the prediction of intention to perform and not perform the target behaviour (aim 3). Research aims 2 and 3 also have an exploratory purpose. These aims are not focused on providing definitive answers about the application of the TPB models to action and inaction. Rather, the research seeks to explore whether the models operate differently when applied to action and inaction in order to inform more focused future research.

3.2.2 Survey design

Cross-sectional survey designs collect data at a single point in time from a sample of a specified population (Visser, Krosnick, Lavrakas, & Kim, 2014). They are highly versatile and may be used in exploratory, descriptive, and explanatory studies (Neuman, 2014). Standardisation is a central tenet of survey research. The use of standardised instruments such as questionnaires, structured interviews, and structured observations, enable the

researcher to collect the same data in the same way from a large number of respondents (Sapsford, 2007; Saunders et al., 2009). Further, data generated in survey research is mainly quantitative. Survey designs, therefore, facilitate the collection of accurate, reliable, and valid data to which statistical analysis may be performed (Neuman, 2014). This analysis includes descriptive and inferential statistics, such as between group comparisons and identifying statistical relationships (Thietart, 2001).

The present research is conducted with exploratory and descriptive purposes, both of which can be met through the use of survey designs. To explore the belief-based foundations of action and inaction, compare the application of the belief-based and direct measure TPB models to action and inaction, and to to examine the role of AR within the TPB, it is necessary to measure and analyse data when the TPB is applied to action and inaction in exactly the same way. This enables the researcher to be confident that any differences identified between action and inaction are due to differences in the underlying beliefs, constructs measured and the relationships between them, rather than outside sources of bias. The use of a standardized instrument that presented the same questions in the same format to all respondents is therefore necessary. This standardized instrument allowed for the collection of quantitative data from a large sample so that statistical analysis could be applied.

3.2.2.1 Survey designs in TPB research

Most TPB studies employ a cross-sectional survey design (Elliott & Ainsworth, 2012). With the exception of behaviour, all constructs within the TPB are assessed contemporaneously. Studies that assess behaviour conduct a follow-up phase of data collection to capture self-reported or observed behaviour at a later time. Cross-sectional survey designs have been utilised in past studies that apply the TPB to action and inaction (e.g. Richetin et al., 2011) and examine the role of AR within the TPB (e.g. Godin et al., 2010; Robinson, Masser, White, Hyde, & Terry, 2008; Sheeran & Orbell, 1999).

In their proposed questionnaire format, Ajzen and Fishbein (1980) group items measuring the same construct together so that respondents answer all items assessing a given construct consecutively before moving on to answer items measuring the next construct. Budd (1987) argues that when the relationships between constructs of the TRA model are

obvious to respondents they may answer later questions in the questionnaire consistently with their earlier answers due to self-presentational concerns. This could lead to artificially high correlations between beliefs, attitude, intention, and behaviour within the TPB model that did not exist prior to the completion of the questionnaire. However, two studies by Ellen and Madden (1989) found no evidence of such an effect. Furthermore, Armitage and Conner (1999) utilised a cross-sectional survey design to examine whether the use of random or thematic presentation of construct items moderated the relationships between TPB variables. No significant differences between random and thematic questionnaires were found for any of the TPB's hypothesised relationships. Together, these studies suggest that consistency bias may not pose a serious threat to the validity of TPB studies regardless of whether items are presented in a thematic or random manner.

All questionnaires utilised in this thesis present questions in a thematic manner. Thematic presentation facilitates the use of question branches where one question is asked followed by a number of related items. Question branches reduce the cognitive burden for respondents and reduce the time required to complete the questionnaire. To reduce the potential impact of consistency bias in the present research, the administration and formatting of action and inaction questionnaires were exactly the same. This provided the greatest assurance that any influence of consistency bias was equivalent across action and inaction questionnaires.

Another potential limitation of cross-sectional surveys is that they produce correlational data that cannot be used to establish causal effects in a definitive way. This is because the temporal order of variables cannot be identified (Bryman & Bell, 2015). The TPB outlines the causal process of how behavioural, normative, and control beliefs lead to the formation of attitudes, subjective norms, and perceived behavioural control. Together, these constructs form intention which, in turn, leads to behaviour. This intention-behaviour relationship is moderated by actual behavioural control (Fishbein & Ajzen, 2010). Few TPB studies have explicitly examined the causal relationships between intention and its hypothesised antecedents (Armitage & Conner, 1999). Instead, most support for the TPB model is found in the large body of cross-sectional literature that exhibits the predictive validity of the model's proposed relationships. Cross-sectional data can, however, only show that between-participant differences in the model's constructs are related to between-participant differences in intentions and behaviour (Elliott, Thomson, Robertson, Stephenson, & Wicks,

2013). Sutton (2002, p. 298) explains that such studies use “a cross-sectional between-individuals analysis to draw inferences about processes that are assumed to occur within individuals overtime”. To evidence causal links within the TPB, studies would instead need to show that within-participant changes in antecedent variables lead to within-participant changes in intention and behaviour (Sutton, 2002).

Evidence for the causal order of TPB constructs is found in studies using a combination of cross-lagged regression analysis and the Preacher and Hayes’ (2007 and 2008) bootstrapping procedure for testing multiple mediators. This approach enables the researchers to predict naturally occurring time-line changes in intention and behaviour from corresponding changes in their antecedent variables. For example, Elliott et al (2013) conducted two studies using a two-wave panel design and found that changes in attitude, subjective norm, and perceived behavioural control generated a change in intention. Further, changes in intention and perceived behavioural control were found to predict changes in behaviour. Similar findings were found in the second study which examined the two-component TPB model extended to include measures of AR, moral norm, and self-identity. Using a similar approach, Armitage et al. (2011) also found that changes in attitude, subjective norm, and perceived behavioural control had a causal influence on intention. Whereas perceived behavioural control was causally related to behaviour intention was not found to predict behaviour.

The sum of evidence to support the predictive validity of the TPB model, findings of behaviour change intervention studies, and direct investigation into the causal order of TPB constructs provide strong evidence for the hypothesised causal structure of the model. Nevertheless the present research is focused on exploring the belief based foundations of action and inaction, whether the TPB model operates differently when applied to predict action and inaction, and the role of AR within the TPB when assessed in regard to action and inaction. These aims do not involve testing the causal structure of the TPB model.

3.3 Research methods

This section discusses the specific methods utilised across the 3 empirical studies reported in the thesis. The section covers survey administration (section 3.3.1), time interval between the main and follow-up questionnaires in studies 2 and 3 (section 3.3.2), sampling methods (section 3.3.3), and the questionnaires and procedures utilised (section 3.3.4). The important ethical considerations of the research are then outlined (section 3.3.5) before the data analysis methods used in the belief-elicitation, belief-based measure and extended direct measure studies are discussed (section 3.3.6).

3.3.1 Survey administration

In survey research, data may be gathered via questionnaires or interviews. All studies of this thesis use self-administered questionnaires as the means of data collection. Self-administered questionnaires have several advantages over structured interviews to meet the aims of the present research. Most pertinently, they eliminate the influence of interviewer bias because the respondent completes the questionnaire with no involvement from the researcher (Bryman & Bell, 2015). As such, the questionnaire is an entirely standardized instrument whereby all respondents answer exactly the same questions in exactly the same way (Sapsford, 2007). In addition, the absence of an interviewer also reduces the potential influence of social desirability bias (Bowling, 2005). This differs from structured interviews where variation in the delivery of questions and the presence of the interviewer may influence the answers provided by the respondent (Bryman & Bell, 2015). Self-administered questionnaires also benefit from being quicker to administer and are more cost-effective than conducting interviews which permits the researcher to obtain a much larger sample (Sapsford, 2007). The use of self-administered questionnaires does, however, have a greater risk of missing data. This is because it is easier for respondents to actively not answer questions when completing a questionnaire alone than when prompted for an answer by an interviewer (Bryman & Bell, 2015). This is further the case when respondents do not understand how to answer a questionnaire item because the researcher is not present to provide guidance (Sapsford, 2007). It is, therefore, essential that self-completed questionnaires are simple to understand with clear instructions and an easy to answer format (Bryman & Bell, 2015). Self-administered questionnaires also afford the researcher less control over the conditions under which the respondent answers questions than in interviews (Neuman, 2014).

Studies 1.1 and 2.1-3.2 use a web-based mode of administration whereas study 1.2 uses a mixed-mode strategy including both web-based and paper and pencil administration. Web-based surveys eliminate data entry errors and simplify the logistics of data collection (Behrend, Sharek, Meade, & Wiebe, 2011). They have also been shown to result in fewer missing values than paper and pencil data (Stanton, 1998). Web-surveys enable the researcher to quickly and inexpensively gather data from a large sample of geographically distant respondents (Neuman, 2014; Truell, Bartlett II, & Alexander, 2002). A limitation of web-surveys is that they do not enable the researcher to determine the response rate because respondents self-select into the study (Bryman & Bell, 2015). When using web-based surveys it is important to ensure that there are no differences in the survey format when completed using different browsers or devices. This is because such differences may influence respondent's answers (Dillman, Smyth, & Christian, 2014). To address this, data for all web-based surveys was collected using SocialSci[1], an online platform where researchers may design and host web-based questionnaires. The dedicated platform was developed with cross-device and browser capability to ensure respondents were all presented with the same format of questionnaire. A further limitation of web-based surveys is that there is a possibility that multiple submissions will be made from the same respondent (Reips, 2000). This may occur because the respondent has a particular interest in the topic investigated, such as with blood donation in studies 1.1 and 1.2, or when there is an incentive for participation as there was in studies 2.1-3.2.

For studies 1.1 and 1.2 respondents were recruited through an invitation sent via the university email list and flyers on campus, both of which included an URL for the survey hosted on SocialSci. Due to this, it was not possible to prevent multiple submissions which constitutes a limitation of these studies. Studies 2.1-3.2 recruited respondents using the Amazon Mechanical Turk platform[2] (MTurk). MTurk "is a crowdsourcing web service that coordinates the supply and the demand of tasks that require human intelligence to complete" (Paolacci, Chandler, & Ipeirotis, 2010, p. 411). It is an online labour market where requesters (such as researchers) create tasks that workers (people who have signed up to MTurk) can choose to complete in exchange for payment. In order to register on the platform workers must have a valid U.S. social security number and bank account. The risk of multiple submissions from the same worker is low because workers are only permitted to complete an advertised survey (HIT) once and were required to input their worker ID into the survey on Socialsci.

[1] Socialsci.com
[2] Mturk.com

In addition to web-based administration, data for study 1.2 was also collected using paper and pencil questionnaires. Dillman (2014) recommends the use of mixed-mode administration as a means to compensate for the weaknesses of each method. In study 1.2 using both web-based and paper and pencil administration increased the outreach of the survey invitation to students across all academic schools of Bangor University. This addressed the concern of sampling bias which may have arisen due to the university email list restricting the dissemination of the survey invitation to only one college. Using a mixed-mode administration strategy also meant that students who tend to overlook notices sent from the university via email may be more willing to take part if approached in person. Whereas some research has shown that web-based and paper and pencil administration may differ in regard to response rates, missing data, and completion time (e.g. Weigold, Weigold, & Russell, 2013; Wood, Nosko, Desmarais, Ross, & Irvine, 2006), numerous studies have shown that psychometric properties are equivalent across these modes (e.g. Cole, Bedeian, & Feild, 2006; De Beuckelaer & Lievens, 2009; Meade, Michels, & Lautenschlager, 2007; Meyerson & Tryon, 2003). They have also been shown to be comparable in regard to social desirability responses (Dwight & Feigelson, 2000; Richman, Kiesler, Weisband, & Drasgow, 1999). De Beuckelaer (2009) states that merging data obtained through web-based and paper and pencil questionnaires is acceptable due to their comparable qualities.

3.3.2 Time interval

As studies 2.2 and 3.2 assessed behaviour it was necessary to identify a suitable time interval between the administration of main and follow-up questionnaires. A wide range of time intervals have been utilised in past TPB studies, for example 3 days (e.g. Stok, De Ridder, De Vet, & De Wit, 2014); 2 weeks (e.g. Conner, Povey, Sparks, James, & Shepherd, 2003); 6 months (e.g. Conner, Norman, & Bell, 2002); and 15 months (e.g. Godin, Belanger-Gravel, Gagne, & Blondeau, 2008). The interval chosen is dependent on the behavioural context, the level of generality required to meet the research aims, the feasibility of contacting respondents, and obtaining sufficient responses over the time period of interest (Fishbein & Ajzen, 2010). Behaviour was not assessed for study 1.2 which investigated donating and not donating blood. Only around 4% of eligible people donate blood in the UK (NHS Blood and Transplant, 2017). It was, therefore, considered unlikely that a sufficiently large sample of respondents would donate blood and complete a follow-up questionnaire within the timeframe allocated for the study so that data analysis could be conducted.

Both study 2 and 3 involved a follow-up survey 2 weeks after the completion of the main questionnaire. As respondents are likely to have regular opportunities to use sunscreen (study 2) and eat high-calorie snacks (study 3) a two week timeframe was considered appropriate. A two week period also meant that respondents were likely to remember taking part in the study and that participation required the completion of a follow-up questionnaire. Further to this, stronger intention-behaviour relationships are expected when intention and behaviour are measured in close temporal proximity than when behaviour is assessed after a longer interval (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975; Sheeran & Orbell, 1998). This is because an individual is more likely to encounter events which will lead to a change in intention, such as becoming aware of new information, as time goes on (Ajzen & Fishbein, 1980).

3.3.3 Sampling technique

Sampling techniques can be divided into probabilistic and non-probabilistic categories. Probabilistic sampling refers to all techniques which use random selection so that each element of the population has a known probability (not equal to zero) of being included in the sample (Thietart, 2001). This random selection generates samples that are more likely to represent the population from which they are taken than non-random samples (Neuman, 2014). It also enables the researcher to calculate the size of sampling error—the deviation between the sample data and an ideal population parameter resulting from the use of random selection (Neuman, 2014). Because of this, probability samples enable the researcher to draw inferences about the population from the sample so that findings may be generalized to the population (Bryman & Bell, 2015). Probabilistic sampling requires the use of a sampling frame which is a complete and accurate list of all elements of the target population (Saunders et al., 2009). For example, a sampling frame for a study into blood donation could be derived from a national database of all currently registered blood donors.

Non-probabilistic sampling techniques are used when no sampling frame is available, it is not possible or practical to create one, or when precise representativeness of the target population is not necessary (Babbie, 1990). Non-probabilistic sampling techniques are those that do not use random selection to draw elements from the population. This means that some elements may have a greater chance of being selected than others (Bryman & Bell, 2015). Because the probability that each element will be selected from the population is not known, it is not possible to make statistical inferences about the characteristics of the

population from the sample (Saunders et al., 2009). As such, generalizations cannot be made about the population based on the sample data (Sapsford, 2007).

The studies reported in this thesis use non-probability sampling techniques. For the blood donation study a sampling frame of all registered blood donors across the UK or in specific localities was sought, however, this was inaccessible to the researcher. It was not possible to create a sampling frame that would accurately identify all individuals interested in registering as a blood donor or who are currently registered. The university does not provide a list of all registered students for participant recruitment purposes, but it was possible to contact all students registered within the College of Business, Law, and Social Sciences (CBLESS) via the college email list. Using a sample of students from only one college at the university, however, could also lead to bias as these students may share similar interests or characteristics not as prevalent in students of other colleges at the university.

The sunscreen and high-calorie snack studies also make use of non-probability sampling techniques due to there being no adequate sampling frames available. The consequences of dietary and sun protective behaviours have the potential to impact the health of everyone in the population. For this reason a sample of the general population was considered most useful for these studies. The Amazon Mechanical Turk platform was identified as an appropriate tool for data collection and as such, a potential sampling frame for the studies was all registered users of the Amazon Mechanical Turk platform. Researchers do not, however, have access to this database and are not permitted to invite workers to a HIT if the worker has not previously completed work for them. It is also likely that a full list of registered users would prove problematic when used to draw a random sample because of the large number of inactive users present in the database. This is because there would likely be a high non-response rate which would compromise the representativeness of a probability sample (Saunders et al., 2009).

Non-probability sampling techniques include quota, purposive, snowball, self-selection, and convenience sampling as shown in Figure 3.1. Quota sampling is the preferred non-probability sampling technique as it can be used to produce a quasi-representative sample of the target population (Neuman, 2014). The population is stratified into predefined criteria so that each element belongs to one stratum. A quota is then assigned to each stratum

which signifies the number of elements of each stratum that should be included in the sample (Thietart, 2001). This quota is based on the researcher's judgement about the incidence of the criteria in the total population. Purposive sampling is the selection of elements based on the researcher's knowledge of the population, the nature of population elements, and the research questions which are to be addressed (Babbie, 1990). It involves the researcher using a wide range of methods to include all possible elements of a highly specific or difficult to reach population (Neuman, 2014). The researcher must have an in-depth understanding of the population under investigation so that they can make a judgement about how typical or a-typical a particular element is, and how similar or dissimilar selected elements are (Thietart, 2001). Purposive sampling may be undertaken in several ways. The extreme case method is used when a researcher selects unusual or special cases to gain an understanding of a phenomenon (Saunders et al., 2009). A homogeneous method enables the researcher to select sub-groups of elements that share particular characteristics of interest so that they may be studied in-depth (Saunders et al., 2009). In contrast, heterogeneous purposive sampling involves the selection of elements with diverse characteristics to provide as much insight as possible into the target population (Saunders et al., 2009). In the critical case method, researchers select elements that they perceive to be of particular importance (Saunders et al., 2009). On the other hand, typical case purposive sampling is used to select elements which are judged to have characteristics which are typical of the target population and are used to gain an illustrative profile of the population (Saunders et al., 2009).

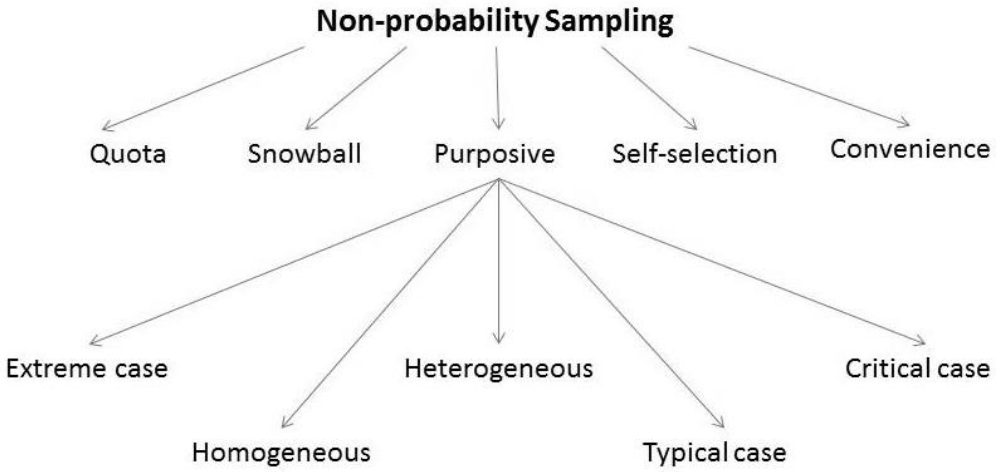

Figure 3.1 - Non-probability sampling
(Taken from Saunders et al. (2009))

Snowball sampling is a multi-stage technique used when there is difficulty in identifying or accessing members of the target population. Data collection begins with an initial sample and respondents are asked to refer people who fit the criteria of the study. Referred elements that go on to complete the study are also asked to refer others, and so on (Neuman, 2014). Convenience sampling is the most widely used non-probability sampling technique. The primary criteria for selecting elements is that they are accessible, readily available to the researcher, and willing to take part in the study (Neuman, 2014). Neuman (2014) advises against using convenience samples when an accurate representation of the target population is sought because it is easy to misrepresent features of the entire population based on biases in the sample. Finally, self-selection sampling is sometimes identified as a sub-category of convenience sampling. Self-selection sampling refers to the technique whereby data is collected from elements that have volunteered to take part in the study on their own accord, without being approached. Elements may volunteer to take part for a number of reasons, such as being interested in the topic investigated or due to the offer of an incentive for participation (Saunders et al., 2009).

3.3.3.1 Sample for study 1

A homogeneous purposive sample of British Bangor University students was used in study 1. The sample for study 1.1 included students enrolled on undergraduate and postgraduate taught courses in the College of Business, Law, and Social Sciences (CBLESS). An invitation email was sent via the CLBESS email list to all students studying on a programme within the college. Flyers were also posted in each school which provided students with an overview of the research project and a link to the study hosted on the SocialSci platform. In study 1.2 students enrolled on any undergraduate programme at the university were eligible to take part. To make the sample as representative as possible, several different recruitment methods were used. Face-to-face recruitment took place at numerous locations[3] across the university over a 4 month period. Locations were visited repeatedly on different days of the week and at different times of day to reach as many students as possible. Flyers were posted in common areas across the university and email invitations were sent via the CBLESS email list to all undergraduate students studying in the college.

[3] Locations included, but were not limited to, university libraries, academic schools, common rooms, halls of residence, bars and cafes, and computer rooms.

Student samples are widely used in marketing, consumer behaviour, and social psychology research (Peterson & Merunka, 2014). Simonson et al. (2001) found that 75% of positivist studies in April issues of the Journal of Marketing Research and September issues of the Journal of Consumer Research published between 1995 and 1999 made use of student samples. Further, Peterson (2001) reports that student samples were used in 86% of empirical studies published in Volume 26 of the Journal of Consumer Research. Despite the prolific use of student samples in the literature there is debate regarding the extent to which results obtained from such subjects are generalizable to non-student populations (Peterson & Merunka, 2014). A purposive sample of university students was an appropriate technique for study 1 because the behavioural context investigated in these studies was blood donation. University students are a group specifically targeted by blood donation services across the UK. For example, there are regular blood donation sessions held on university campuses across the UK, some of which are held exclusively for students to donate. Students can also become college ambassadors for the blood service to encourage blood donation amongst their cohort at university events (Welsh Blood Service, 2017). It may, therefore, be possible to generalise the results of study 1 to the UK student population, but not to other populations or contexts. The extent of this generalisation is appropriate to meet the aims of this thesis.

3.3.3.2 Amazon's Mechanical Turk and sample for studies 2 and 3

A self-selected sample of MTurk workers were used in studies 2 and 3. The MTurk platform is an increasingly popular tool in academic research. Goodman and Paolacci (2017) note that 27% of the 1,350 surveys and experiments published in the Journal of Consumer Research between June 2012 and April 2016 collected data using the MTurk platform. They also note that the incidence of MTurk use has increased rapidly over that timeframe, rising from 9 to 43% of total studies in issues 39 to 42. MTurk facilitates the collection of geographically and culturally diverse samples in an efficient and cost-effective way (Goodman & Paolacci, 2017; Gosling, Vazire, Srivastava, & John, 2004). The platform has been utilised in numerous studies examining the asymmetry of action and inaction (e.g. Dale & Duran, 2011; Nordmeyer & Frank, 2019). With MTurk becoming more prevalent in academic research, several important concerns have been raised regarding the reliability, validity and generalizability of data derived from MTurk samples (e.g. Buhrmester, Kwang, & Gosling, 2011). MTurk workers complete HITs in exchange for payment which means that there is an incentive for completing tasks as quickly as possible (Chandler & Shapiro, 2016). Data collection is also unsupervised and workers may complete HITs in undesirable

environments (Paolacci et al., 2010). For example, Chandler et al. (2013) report that whilst most workers complete HITs alone they are often engaged in other activities simultaneously such as watching TV, listening to music, or instant messaging other people. Prolific workers were, however, found to be more likely to work alone and less likely to engage in other tasks whilst completing HITs. It could be expected that the distraction of multitasking and motivation to complete tasks quickly would lead to poor quality data compared with other methods of data collection. Contrary to this, MTurk workers have been shown to be more attentive to study instructions than undergraduate students participating within and outside of laboratory settings, and on instructional manipulation checks (Hauser & Schwarz, 2016 studies 2 and 3; Ramsey, Thompson, McKenzie, & Rosenbaum, 2016 study 2). Furthermore, in a task requiring participants to read a story, MTurk workers have demonstrated a higher level of involvement and empathy when compared like-for-like with a student sample (Johnson & Borden, 2012).

A growing body of literature supports the validity of data derived from MTurk samples. Several studies have evidenced scale reliabilities similar or higher in MTurk samples than undergraduate student samples (e.g. Behrend et al., 2011; Buhrmester et al., 2011; Johnson & Borden, 2012). Similarly, when measurement invariance was compared for scale items of the Big Five inventory, MTurk data was comparable to an undergraduate and an organizational employee sample (Feitosa, Joseph, & Newman, 2015). Crump et al. (2013, p. 16) further support the validity of MTurk samples by replicating a range of cognitive behavioural experiments. They conclude that the platform is a 'revolutionary tool for conducting experiments' and MTurk is a valid data collection platform for behavioural experiments. Several studies also show that concerns about the quality of MTurk data may be unwarranted. Behrend et al. (2011) compared data obtained from MTurk and student samples and found that a similar proportion of cases were flagged due to incomplete responses and consistency issues. The rate of payment per HIT is not significantly associated with poorer data quality (Buhrmester et al., 2011) and there is little evidence to suggest that the environment within which MTurk workers complete HITs has a negative impact on their performance (Chandler & Shapiro, 2016).

A further concern with the use of MTurk samples is self-selection bias. Workers self-select to join the MTurk platform, choose to participate in some tasks over others available to them, and typically complete tasks for a low rate of payment (Goodman & Paolacci, 2017). For

example, workers are more attracted to HITs with higher rates of payment and those posted to the platform more recently (Buhrmester et al., 2011; Chilton, Horton, & Miller, 2014). These factors may mean the composition of MTurk samples differs from that of the general population. Despite this, several studies have shown MTurk samples to be more representative of the US population than commonly used convenience samples (e.g. Berinsky, Huber, & Lenz, 2012; Buhrmester et al., 2011; Casler, Bickel, & Hackett, 2013; Paolacci et al., 2010). Goodman and Paolacci (2017) also advise that the influence of self-selection bias can be minimised through careful composition of the HIT by describing the task generally whilst ensuring the worker knows what is required of their participation. They further recommend that requesters should make use of quality filters, pay workers a fair wage, and behave ethically such as accurately informing workers of how long the task should take. Consistent with these recommendations studies 2 and 3 restrict participation to workers located in the US, with a past HIT approval rating of greater than or equal to 95%, and with more than 5,000 approved HITs. Careful attention was also paid to providing workers with a general, yet accurate, description of what the HIT entailed, how long it should take to complete, and a fair payment rate based on Amazon's recommendations was paid for completion.

3.3.4 Questionnaires and procedures

The questionnaires constructed for the present research are based on the guidelines set forth by Fishbein and Ajzen (2010). Whilst these guidelines outline important features of TPB questionnaires it is essential that each questionnaire is tailored to the specific behavioural context and population to which it will be applied (Ajzen, 2006).

3.3.4.1 TACT elements

Attitudinal and behavioural entities consist of four elements: the target at which the action is directed, the action itself, the context in which the action is performed, and the time of occurrence (Ajzen & Fishbein, 1977; Fishbein & Ajzen, 1975). The principle of compatibility stipulates that "the more similar the target, action, context and time elements of one indicator to those of the other, the stronger the statistical relation between them" (Ajzen, 1988, p. 96). Measures of all constructs assessed in the model should include exactly the same action, target, context, and time elements for predictive validity (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). Similarly, the TACT elements used to elicit readily accessible beliefs in the

belief-elicitation studies should also be measured in regard to the same specific elements (Ajzen, 2006). For each study of the thesis, care was taken to ensure the principle of compatibility was adhered to throughout, with the exception of one measure of behaviour in study 2. All measures in study 1 were assessed in regard to '(not) donating blood at the next blood donation sessions at Bangor University'. All questions in study 2 were measured in regard to '(not) using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity'. Finally, all items included in study 3 capture '(not) eating high-calorie snacks in the next two weeks'.

3.3.4.2 Elicitation studies

Ajzen and Fishbein (1980) recommend that belief-elicitation studies capture the beliefs of a small number of respondents representative of the research population. For each elicitation study (1.1, 2.1 and 3.1) respondents were required to complete either a questionnaire about performing or not performing the target behaviour. Separate content analyses were performed on the individual accessible beliefs in regard to action and inaction to create a set of modal salient belief sets for action and inaction in each study. These modal salient belief sets are used to examine the extent to which beliefs about action and inaction are conceptually mirrored for each of the behavioural contexts investigated. The modal salient belief sets serve as the basis for the belief-based measures included in the main TPB questionnaires of studies 2 and 3. As such, the modal salient belief sets for action and inaction facilitate examination of whether the belief-based TPB model operates equivalently when applied to action and inaction.

3.3.4.2.1 Sample sizes

Where data is analysed using subjective methods the sample size should be calculated based on the acceptable credibility level to meet the research aims (Neuman, 2014). Ajzen (1991) recommends that belief-elicitation studies capture the beliefs of a small number of respondents representative of the research population, or from respondents who will complete the main TPB questionnaire themselves. Between 17 and 23 respondents completed the belief-elicitation study questionnaire in regard to either action or inaction in each of the studies.

3.3.4.2.2 Belief-elicitation questions

Individual accessible beliefs were elicited using open-ended questions. Open-ended questions are consistent with the aims of the elicitation studies in three ways. Firstly, they are useful for generating data for fixed-choice format answers (Bryman & Bell, 2015), such as the belief-based items included in the main TPB questionnaire in studies 2 and 3. Secondly, open-ended questions allow the respondent to answer in their own terms which allows unusual and unexpected responses to be captured. Thirdly, open-ended questions ensure that the responses provided are not influenced by the researcher or constrained by the options provided (Bryman & Bell, 2015). Whilst open-ended questions take longer and require greater effort to complete than their closed-ended counterparts, the elicitation studies contained a small number of questions, all of which could be answered in one or very few words.

The belief-elicitation studies covered all 9 standard questions recommended by Fishbein and Ajzen (2010). These questions capture behavioural, normative, and control beliefs. Manstead and Parker (1995) argue that the standard questions used to capture behavioural beliefs, in which respondents are required to list the advantages and disadvantages of performing the target behaviour, only tap into instrumental beliefs and do not adequately capture experiential beliefs. In a pilot study designed to elicit both instrumental and experiential behavioural beliefs, Manstead and Parker (1995) found that there was no overlap in responses of the two question sets. Indeed, Ajzen and Driver (1991) found no overlap in behavioural beliefs elicited using instrumental and experiential measures in the context of boating, whereas they identified some degree of overlap in the context of mountain climbing. Their study also showed that instrumental and experiential beliefs were differently predictive of behaviour when measured a year later. Further studies also show that questions designed to prompt instrumental and experiential outcomes are systematically different from each other (Darker, French, Longdon, Morris, & Eves, 2007; Sutton et al., 2003). These studies indicate that using only the standard behavioural belief-elicitation questions may lead to the elicitation of incomplete modal salient belief sets. To capture experiential behavioural beliefs two additional questions were included in the elicitation studies. Additional behavioural and control belief questions were also included to ensure sufficient beliefs were elicited for both behavioural alternatives because cognitions about action and inaction may differ in their accessibility. These questions were designed to capture the same type of beliefs already assessed by the standard elicitation questions.

They worked much in the same way as an interviewer rephrasing a question to help a respondent provide an answer, by asking for the desired information in a different way.

Several studies have shown that people are able to accurately process around 5-9 items of information at any one time (e.g. Mandler, 1967; Miller, 1956; Saaty & Ozdemir, 2003). On this basis, the TPB assumes that an individual's attitude toward a behaviour at any given time is determined by at most 5-9 readily accessible beliefs (Fishbein & Ajzen, 2010). Fishbein and Ajzen (2010) stipulate that respondents should be given five or six lines to note down the thoughts that come to mind in response to each belief-elicitation question. This number reflects the notion that whilst an individual may hold many different beliefs about an attitude object only a small number are readily accessible at any one time. In a systematic review of elicitation studies about exercise beliefs, Downs and Hausenblas (2005) determined that the average number of beliefs reported per study was seven for behavioural beliefs, four for normative beliefs, and six for control beliefs. Nine boxes were provided to ensure that respondents were given sufficient opportunity to report all thoughts which come to mind in response to the questions. Respondents were informed that they were not required to provide a response for every box. Whilst respondents were able to write as much text as they desired in each box, the boxes themselves were presented as a single line of text and only wide enough to write a few words. The size of box was designed to encourage respondents to provide only thoughts that came to mind in response to the question, rather than explanations or other elaborations about the topic of the study.

3.3.4.2.3 Questionnaire format

The SocialSci platform was used to collect data for all elicitation studies reported in this thesis. Upon following the survey link respondents were met with a participation information page and required to confirm their consent to take part in the study. Respondents were randomly directed to complete the questionnaire in regard to either performing or not performing the behaviour under investigation. Other than the negated TACT element in the inaction survey, questionnaires were exactly the same for both behavioural alternatives. Instructions for completing the questionnaire were presented on the first page in bold text. Questions for each belief type were grouped together so that they followed a logical order. They were also presented on separate pages so that respondents viewed questions relating to only one type of belief on any given page. Demographic and background questions were the last to be asked and were presented on a single page. Studies 2.1 and 3.1 also required

respondents to input their survey code on this page. After completing the survey respondents were presented with a debriefing page which thanked them for their participation.

3.3.4.3 Main and follow-up questionnaires

The main questionnaires were used to assess direct measures of attitude, subjective norm, PBC, intention, and AIR. Study 3.3 also incorporated a measure of AAR. Main questionnaires for studies 2 and 3 incorporated belief-based measures of attitude, subjective norm and PBC. Study 2 and 3 involved a follow-up questionnaire which captured actual behavioural control (covering both actual capacity and actual autonomy elements) and behaviour.

3.3.4.3.1 Questionnaire design

Closed-ended questions were used to collect data in the main and follow-up questionnaires. The use of closed-ended questions was advantageous for the present research in a number of ways. Firstly they collect quantitative data using standardized questions whereby all respondents are presented with the same questions in the same way (Bryman & Bell, 2015). This makes it possible to use statistical analysis to compare action and inaction models, and those where anticipated affect is measured compatibly and incompatibly with other TPB constructs. As closed-ended questions are quick and easy to answer, they help maintain motivation and attention for the duration of the questionnaire (Neuman, 2014) which is particularly useful in TPB research where questionnaires are often lengthy as they gather information relating to many different constructs. Closed-ended questions also make it more likely that answers from less articulate respondents will be adequately captured (Neuman, 2014). Closed-ended questions do, however, permit respondents to answer questions that are not applicable to them or to which they have no opinion. Misinterpretation of questions is difficult to identify when closed-ended questions are used and responses may be sensitive to socially desirable reporting (Neuman, 2014; Saunders, Lewis, & Thornhill, 2009). These issues yield invalid responses which weakens the quality of the data captured (Neuman, 2014). To address these potential issues all questions were worded clearly and respondents were not required to provide an answer for all belief-based questions as not all beliefs will be relevant to all respondents. Further to this, social desirability was not considered a serious

issue in the present research because the questionnaires did not ask respondents about their personal experiences and questionnaires were self-administered.

3.3.4.3.2 Questionnaire formats

3.3.4.3.2.1 Direct measures

Multi-item scales were used to assess all direct measures in the main questionnaires. Multi-item scales are more accurate and have greater reliability and validity than single item scales because the measurement error of any single item is compensated for when the final score is computed (Nunnally & Bernstein, 1994). They are also more able to represent the complexity of theoretical constructs, such as attitude, and provide the researcher with more information to estimate the measurement properties of the construct (McIver & Carmines, 1981). Ajzen (2006) cautions that to obtain reliable and internally consistent direct measures it is important that items are not selected arbitrarily; instead they should be carefully chosen during the formative stage of the investigation. The direct measures utilised in the present research were adapted from past studies where they had exhibited high reliability and internal consistency.

Main study questionnaires included both bipolar and unipolar scale items. Bipolar scales reflect two opposing alternative attributes (e.g. good and bad) and have a clear conceptual midpoint. Unipolar scales assess the varying level of a particular attribute and have no midpoint; instead the zero point is positioned at one end of the continuum (DeVellis, 2003; Krosnick & Fabrigar, 1997). The optimum number of response options is dependent on the respondent's cognitive skills and motivation to provide accurate answers (Krosnick, Judd, & Wittenbrink, 2005). On the one hand, providing a greater number of options has the potential to capture more subtle differences in responses. On the other hand, providing too many options can lead to increased random error because respondents may struggle to interpret the meaning of the graduations (Furr, 2011). Additionally respondents with low motivation or cognitive ability may engage in questionnaire sufficing whereby they look for cues in the question to select reasonable answers which are easy to select without much thought (Krosnick et al., 2005). Krosnick and Fabrigar (1997) advise that 5 to 7-point scales have greater validity and reliability than those that are longer or shorter. Fishbein and Ajzen (2010) too recommend the use of either 5 or 7-point scales for the assessment of direct measures. All direct items of the present research were assessed using 7-point scales to

provide greater distinction between responses. The use of an odd number of response options has the advantage of permitting respondents with neutral psychological positions to indicate this with their response, rather than forcing them to choose an inaccurate position (Furr, 2011). The response options used did not include 'don't know' or 'no opinion' options. Krosnick, Judd and Wittenbrink (2005) advise against the use of these options (whether measured within or separate from the midpoints) because they may reflect issues other than lack of knowledge or opinion, such as low motivation, ambiguity about the question, or ambivalence. Respondents were, however, not required to provide an answer to every question in the event they could or did not wish to provide an answer.

Direct measures of attitude toward the behaviour were assessed using semantic differential scales. The semantic differential is used to assess connotative meaning by presenting respondents with evaluative bipolar adjective scale items presented at either end of a continuum. The bipolar scales measure both directionality and intensity of responses (Osgood, Suci, & Tannenbaum, 1957). The semantic differentials included in the studies were designed to capture both experiential (e.g. enjoyable-unenjoyable) and instrumental (e.g. positive-negative) components of the attitude concept. Subjective norms and perceived behavioural control were assessed using 7-point bipolar numerical rating scales scored from -3 to +3. Each response option was labelled with the corresponding score and the ends of each continuum were labelled with opposing terms which corresponded to the component assessed. Subjective norm items assessed both injunctive (e.g. people who are important to me would approve/disapprove) and descriptive norms (e.g. most people important to me will…) whereas perceived behavioural control items captured capacity (e.g. I believe I have the ability to…) and autonomy components (e.g. how much control do you feel you have over…). Behavioural intention and AR measures were assessed using 7-point unipolar numerical items scored from 0-6 and were labelled with end points to signify the presence and absence of the attribute measured.

3.3.4.3.2.2 Belief-based measures

Belief-based measures were used to capture attitude, subjective norm and PBC in studies 2.2 and 3.2. All items were formulated in regard to exactly the same TACT elements as in the elicitation study and for the direct measures. Two items were formulated for each modal salient belief from which an overall score was calculated. Behavioural beliefs were assessed in regard to the strength and outcome evaluation of each salient belief. Descriptive and

normative beliefs were assessed separately with items created for each salient normative referent. Injunctive beliefs assessed belief strength and motivation to comply with the referent, whereas descriptive beliefs involved the assessment of belief strength and identification with the individual or group. Control belief items were formulated to capture the likelihood that the factor would be present in addition to the factor's power to facilitate or impede the performance of the behaviour. There is disagreement in the literature about whether subjective likelihood scales should be bipolar or unipolar. Fishbein and Ajzen (2010) suggest that the use of either type of scale can be equally justified because expectancy-value scales constitute equal-interval, rather than ratio, scales. Respondent's ratings can, therefore, be subject to linear transformation without resulting in a change in the measure's scale, although this can have a considerable impact on the correlations between the composite belief-based score and other constructs (Fishbein & Ajzen, 2010). When scoring belief-based items using bipolar scales it is not possible to determine whether disagreement that a behaviour will lead to a positive outcome necessarily implies that the respondent believes it will result in a negative outcome, and vice versa. Therefore, it may not be appropriate to assume that bipolar scoring of belief statements accurately reflect the implications of the attitude overall (Fishbein & Ajzen, 2010). In the present research belief-based items were scored using 7-point unipolar scales scored from 0 to 6 with endpoints labelled to indicate the presence or absence of the relevant attribute.

Belief-based measures of behavioural, injunctive normative, descriptive normative, and control beliefs were presented separately in the questionnaire. Belief strength items for each belief type were presented in grid format following a statement or question stem. The use of a grid format allowed respondents to quickly and easily respond to many different yet related items. Measures of outcome evaluations, motivation to comply with the referent, identification with the individual or group, and belief power were also presented in grid format directly after their respective belief strength questions. Both sets of belief measures for each belief type were presented on the same page of the questionnaire.

3.3.4.3.2.3 Follow-up questionnaire measures

Studies 2 and 3 required respondents to complete a short questionnaire two weeks after completing the main questionnaire. The follow-up questionnaires were hosted on the SocialSci platform and accessible only to respondents invited to take part. Respondents were invited to complete the follow-up questionnaire via a HIT posted on the MTurk platform which was viewable only to respondents who had been assigned a study-specific

qualification by the researcher. Respondents were also sent an invitation with a survey link via the MTurk messenger system. In study 2 two versions of the questionnaire were used, one comprised of questions in regard to performing and the other in regard to not performing the behaviour. Study 3 had an additional version of the follow-up questionnaire that captured responses regarding both behavioural action and inaction. Respondents were directed to complete the follow-up questionnaire which corresponded to the main questionnaire they completed.

The follow-up questionnaire for study 2 presented respondents with instructions to think back to the occasions where they engaged in an outdoor leisure activity since completing the first questionnaire. Behaviour was captured using two methods. The first calculated a score based on the number of occasions the respondent engaged in an outdoor leisure activity in the last two weeks and the number of those occasions the respondent used (or did not use) sunscreen with an SPF of 15 or more. Response options for both questions ranged from 0 to 20 or more and were presented using a drop-down menu. Whilst all other measures in the study were defined in regard to 'using (or not using) sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity' this behavioural measure assessed frequency of sunscreen use over a two week period and, thus, violated the principle of compatibility. This measure was included to enable the full TPB model to be compared between doing and not doing models using SEM which was not possible with a dichotomous outcome variable. Respondents were also asked to indicate whether they used (or did not use) sunscreen with an SPF of 15 or more the next time they engaged in an outdoor leisure activity and were provided with 'yes' and 'no' response options. In study 3 behaviour was assessed using two questions. The first question asked respondents whether or not they had eaten high-calorie snacks in the last two weeks and response options included 'yes' or 'no'. The second question asked respondents the number of days they had eaten (or not eaten) high-calorie snacks in the last two weeks. From a drop-down menu, respondents could select any value up to 14. Both measures of behaviour adhered to the principle of compatibility by referring to the same TACT elements as questions in the main questionnaire.

The follow-up questionnaires also captured ABC using three items on unipolar scales scored from 0 to 6. In study 3 respondents who completed the main TPB questionnaire in regard to both behavioural alternatives also completed the ABC questions for both performing and not

performing the behaviour. The order in which the ABC questions were presented was compatible with the presentation order of the first questionnaire (i.e. respondents who were first presented with questions in regard to performing the behaviour were also asked ABC for performing first in the follow-up questionnaire, and vice versa).

3.3.5 Ethical considerations

Research ethics is concerned with the moral and responsible way in which a research project is undertaken (Saunders, Lewis, & Thornhill, 2009). Ethical considerations for studies involving human participants are centred on the avoidance of harm to all parties involved. The present research was conducted in line with the guidelines set forth by the College of Business, Social Sciences, and Law Ethics Committee (CBSSL) at Bangor University and all studies were approved by the CBSSL Ethics Committee prior to their implementation.

A fundamental principle of research ethics is that participation must be voluntary (Neuman, 2014). Informed consent is obtained when respondents agree to participate in the study based on full information about their participation rights and the use of data provided (Saunders et al., 2009). In this thesis informed consent was obtained from respondents in all studies prior to their starting the questionnaire. In studies 1.1, 2.1-3.2 data was collected using a web-based survey whereas in study 1.2 some respondents completed the questionnaire online and others via a paper and pencil survey. Questionnaires completed in paper and pencil format were accompanied by a participant information sheet. Respondents were required to check a box that stated they had read and understood the participation information provided and that they consented to take part in the study. Questionnaires completed via the SocialSci platform were first presented with a participant information page. Respondents were informed that proceeding to the survey constituted confirmation that they understood the information provided and that their consent to participate in the study. The information presented in the participant information sheet and participant information page in study 1.2 was the same. Therefore, all respondents received exactly the same information prior to taking part in the study, regardless of which mode of questionnaire they completed.

Participant information sheets or participant information page presented respondents with the following information in all studies:

1. Overview of the topic, research aims and purpose.

2. Summary of the type of information gathered.

3. Approximate time required to complete the survey.

4. Remuneration rate and conditions which must be met for payment to be made (studies 2.1-3.2 only).

5. How confidentiality and anonymity would be managed.

6. That participation was voluntary.

7. That they had a right to withdraw at any time until they submitted the completed questionnaire.

    a. That they would not be disadvantaged or penalised for withdrawing from the study (studies 1.1 and 1.2).

    b. That if they withdrew from the study they would not be paid (studies 2.1-3.2).

8. What the data collected would be used for.

9. Contact details of the researcher and researcher's supervisor.

In survey research private details may be collected about respondent such as their beliefs, attitudes, behaviours, and demographic information. Ethical research involves only collecting information that is necessary to achieve the research objectives and protecting that information from public disclosure (Neuman, 2014). Anonymity and confidentiality are the two ways in which researchers may protect the privacy of respondents after data is collected. Data is anonymous when the researcher is unable to identify which respondent provided a particular response (Babbie, 1990). Confidential data is where the researcher may link a response to a particular respondent but does not. Instead information is only presented in an aggregate form (Neuman, 2014).

In studies 1.1 and 1.2 data was collected anonymously as no personally identifiable information was collected. No information was gathered overtly or covertly regarding the email or IP address of respondents completing the survey online. Respondents who completed the paper and pencil questionnaire in study 1.2 were asked to deposit their completed questionnaire in a box nearby which ensured the anonymity of the data. Data for studies 2.1-3.2 were collected via the MTurk platform and treated confidentially. When

registering for the platform MTurk workers are assigned a unique worker ID. It is necessary for researchers to obtain this worker ID for all respondents in a study so that they may confirm that the respondent has satisfactorily completed the survey. For studies 2.2 and 3.2 it was also necessary to collect this worker ID so that the researcher could invite the respondent to complete a follow-up survey at a later time. Whilst the worker ID does not explicitly identify the individual to whom it belongs, it some circumstances it can be used to identify the individual (Lease et al., 2013). As studies 2.1 and 3.1 required workers to complete one survey the worker ID was collected only to confirm that the respondent had satisfactorily completed the questionnaire and to confirm payment. Once payment had been confirmed the data was anonymised and the researcher worked only from this anonymous data set. Studies 2.2 and 3.2 required workers to complete two surveys two weeks apart. Worker IDs were collected in both phases of data collection so that responses from each respondent could be matched for analysis. Once responses from the two data collection phases were matched, reviewed, and payment approved the data set was anonymised.

When conducting research particular care must be taken to safeguard the dignity and rights of vulnerable people and when sensitive topics are being investigated. The present research did not involve vulnerable groups such as children, people with disabilities, or those with whom permission of a gatekeeper would be required to take part in the study. The behavioural contexts investigated in this thesis were not thought to be sensitive in nature, such as criminal activity, experience of violence, or illness. It is possible; however, that participating in the studies may provoke negative feelings for individuals who have been personally affected by the topics of the studies. For example, if the individual has been in receipt of donated blood, has been affected by skin cancer, or experienced problems with their weight they may reflect on these experiences when answering the related questionnaire. The risk of such distress was minimised in several ways. The studies did not elicit information about respondent's personal experiences or require them to provide explanations for their responses. The questions were also purposefully worded in a neutral and general way. Care was taken to ensure that respondents were aware of the topic of the study and the type of questions asked prior to their participation. To ensure respondents did not feel pressure to take part or continue with the survey should they not wish to, the voluntary nature of participation and respondent's rights to withdraw at any time were also emphasised. Respondents were also encouraged to contact the researcher or their supervisor if they had any questions or concerns about the study. Furthermore, contact details for appropriate support services were provided. For example, the participation

information sheet for the blood donation studies (1.1 and 1.2) included the telephone number and email address for Bangor Student Services because respondents for these studies were students. None of the studies of this thesis involved deception and there was no risk to the researcher in conducting the research as all data was collected in public areas of the university campus.

Studies 2.1-3.2 provided a financial incentive for participation. Requirements for successful completion of the study were clearly outlined to respondents in the study description on the MTurk platform and in the participation sheet. For example, respondents were informed that they must only complete the survey once, answer honestly, and carefully work through the survey. Whilst responses were removed from the data set for a number of reasons, payment was only withheld from a small number of respondents where they had obviously violated the conditions of the study. Where payment was withheld, respondents were notified of the reason which gave them the opportunity to discuss this with the researcher should they want to. Estimated completion times for the studies were purposefully overstated and the payment amount was clearly indicated in the participant information sheet and page. Overstating the estimated completion times ensured that payment met or exceeded the rate suggested by MTurk for most respondents. Respondents were made aware that payment would be authorised within 48 hours of their completing the survey. After completing the survey respondents viewed a page which thanked them for their participation and once again provided the contact details of the researcher and their supervisor. This made it simple for respondents to ask any questions or report concerns if they arose during the study. The researcher also ensured that all communication from respondents or potential respondents received a prompt reply.

Research ethics is also concerned with the processing, storing, and movement of personal data which is legally protected under EU Directive 95/46/EC. Personal data is that which can be linked to an identifiable person (Neuman, 2014). Greater restrictions apply to the use of sensitive personal data such as racial or ethnic origin, religious beliefs, or political opinions (Neuman, 2014). In the present research steps were taken to ensure the appropriate management of all data collected. By obtaining informed consent respondents were made aware of how the data collected in the study would be used. All paper and pencil questionnaires were anonymous and, therefore, contained no personal data. Despite this, all questionnaires were stored in a locker at a secure location of the university. MTurk was used

to recruit respondents for studies 2.1-3.2. The worker ID for all respondents who completed a questionnaire was listed on the researcher's MTurk dashboard. Once data collection had been completed for each study the researcher removed details of the HIT and worker ID's from their MTurk account. Whilst this meant that worker ID's could no longer be viewed via the researcher's account, workers were still able to view details of the HIT and contact the researcher if they desired. Data for all web-based questionnaires was collected via the SocialSci platform which required a password to access. Permissions to access the questionnaires and data were restricted to the researcher and their supervisors. Once data collection had been completed for each study the data was downloaded and subsequently deleted from the platform.

All data for the present research was kept on an encrypted and password encrypted computer at all times. Backup copies of the data files were stored on a secure area of the university computer system. In line with the university guidelines, data for this thesis will be retained until the degree is awarded. To further protect the privacy of respondents, only anonymised data was transferred, for example from student to supervisors via the university email system.

3.3.6 Data analysis

3.3.6.1 Elicitation study data analysis

The TPB seeks to explain behaviour at the individual level, however, the content and number of individual accessible beliefs emitted in the belief-elicitation study varies from one respondent to the next. This makes it difficult to identify which beliefs are readily accessible for a given population and to compare beliefs held by different groups (Fishbein & Ajzen, 2010). To meet the aims of the present research it is necessary to compare the beliefs held in regard to performing and not performing the behaviours investigated. To do this it is necessary to create modal salient belief sets for action and inaction using content analysis. The use of modal salient sets overcomes the administrative difficulties associated with assessing individually readily accessible beliefs and provides uniform measures which simplify subsequent quantitative analysis (Agnew, 1998). A potential concern with the use of modal belief sets is that they assume homogeneity of beliefs in the population. Agnew (1998) compared the use of modal versus individually salient beliefs within the TRA framework and found that individually salient beliefs exhibited only marginally higher

correlations with their corresponding global constructs and intention than modal belief sets. In addition the overlap between individually salient and modally salient beliefs was approximately 80% for behavioural and normative beliefs. Agnew (1998) concluded that the modal salient belief sets sufficiently capture individually salient beliefs.

The content analysis procedure used in all belief-elicitation studies of this thesis followed the recommendations of Fishbein and Ajzen (2010). This involved grouping together beliefs which referred to similar outcomes and counting the frequency of their occurrence. Outcomes which were semantically different but clearly referred to the same belief were grouped together. For example, responses 'hurting' and 'painful' were regarded as equivalent in the blood donation elicitation study because they are different words used to describe the same experience. Beliefs that were similar but may not refer to the same outcome were grouped together if they could reasonably be emitted from the same respondent. As such, related outcomes were treated as separate beliefs when they were both mentioned by numerous respondents. On the other hand, related outcomes were grouped together if few respondents mentioned both beliefs. Fishbein and Ajzen (2010) also advise that low frequency outcomes that have something in common many be grouped together. These responses may be given a general label in the modal set.

Ajzen and Fishbein (1980) outline three decision rules for determining which beliefs are included in the modal salient set. The first rule involves using the 10-12 most frequently mentioned beliefs. They note that when a large number of outcomes are included in the modal set it is likely that at least some beliefs mentioned by each respondent will be included. The second rule involves including a certain percentage of the total number of beliefs mentioned, such as choosing all beliefs emitted until 75% of beliefs are accounted for. The third rule involves including beliefs that exceed a certain frequency, such as all beliefs listed by at least 10 or 20 percent of respondents. The choice of decision rule involves finding a balance between maximising the number of personal salient beliefs included, minimising the number of beliefs omitted, and also minimising the number of beliefs included that are not salient to the individual (Sutton et al. 2003). As such, there is no clear criteria to indicate which rule should be used in a particular study, the rule applied is based on what the researcher believes to be the most appropriate (Ajzen et al. 1995).

Sutton et al. (2003) argue that including beliefs that are not salient to the individual is a more serious error than omitting individual salient beliefs in the modal set. This is because the presentation of a non-salient belief may cause it to become salient to the individual and, in turn, lead to a change in attitude. Fishbein and Ajzen (2010), however, highlight that when completing a belief-elicitation questionnaire respondents may recall previously non-salient information or make new inferences on the basis of new information. This may prompt beliefs to be accessible that may become important determinants of their attitude. A 20 percent decision rule was utilised for all elicitation studies of this thesis. This approach was the best fit with the characteristics of both action and inaction data sets and provided a clear cut off point for inclusion.

3.3.6.2 Main study data analysis

A number of analytic methods and techniques are utilised in this thesis, namely structural equation modelling (SEM), path analysis, multiple regression and moderation analysis. Each of these methods and techniques will be outlined in the following section. However, the focus of this discussion is on SEM which is the main data analysis method utilised in the present research.

Structural equation modelling (SEM) is a group of statistical techniques used to simultaneously estimate the relationship between multiple exogenous (independent) and endogenous (dependent) constructs (Gefen, Straub, & Boudreau, 2000). SEM has several advantages over first-generation multivariate procedures such as regression and factor analysis. SEMs support the inclusion of both measured (observed) and latent (unobserved) constructs whereas earlier procedures only support measured constructs. Latent constructs are hypothetical concepts that cannot be directly measured, such as attitude and intention. The latent construct is operationally defined by the researcher and measured by multiple observable and measureable indicators believed to represent the underlying construct (Byrne, 2010). SEM, therefore, facilitates the exploration of relationships between theoretical constructs (Urbach & Ahlemann, 2010). A full SEM consists of a measurement model and a structural model. The measurement model evaluates how, and to what extent, indicators relate to their underlying latent construct. The structural model is focused on how each construct relates to the other constructs in the model (Byrne, 2010).

The analysis of both measurement and structural models has important implications in terms of identifying and reducing error. Regression models do not distinguish between measurement error and error derived from a model's lack of fit due to structural misspecification (Iacobucci, 2009). Measurement error refers to biases or flaws in the measurement process which may occur for reasons such as respondents answering questions inaccurately or differently to the way intended by the researcher. By accounting for measurement error in the latent constructs it is possible to estimate the true structural coefficient (Ullman and Bentler, 2013). SEM, therefore, provides finer diagnostics for model improvement than regression (Iacobucci, 2009). SEM also reduces problems with some forms of multicollinearity because indicators of a given construct are represented by a factor which is not possible using regression models (Iacobucci, 2009).

Most techniques utilised in SEM research assume multivariate normality. Univariate distributions should be examined for outliers, skewness and kurtosis whereas multivariate distributions should be examined for normality and multivariate outliers (Ullman, 2006). SEM is based on covariance structures which are relatively less stable when estimated from small samples. Chi-square tests and parameter estimates are also sensitive to small sample sizes. It is, therefore, important that a sufficiently large sample is utilised in SEM (Ullman, 2006). Several rules of thumb are outlined in the literature for determining sufficient sample sizes in SEM models. A minimum of 100-150 or 200 cases have been suggested (Anderson & Gerbing, 1988; Kline, 2015). Furthermore, Kline (2015) argues that a minimum of 100 cases per group should be used for multi-group modelling. Bentler and Chou (1987) suggest that for each free parameter in the model there should be a minimum of 5 cases when latent constructs have multiple indicators, although higher rations are preferable. Hair et al. (2009) suggests that model complexity should be taken into account when determining sample size, where more complex models require a higher sample size than simpler models. Model complexity is dependent on the number of latent constructs and whether the analysis includes a multi-group analysis. Sample sizes utilised in this thesis took into account the complexity of the model in terms of number of constructs and indicators, and that multi-group comparisons were performed. All indicator to case ratios are above 5:1.

3.3.6.3 Measurement model assessment

Measurement models specify the relationship between constructs and measures. The direction of this relationship may go from the construct to the measures (reflective

measurement) or from the measures to the construct (formative measurement) (Diamantopoulos, Riefler, & Roth, 2008). Figure 3.2 depicts the difference in relationship between construct and measures in reflective and formative measurement.

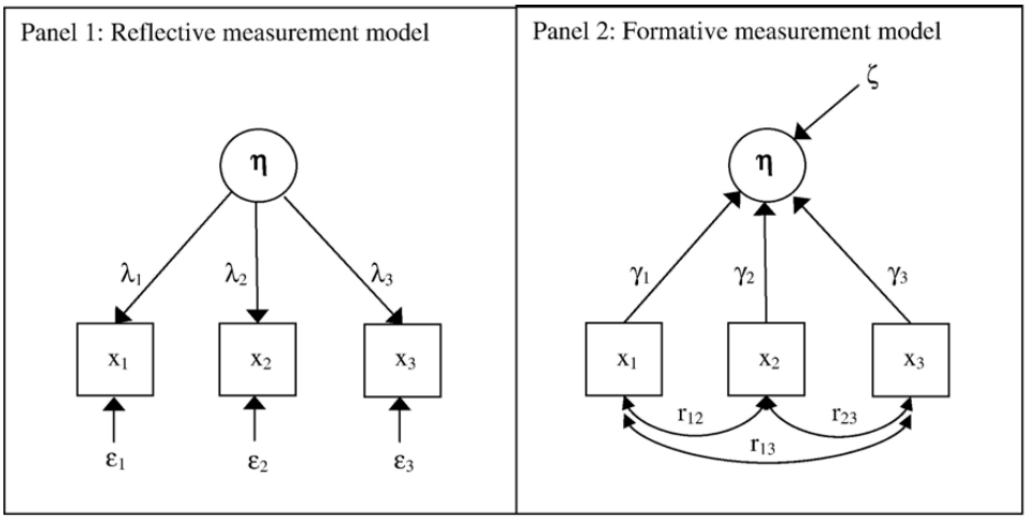

Figure 3.2 - Reflective and formative measurement models (taken from Diamantopoulos et al., 2008: p. 1205)

The characteristics of reflective and formative models differ in a number of important ways. Measures of a reflective model are assumed to capture the full meaning of the reflective construct and indicators are manifestations of the construct itself. Changes in an indicator should not change the meaning of the construct (Jarvis, MacKenzie & Podsakoff, 2003). Reflective indicators are also expected to covary with each other and a change in one indicator should be associated with a change in the other indicators measuring the same construct (Urbach & Ahlemann, 2010). The nomological net of reflective indicators should not differ as indicators should share the same antecedents and consequences. Finally, each reflective indicator has an error term which accounts for the way all measures are assumed to incorporate some error (Jarvis et al., 2003). In contrast, the meaning of formative constructs is derived from the formative indicators. A change in one indicator will change the underlying meaning of the formative construct. However, changes in the construct will not cause a change in the indicators of the construct (Urbach & Ahlemann, 2010). Formative indicators are instead not interchangeable. They do not need to share a common theme and omitting an indicator is likely to change the conceptual scope of the construct (Urbach & Ahlemann, 2010). Formative indicators may or may not covary and a change in one indicator will often not be associated with a change in other indicators of the same construct (Jarvis et al., 2003). The nomological net of formative indicators may be different because they are not

assumed to share common antecedents and consequences. In formative models the error term (disturbance) is at the construct level and individual indicators are specified as error free (Diamantopoulos et al., 2008). This error term represents the surplus meaning of the construct which is not captured by the set of formative indicators of the construct (Diamantopoulos et al., 2008; Jarvis et al., 2003). An overview of the differences between formative and reflective models is presented in Table 3.4.

Table 3.4- Decision rules for determining whether a construct is formative or reflective (taken from Jarvis, MacKenzie & Podsakoff, 2003: p. 203)

	Formative model	Reflective model
1. Direction of causality from construct to measure implied by the conceptual definition	Direction of causality is from items to construct	Direction of causality is from construct to items
Are the indicators (items) (*a*) defining characteristics or (*b*) manifestations of the construct?	Indicators are defining characteristics of the construct	Indicators are manifestations of the construct
Would changes in the indicators/items cause changes in the construct or not?	Changes in the indicators should cause changes in the construct	Changes in the indicator should not cause changes in the construct
Would changes in the construct cause changes in the indicators?	Changes in the construct do not cause changes in the indicators	Changes in the construct do cause changes in the indicators
2. Interchangeability of the indicators/items	Indicators need not be interchangeable	Indicators should be interchangeable
Should the indicators have the same or similar content? Do the indicators share a common theme?	Indicators need not have the same or similar content/indicators need not share a common theme	Indicators should have the same or similar content/indicators should share a common theme
Would dropping one of the indicators alter the conceptual domain of the construct?	Dropping an indicator may alter the conceptual domain of the construct	Dropping an indicator should not alter the conceptual domain of the construct
3. Covariation among the indicators	Not necessary for indicators to covary with each other	Indicators are expected to covary with each other
Should a change in one of the indicators be associated with changes in the other indicators?	Not necessarily	Yes
4. Nomological net of the construct indicators	Nomological net for the indicators may differ	Nomological net for the indicators should not differ
Are the indicators/items expected to have the same antecedents and consequences?	Indicators are not required to have the same antecedents and consequences	Indicators are required to have the same antecedents and consequences

Because formative and reflective measurements differ in conceptualisation and characteristics the analysis procedures followed for each type of model is also different. It is, therefore, important to correctly identify whether a model is reflective or formative to avoid model misspecification (MacKenzie et al. 2005). Within the TPB framework belief-based models are formative models whereas direct measure models are reflective models.

Prior to analysis, all data were assessed for coding errors, missing values, outliers, and multivariate normality of the data. The measurement models were then evaluated followed by the structural models. Due to differences in the analysis procedure for formative and reflective measurement models, measurement model analysis for the belief-based and direct measure models will be discussed separately.

3.3.6.4 Direct measure model analysis

Studies 1.2, 2.3 and 3.3 explore the application of extended direct measure TPB models when applied to action and inaction. Measurement models were compared in regard to relative model fit, extent of modifications required and psychometric properties. In each study, measurement models were first refined independently. This approach provides a 'best case' model for each alternative as would typically be presented in the literature because most TPB studies only apply the model to one behavioural alternative. The extended direct measure TPB model was then refined on a like-for-like basis so that comparison of the underlying factor structure and structural relationships could be made when the extended direct measure TPB model is applied to action and inaction. This approach also facilitated the use of multi-group confirmatory factor analyses (MGCFA) to compare action and inaction models which is not possible when the models differ (e.g. where two models have a different number of indicators).

Direct measure measurement models (study 1.2, 2.3 and 3.3) were assessed using confirmatory factor analyses (CFA) which analyse the correspondence between all latent factors of a model and their indicators (Kline, 2015). The first step of a CFA involves evaluating model fit (see Table 3.5 for an overview of benchmarks of model fit) which refers to the correspondence between the observed covariance matrix and the estimated matrix of the specified model (Hair et al. 2008). Assessment of goodness-of-fit enables the researcher to test whether the theoretical model is valid (Hair et al, 2008). There is no single measure of goodness-of-fit in SEM, rather the researcher must accept or reject a hypothesised model as a whole based on a range of fit statistics (Hair et al, 2008). Absolute fit indices are a direct measure of the extent to which the specified model reproduces the observed data (Hair, Anderson, Tatham, & Black, 1998). Incremental (or comparative) fit indices assess how well the estimated model fits the data relative to a statistical baseline model, typically the independence (null) model that assumes zero population covariances amongst the observed variables (Kline, 2015). Parsimony of fit indices provide information about which model among a set of competing models produces the best fit whilst taking into account the model's complexity (Hair et al. 1998).

Table 3.5 – Goodness-of-fit indices

Indices type	Index	Threshold
Absolute fit	Goodness-of-fit (GFI)	≥ .90 (Hair et al., 1998; Kline, 2011)
	Root Mean Square Error of Approximation (RMSEA)	< .80 (Hair et al., 1998)
Incremental fit	Adjusted Goodness-of-Fit Measures (AGFI)	≥ .90 (Hair et al., 1998)
	Comparative Fit Index (CFI)	≥ .95 (Hu & Bentler, 1999)
	Normed Fit Index (NFI)	≥ .90 (Hair et al., 1998)
	Tucker Lewis Index (TLI)	≥ .90 (Hair et al., 1998)
Parsimony of fit	Akaike Information Criterion (AIC)	Higher values indicate greater parsimony
	X^2/df	< 3.0 (Hair et al., 1998; Kline, 2011)

Construct validity refers to the extent to which measured variables represent the latent construct they are assumed to measure (Hair et al. 2008). One type of construct validity is convergent validity which refers to the extent that indicators of a specific construct converge or share a high portion of variance in common (Hair et al. 2008). Firstly, convergent validity is evidenced when all path estimates of all indicators measuring a common construct load significantly on that construct with standardized factor loadings relatively high, but not excessively so (.70 - .90) (Kline, 2015). Correlations between constructs should also be low (< .70). Each indicator yields a squared multiple correlation that represents the extent to which the indicator's variance is explained by the latent construct and should exceed .40. Hair et al. (2008) suggest indicators are removed if they do not load significantly or substantially on their respective construct or exhibit low squared multiple correlations. Average variance extracted (AVE) is the mean variance extracted for items that load on a construct and values of .5 and above indicate adequate convergence (Fornell & Larcker, 1981). Reliability is a measure of the extent to which a set of indicators is internally consistent in their measurement. Bagozzi and Yi (1988) recommend Cronbach's alpha values should exceed .6.

Discriminant validity is another form of construct validity and refers to the degree to which constructs that are assumed to differ are distinct (Hair et al. 1998). Two methods of assessing discriminant validity are reported in this thesis. The Fornell-Larcker criterion (1981) stipulates that discriminant validity is evidenced when the squared correlation between each pair of constructs is less than the AVE values for both of the constructs. According to the heterotrait-monotrait ratio of correlations (HTMT) criterion (Henseler, Ringle

& Sarstedt, 2015), discriminant validity is achieved when the ratio of average heterotrait-heteromethod correlations (i.e. the correlation of indicators across constructs) to the geographic mean of the average monotrait-heteromethod correlations (i.e. the correlations of indicators for the same construct) is less than .85 (Voorhees et al., 2016, p. 124).

When the extended direct measure action and inaction models were refined on a like-for-like basis, refinements to the models were only made when they were applicable across both action and inaction measurement models (e.g. where an item exhibited low standardized factor loadings or low squared multiple correlations across models). Refinements were not made when rules of thumb were not met by only the action or inaction model. In contrast, when refined independently, refinements were made to the action and inaction measurement models without consideration of the other model.

Multi-group CFAs (MGCFA) were utilised to establish whether action and inaction measurement models exhibit measurement invariance. Measurement invariance refers to the equivalence of instruments and measures of the same psychological construct across groups (Milfont & Fischer, 2010). Multi-group invariance involves assessing the equivalence of sets of parameters across two measurement models in an increasingly restrictive way (Byrne, 2009). Configural invariance indicates that respondents across two groups conceptualise constructs in the same way. It is tested by constraining the factorial structure to be the same across groups (Milfont & Fischer, 2010). Configural invariance is evidenced if the same number of factors and their pattern of fixed and freely estimated parameters are similar across models (Byrne & van de Vijver, 2010). Metric invariance tests whether respondents answer questions in the same way across groups, and if the strength of relations between scale items and their respective construct are the same across groups. It is tested by constraining all factor loadings to be equal across groups. It is evidenced when observed item differences across groups indicate group differences in the underlying latent construct (Milfont & Fischer, 2010). Scalar invariance is a measure of how observed scores are related to latent scores across groups and is tested by constraining intercepts of items to be the same across groups (Steenkamp & Baumgartner, 1998). Scalar invariance is evidenced when observed scores are related to latent scores, regardless of group membership. Examining measurement invariance across extended direct measure TPB models provides evidence of whether action and inaction are conceptually mirrored concepts within the TPB framework (objective 1.4).

3.3.6.5 Formative measurement model assessment

There is no widely accepted set of procedures for the evaluation of formative measurement models as there is for reflective models (Diamantopoulos & Winklhofer, 2001). Diamantopoulos and Winklhofer (2001) identify four issues discussed in the literature that are of importance when evaluating formative models. These include content specification, indicator specification, indicator collinearity, and external validity. Content specification refers to the scope of the latent variable that is defined by the indicators of the variable. Breath of definition is of key importance to causal indicators because failure to identify all facets of the construct will mean the full concept will not be captured (Nunnally, & Bernstein, 1994). The scope of the belief-based constructs was determined by the modal salient belief sets constructed in the belief-elicitation studies. The same procedures were followed to construct modal salient belief sets for action and inaction belief-based models. This ensured that content specification was equivalent across action and inaction models. Indicator specification must take into account the entire scope of the latent variable according to the content specification (Diamantopoulos & Winklhofer, 2001). This was addressed by incorporating all modal salient beliefs into the belief-based models.

The formative measurement model is based on multiple regression and so multicollinearity is of concern. Multicollinearity makes it difficult to separate the distinct influence each indicator exerts on the formative construct (Bollen, 1984; MacKenzie et al., 2005). Variance inflation factor (VIF) is a measure of indicator validity and identifies how much of an indicator's variance is explained by other indicators of the same construct in the model. Values of under 10 are viewed as acceptable (Urbach & Ahlemann, 2010). Indicator validity was also established by examining the extent to which formative indicators of a construct explain variance in that formative construct (Bollen, 1989). External validity refers to the degree to which a formative index is related to measures of other variables. There is considerable debate in the literature as to what procedures should be used to test for external validity (Diamantopoulos & Winklhofer, 2001). MacKenzie et al. (2005) recommend using the correlation between formative constructs and alternative measures of the same construct to assess reliability, however, Diamantopoulos et al. (2008) suggest this may actually capture external validity. In line with von Haeften, Fishbein and Kasprzyk (2001), the correlation between each of the belief-based constructs and its respective reflectively measured construct was tested. Significant correlations mean the formative index captures the concept as intended. The strength of the correlation indicates the extent to which the formative index captures the same concept as the direct measure construct.

Model identification is an important issue in the analysis of formative models. Model identification refers to whether it is theoretically possible for the SEM model to derive a unique estimate for every model parameter (Kline, 2015). By their nature formative models are not identified and, therefore, estimation of the model cannot occur. This is because the number of non-redundant elements in the covariance-matrix of the observed variables must be equal to or larger than the number of unknown parameters in the model (Diamantopoulos et al. 2008). To address this issue, formative constructs must emit at least two paths to reflective constructs or indicators (Diamantopoulos et al. 2008). Identification is achieved in study 2.2 and 3.2 using multiple indicator multiple cause (MIMIC) models (see Figure 3.3). MIMIC models have been shown to exhibit superior fit compared to other methods of identifying formative models (Diamantopoulos & Temme, 2013). Reflective indicators used to identify formative models were selected on the basis that they loaded significantly and substantially on their respective construct and exhibit high squared multiple correlations in both action and inaction extended direct measure models. As such, they were shown to be strong indicators of their respective construct to a similar extent in the action and inaction models.

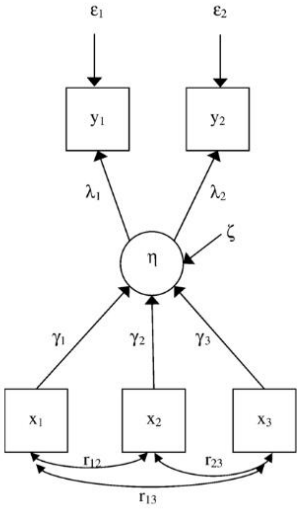

Figure 3.3 - Identification using a MIMIC model (taken from Diamantopoulos et al. 2008)

3.3.6.6 Structural model assessment

The structural model is the aspect of SEM that examines the relationships between constructs in the model (Kline, 2015). The extended direct measure structural models were first examined in terms of model fit using the same indices as in the CFA. Overall model fit using at least one absolute index, one incremental index and the χ^2 is necessary to evidence

acceptable model fit (Hair et al. 2008). The structural relationships of the belief-based and extended direct measure models were examined in regard to the statistical significance, direction, the strength of the relationships in addition to variance-explained. Comparison of the significance, direction and strength of structural relationships across belief-based (objective 1.5) and extended direct measure (objective 1.7) models when applied to action and inaction identifies whether action and inaction are influenced by different determinants. It also facilitates the exploration of whether anticipated regret exerts a differential influence on intention and behaviour when the extended direct measure model is applied to action and inaction (objective 4.1 to 4.4). Comparison of the variance-explained in the belief-based (objective 2.2) and extended direct measure (objective 3.4) models also provides insight into whether the models operate equivalently when applied to action and inaction.

Structural invariance tests were conducted using multi-group comparisons to establish whether the structural relationships of the extended direct measure models are equivalent when applied to action and inaction (objective 1.8 and 4.5). Structural invariance tests are performed in two steps. Firstly, fit statistics are obtained for the baseline multi-group model to establish that the same pattern of parameters can be fit to the data across groups. Secondly, chi-square difference tests are performed to establish whether there are significant differences in the standardized regression weights across models (Byrne, 2010). Significant chi-square difference tests indicate that there are significant differences in the relationship between two constructs across models. Structural invariance was established to identify whether determinants of intention (study 1.2, 2.3 and 3.3) and behaviour (2.3, 3.3) are significantly different for action and inaction.

Because belief-based models for action and inaction incorporate different beliefs for each construct, multi-group comparisons were conducted using path analyses. Path analysis involves the evaluation of a structural model without the accompaniment of a measurement model. As such, the focus of path analysis is only focused on how constructs relate to each other (Hair et al. 2008). Evaluation of the structural equivalence of belief-based measures was conducted using composite scores for each of the belief-based constructs. The approach followed was the same as for the extended direct measure models previously outlined. Establishing the structural equivalence of relationships when the belief-based models are applied to action and inaction addresses objective 1.6.

3.3.6.7 Regression analysis

Regression analysis is a general statistical technique used to determine the relationship between a number of independent variables and a single dependent variable (Hair et al., 1998). Hierarchical regression involves entering different independent variables at different stages of the regression analysis to identify the specific amount of variance explained by that independent variable. This permits the researcher to establish whether such independent variables significantly add to the prediction of the dependent variable when all other variables are accounted for (Kline, 2015). Hierarchical regression was used to test whether distinct beliefs about action and inaction significantly enhance the predictive power of the belief-based model, over and above the variance already explained by the mirrored beliefs between action and inaction in studies 2.2 and 3.2 (objective 1.3).

3.3.6.8 Moderation analysis

Moderation analysis tests whether the strength or direction of a relationship between an independent (X) and dependent (Y) variable changes due to the effect of another variable (M) (Hayes, 2014), as depicted in Figure 3.4. Moderation analysis involves first fitting a regression model where the dependent variable is predicted from the independent variable and proposed moderator. In the second step the interaction effect between the independent variable and moderator is added into the model. Moderation is evidenced when this model yields a significant change in R^2 and the interaction effect is significant (Hayes, 2014).

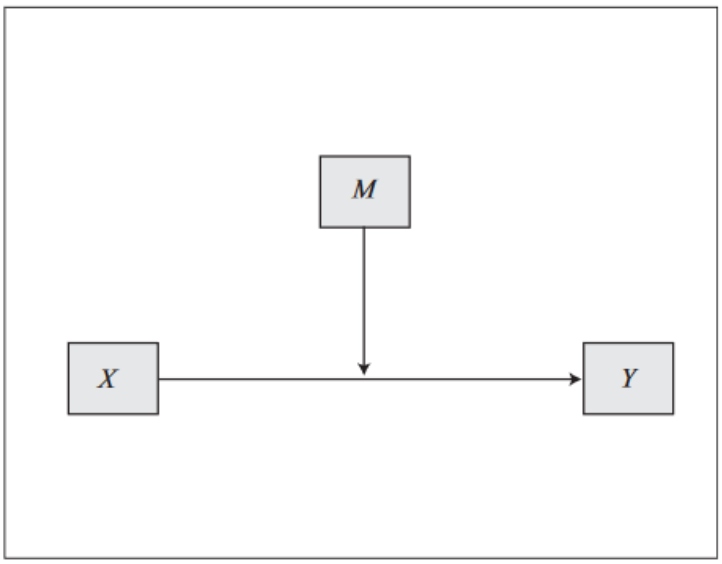

Figure 3.4 – Conceptual diagram of simple moderation model (Hayes, 2013)

The interaction is then probed to establish where in the distribution of the moderator the independent variable is related to the dependent variable (Hayes, 2014). The interaction was probed using simple slopes analysis by selecting values of the moderator, calculating the conditional effect of the independent variable on the dependent variable at these values, and generating a confidence interval for this effect (Hayes, 2014). Moderation analyses were conducted to determine whether actual capacity and actual autonomy moderate the intention-behaviour relationship differently across action and inaction models in studies 2.3 and 3.3 (objective 3.3).

3.4 Chapter summary

This chapter has discussed the overarching methodology of the thesis. The research is conducted within a post-positivist paradigm with descriptive and exploratory purposes. Cross-sectional survey designs are employed across all 3 empirical studies. Justification for the survey administration methods, time interval, and sampling technique utilised are detailed. An in-depth discussion of the questionnaires and procedures employed across studies was also presented. Ethical considerations most pertinent to the research were identified and measures taken to address these considerations outlined. Finally, the chapter discussed the data analytic techniques and procedures used to analyse the elicitation and main study data.

Chapter 4 Blood Donation

This chapter explores the application of the TPB framework to donating and not donating blood. The chapter begins with a review of the blood donation literature (section 4.1) pertinent to the aims of this thesis. A belief-elicitation study is then presented which explores the belief-based foundations of donating and not donating blood (section 4.2). The main TPB study then explores the application of an extended direct measure TPB model to donating and not donating blood (section 4.3). This model incorporates measures of AIR and PB into the direct measure TPB model (see Figure 4.1). The studies test the complementarity assumption in the context of donating and not donating blood (research aim 1); assess whether extended direct measure TPB models operate differently when applied to donating and not donating blood (research aim 3); and to determine whether AIR exerts a differential influence on intention to donate and not donate blood (research aim 4).

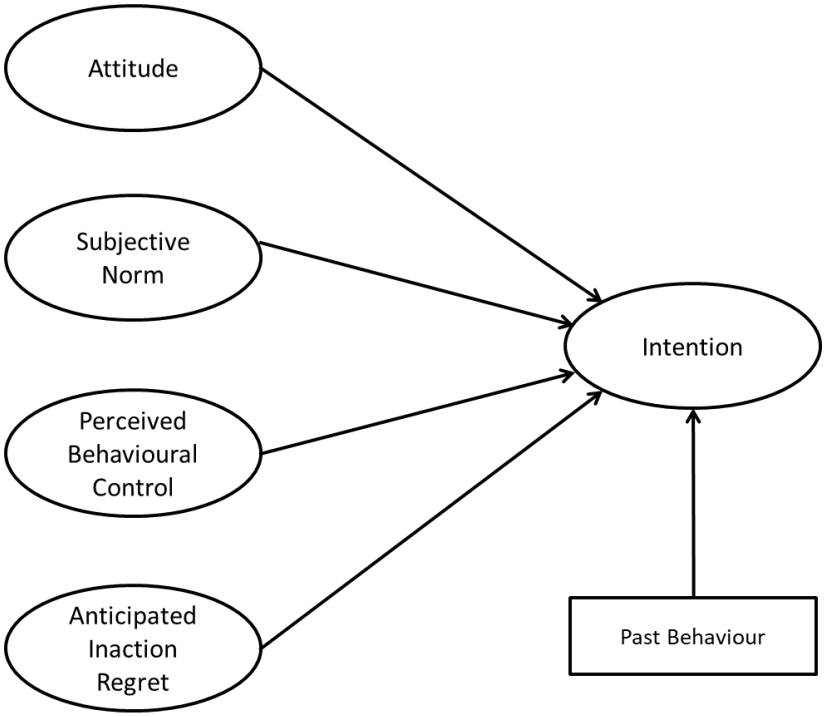

Figure 4.1 - Conceptual model for study 1.2

4.1 Literature review

Blood donation is an integral aspect of health services around the world where blood and blood products are required to save lives and improve health across a broad range of clinical procedures. The recruitment and retention of non-remunerated, volunteer, regular blood donors is essential to maintaining an adequate and safe blood supply (World Health Organization, 2017). In Briton it is estimated that over 25% of people will require a blood transfusion at least once in their lifetime, yet only around 4% of the eligible population regularly donate blood (NHS Blood and Transplant, 2017). The environment in which blood donation takes place is rapidly changing. Whilst demand for whole blood donation fell for many years due to medical advancements, a 2011 survey of blood services across Europe reports that demand for red blood cells is expected to increase by 3-33.6% by 2020. By this time the Welsh Blood Service and the Scottish National Blood Transfusion Service anticipate an increase in demand for red blood cells of 20-25% (Velindre NHS Trust, 2017). The increasing need for blood donation is largely attributed to the growing and aging population which is expected to increase the demand for medical procedures involving blood and blood products. Around half of blood donors in England and Wales are over the age of 45 years and the recruitment of younger donors is key to ensuring future supply requirements are met. In England alone there is a need to recruit approximately 200,000 new donors each year to meet current demand (NHSBT: NHS Blood and Transplant, n.d.). Despite this, NHSBT in England saw a 40% drop in donors in 2014/15 compared to the year 2004/05 while the Welsh blood service saw a 34% reduction in donors between 2005 and 2015 (Velindre NHS Trust, 2017). This reflects a global decline in new donor registration of almost 30%[1] compared to a decade ago (NHS Blood and Transplant 2016).

4.1.1 Belief-based foundations of donating and not donating blood

The TPB is a dominant theoretical framework used to examine the determinants of blood donation (Ferguson, 1996; Masser & Bagot, 2014). In order to understand why people donate or do not donate blood it is necessary to identify the belief-based determinants of these behaviours (Fishbein & Ajzen, 2010). It is these beliefs which may be targeted in behaviour change interventions that aim to recruit new donors or increase donation activity amongst existing donors. Despite this, few TPB studies have conducted a belief-elicitation

[1] A survey of participating blood services for the April 2016 Missing Type campaign identified a 27.6% drop in new donors in 2015 compared with 2005 across 21 countries.

study to identify the belief-based determinants of blood donation. Studies exploring the belief-based foundations of intention to donate blood have tended to compare beliefs between groups. For example, beliefs about giving blood have been compared between donors and non-donors (Melanie Giles & Cairns, 1995), beliefs in regard to donating blood during two phases of an avian influenza outbreak have been compared for individuals with low and high intention to donate blood (Masser, White, Hamilton, & McKimmie, 2012), the beliefs of novice and experienced whole-blood donors have been compared in regard to commencing and continuing plasmapheresis (Bagot, Masser, White, & Starfelt, 2015), and beliefs of first-time blood donors have been compared between those who experienced and did not experience a mild aversive reaction (Masser, White, & Terry, 2013).

Donating and not donating blood represent two mutually exclusive and exhaustive alternatives in regard to blood donation. The reasoned action approach holds that for such behaviours it should only be necessary to assess one behavioural alternative to understand the determinants of both action and inaction (Ajzen, 2017; Fishbein, 1980; Fishbein & Middlestadt, 1987). Masser et al. (2013) captured the beliefs about donating blood held by individuals whom experienced or did not experience a mild aversive reaction following their first blood donation. Examples of the beliefs elicited in regard to donating blood include 'feeling good about yourself', 'increasing blood stocks', and 'improving your own health', amongst others. It is feasible that some beliefs are conceptually mirrored between action and inaction. For example, the belief that donating blood will make the individual feel good about themselves is the mirror opposite of the belief that not donating blood will make the individual feel bad about themselves. It is less plausible that some other beliefs are conceptually mirrored. The conceptual opposite of the belief 'donating blood will increase blood stocks' is that not donating blood will reduce blood stocks, which is illogical. Instead, an individual would be more likely believe that their not donating blood will simply not increase blood stocks. Similarly, the mirror opposite of the belief that donating blood will improve your own health is that not donating blood would harm your own health which, again, is an unlikely belief. Rather, the individual may believe that not donating blood will not lead to improved health. These beliefs are better defined as conceptually related rather than conceptual opposites of each other. It is also conceivable that beliefs about the blood stock levels and potential improvements for one's health are not salient when thinking about not donating blood. Instead, not donating blood may evoke distinct beliefs unrelated to those held about donating blood. Accordingly, modal salient belief sets in regard to donating and not donating blood should not be strictly conceptually mirrored.

4.1.2 The determinants of donating and not donating blood

The TPB has been applied to predict intention to donate blood in numerous studies (e.g. Armitage & Conner, 2001b; Conner et al., 2013; France, France, & Himawan, 2008; Giles & Cairns, 1995; Giles et al., 2004; Godin & Germain, 2013; McMahon & Byrne, 2008b; White, Poulsen, & Hyde, 2017). White et al. (2007) found that the TPB explained 41.5% of the variance in intention to donate blood, whereas Conner et al. (2013) found that the standard TPB constructs explained 37% of the variance in intention. A review of TPB studies investigating blood donation has shown that PBC is consistently the strongest predictor, and subjective norm the weakest predictor of intention to donate blood across donor samples (i.e. where non-donor, donor, or mixed samples are examined) (Masser, White, Hyde, & Terry, 2008). These findings are consistent with the results of a meta-analysis on the antecedents of blood donation within the TPB, where PBC and attitudes are shown to exhibit a large association with intention whereas subjective norm and descriptive norm exhibit medium and small associations with intention, respectively (Bednall, Bove, Cheetham, & Murray, 2013).

Studies investigating blood donation within the TPB have focused on identifying the determinants of donating blood. No known studies have applied the belief-based or direct measure TPB models to identify the determinants of not donating blood. Instead, blood donation research tends to be conducted with a complementarity assumption where determinants of not donating blood are assumed to mirror those of donating blood. For example, Lemmens et al. (2009) examined the determinants of intention to donate blood amongst non-donors as a means to identify antecedents of blood donation that may be targeted for behaviour change interventions. The study recommended that intention to donate blood may be enhanced if non-donors were exposed to persuasive messages tackling key factors that were found to motivate non-donors to intend to donate blood. The research was therefore conducted under the assumption that the reason non-donors do not intend to donate blood is because they are insufficiently motivated by factors that are found to motivate non-donors to intend to donate blood. The study does not acknowledge that non-donors who do not intend to donate blood may be influenced by important distinct beliefs about not donating blood. A key limitation of this approach is that the determinants of not donating blood remain unknown and behaviour change interventions aiming to increase blood donation by tackling cognitions relevant to donate blood may not be optimally effective.

4.1.3 Action and inaction asymmetry in the domain of blood donation

The decision to perform and not perform a behaviour may be guided by non-equivalent processes (see section 2.2 for review). Information about action tends to be noticed, processed and utilised more effectively than information about inaction (e.g. Eerland & Rassin, 2012; Fazio et al. 1982; Hearst, 1991). Beckmann and Young (2007) find that people do not effectively utilise absent stimuli when learning unless the inaction is made highly salient. Similarly, negations tend to be processed less effectively than affirmations when they are of low salience, but with similar efficacy when they are of high salience (e.g. Glenberg et al., 1999). This research suggests that the TPB may operate more effectively when applied to behavioural contexts for which people hold highly accessible beliefs than applied to those for which people hold relatively less-accessible beliefs.

Not donating blood is the 'default' state that occurs when people have not considered donating blood, have decided to not donate blood, or fail to carry out their intention to donate blood. Not donating blood is an inactive behaviour that does not require any effort on the individual's part. It also does not typically involve a strong sensory experience from which beliefs may be formed. Beliefs people hold about not donating blood are therefore expected to be relatively low in accessibility. Donating blood involves deviating from the default position and requires both physical and mental effort to perform. It is also associated with strong sensory experiences such as discomfort and anxiety. As such, people are likely to hold relatively more accessible beliefs about donating blood than not donating blood. Due to this, the direct measure TPB model may operate more effectively when applied to donating blood than not donating blood.

4.1.4 Blood donation and anticipated regret

Numerous studies have extended the TPB to include a measure of AIR. People are assumed to consider the regret that they may experience in the future if they forgo the opportunity to donate blood (Godin et al., 2007). Because blood donation is an altruistic behaviour, greater AIR is associated with a stronger intention to donate blood. AR is shown to be a significant predictor of intention to donate blood (Faqah, Moiz, Shahid, Ibrahim, & Raheem, 2015; Masser et al., 2009; McMahon & Byrne, 2008a; Robinson, Masser, et al., 2008) and, in some studies, blood donation behaviour (Godin et al., 2007). Sandberg and

Conner (2008) conducted a meta-analysis incorporating data from TPB studies that capture AR. The study found that standard TPB constructs accounted for 30% of the variance in intention and AR significantly increased the amount of variance explained by 7%. AR was the strongest predictor of intentions in the model. When added into the hierarchical regression after past behaviour, AR explained an additional 4% of the variance in intention over the TPB constructs and past behaviour. Similarly, in another meta-analysis AR was shown to significantly raise the explained variance in intention from 33% to 38% (Rivis et al., 2009). No known studies have examined the role of AIR in the prediction of not donating blood and therefore its influence on intention is unknown.

Sandberg et al. (2016) argue that AIR will exert a strong influence on intention to perform distal benefit behaviours. Blood donation is a distal benefit behaviour performed with the expectation that the blood one donates will improve the health and wellbeing of recipients in the future. Donating blood is also associated with proximal outcomes that are more mixed in valence, such as encountering vasovagal symptoms, loss of time to do other activities, and feeling proud of oneself. However, these proximal outcomes are of lower importance than the positive future outcome that donating blood will result in. As such, AIR is purported to influence intention to donate blood because it captures the regret one may experience if they forgo the future positive outcome of helping other people. Sandberg et al. (2016) also posit that AIR may influence intention to perform immediate hedonic behaviours because not performing the behaviour may result in the loss of the positive immediate outcome. Not donating blood may be classified as an immediate hedonic behaviour because it is associated with positive proximal outcomes such as avoiding negative emotional or sensory experiences and having more time to do other things. Not donating blood may also lead to more distal negative outcomes in regard to not helping individuals in need of blood or blood products. As such, AIR may also be expected to influence intention to not donate blood. It is important to note that Sandberg and Conner (2008) discuss the way in which AR will influence intention to perform immediate hedonic and distal benefit behaviours. They do not clarify the pattern of AR that may influence intention to not perform immediate hedonic and distal benefit behaviours. It is therefore necessary to establish whether the pattern of regret outlined by Sandberg et al. (2016) holds when the direct measure TPB model is applied to inaction.

Based on this literature the following research questions are proposed:

1. Does the complementarity assumption hold in the context of blood donation?

1.1 To what extent are modal salient belief sets for donating and not donating blood composed of conceptually mirrored beliefs?

1.2 Do extended direct measure donating and not donating blood models exhibit measurement invariance?

1.3 Do different determinants underlie intention in the extended direct measure donating and not donating blood models?

1.4 Are structural relationships of the extended direct measure donating and not donating blood models equivalent?

2. Does the extended direct measure TPB model operate differently when applied to donating and not donating blood?

2.1 Do the extended donating and not donating blood models exhibit similar model fit?

2.2 Are the psychometric properties of the donating and not donating blood models similar?

2.3 Is the explanatory power of the extended direct measure structural models similar across donating and not donating blood models?

3. Does AIR exert a differential influence on intention to donate and not donate blood within the extended direct measure TPB model?

3.1 Does AIR exert a differential influence on intention across donating and not donating blood models?

3.2 Are the structural relationships between AIR and intention equivalent across donating and not donating blood models?

4.2 Study 1.1 Belief-elicitation

A belief-elicitation study was undertaken to identify the readily accessible behavioural, normative, and control beliefs people hold about donating and not donating blood. The elicitation study will address research question 1.1 by establishing the extent to which modal salient beliefs about donating and not donating blood are conceptually mirrored or distinct.

4.2.1.1 Method

4.2.1.1.1 Respondents

A purposive sample of 37 British Bangor University students studying on a taught postgraduate programme completed the blood donation elicitation study. Seventeen respondents completed the questionnaire about donating blood (12 female, M age = 22.4 years, S.D. = 3.72) and 20 respondents completed the questionnaire about not donating blood (14 female, M age = 23.9 years, S.D. = 4.73). An overview of the demographic and background information for the full, donating, and not donating blood samples is provided in Table 4.1. An invitation to complete the anonymous online questionnaire was sent to all students registered on a postgraduate taught course in the College of Business, Law, Education and Social Science at Bangor University via the university email list system. A reminder email was sent to these students three weeks later. Students were also approached in the university libraries and given a flyer that featured the questionnaire website address. Survey Platform SocialSci (www.SocialSci.com) was used to create and host the questionnaire.

Table 4.1 - Demographic characteristics and background information for the full, donating, and not donating blood elicitation study sub-samples

	Full sample (n = 37)	**Donating Blood** (n = 17)	**Not donating blood** (n = 20)
Age (M years, SD)	23.19 (4.31)	22.35 (3.72)	23.9 (4.73)
Gender (% female)	26 (70.3)	12 (70.6)	14 (70)
Course type (% undergraduate)	28 (75.7)	13 (76.5)	15 (75)
Eligibility belief	Frequency (%)		
Eligible	25 (67.6)	12 (70.6)	13 (65)
Not eligible	6 (16.2)	2 (11.8)	4 (20)
Don't know	6 (16.2)	3 (17.6)	3 (15)
Past behaviour	Frequency (%)		
Never donated	21 (56.8)	10 (58.8)	11 (55)
Donated once	3 (8.1)	1 (5.9)	2 (10)
Donated 2-10 times	11 (29.7)	5 (29.4)	6 (30)
Donated 11-20 times	2 (5.4)	1 (5.9)	1 (5)

4.2.1.1.2 Materials and procedure

The belief-elicitation surveys were constructed based on the guidelines provided by Ajzen and Fishbein (1980). Ajzen (2011) notes that these guidelines should serve as a basis for the belief-elicitation procedure but researchers should adapt or extend the questions as appropriate. Because the study aimed to compare the readily accessible beliefs related to donating and not donating blood it was necessary to ensure the belief-elicitation procedure adequately captured beliefs in regard to both alternatives. Several additional questions (Q4, Q5, Q12) were added to the standard belief-elicitation questions which are presented in Figure 4.2 along with a breakdown of the readily accessible beliefs elicited for each question.

Table 4.2 - Elicitation study items and salient beliefs for donating and not donating blood

Donating blood	Total (n=17)	%	**Not donating blood**	Total (n=20)	%
Behavioural beliefs					
Q1 - What do you see as the advantages of you (not) donating blood at a blood donation session in the next month?					
Help saves lives	16	94	More time to do other things	10	50
Make me feel good about myself	10	59	No hassle of making an appointment	6	30
			Avoid pain and discomfort	4	20
Q2 - What do you see as the disadvantages of you (not) donating blood at a blood donation session in the next month?					
Cause pain and discomfort	5	29	Not helping people who need a transfusion	15	75
Take up my spare time	4	24			
Q3 - What else comes to mind when you think about (not) donating blood at a blood donation session in the next month?					
Make me feel nervous or tense	4	24			
Q4 - What do you think are the possible outcomes of you (not) donating blood at a blood donation session in the next month for **yourself**?					
Feel good about myself	14	82	Disappointed in myself	5	25
Feel faint	4	24	Avoid being frightened by blood or needles	4	20
			Avoid feeling nervous or tense	4	20
Q5 What do you think are the possible outcomes of you (not) donating blood at a blood donation session in the next month for **other people**?					
Help people who need blood	16	94	Become more ill/die	12	60
Inspire other people to donate blood	5	29	Reduced blood stocks/pressure on health service	7	35
Normative Beliefs					
Q6 - Please list the individuals or groups who would approve of you (not) donating blood at a blood donation session in the next month.					
Friends	12	71	Religious groups	13	65
Family	12	71	Friends	5	25

Partner	9	53	Family	4	20
Health care professionals	8	47	Parents	4	20
Q7 - Please list the individuals or groups who would disapprove of you (not) donating blood at a blood donation session in the next month.					
Some religious organisations	4	24	Blood transfusion recipients	6	30
			Blood donors	4	20
Q8 - Please list the individuals or groups who are most likely to (not) donate blood at a blood donation session in the next month.					
Health care professionals	4	24	Religious groups	8	40
Q9 - Please list the individuals or groups who are least likely to (not) donate blood at a blood donation session in the next month.					
Religious groups	7	41	Blood donors	7	35
			Health care professionals	5	25
Control Beliefs					
Q10 - Please list any factors or circumstances that would make it easy or enable you to (not) donate blood at a blood donation session in the next month.					
Convenient locations	10	59	No convenient appointments	7	35
Convenient appointment dates and times	7	41	Busy schedule	4	20
			Having other commitments	5	25
			Not being aware of the blood sessions	4	20
Q11 - Please list any factors or circumstances that would make it difficult or prevent you from (not) donating blood at a blood donation session in the next month.					
Not being eligible	8	47	Someone I know wanting me to go with them	4	20
Busy with other commitments	5	29			
Having to travel to donate	4	24			
Illness	4	24			
Q12 - Imagine that you intend to (not) donate blood at a blood session in the next month. What factors do you think **might lead you to actually (not) donate blood** at a blood session in the next month?					
Illness	8	47	Friends donating blood	4	20
No convenient appointments	8	47	Someone I know needing blood	4	20
Unexpected commitments	4	24			

Two versions of the belief-elicitation questionnaire were used in the study one of which elicited beliefs about donating blood at a blood donation session in the next month and the other elicited beliefs about not donating blood at a blood donation session in the next month. Other than the behaviour, all instructions and questions were the same for both questionnaires. Respondents were randomly directed to answer one of the questionnaires.

Six texts boxes were provided below each question for respondents to note their beliefs and instructions stipulated that unrequired boxes should be left blank. Questions relating to background and demographic characteristics followed the belief-elicitation questions which were recorded using a multiple choice format.

4.2.1.1.3 Analysis procedure

Content analysis was used to compile the modal salient behavioural, normative, and control belief sets. The responses from the donating blood and not donating blood questionnaires were analysed separately. For each belief type items were reviewed and a list of the main recurring themes was created. Each item was then categorised according to these main themes and the frequency with which it was mentioned was tallied. Idiosyncratic beliefs mentioned by only one respondent were discounted. Items which were semantically similar and fit into the same theme were treated as a single belief when few respondents mentioned both items in their responses. Where numerous respondents mentioned both items they were treated as separate beliefs (Fishbein and Ajzen, 2010). Beliefs reported by at least 20% of respondents were included in the modal salient belief sets. Therefore, the final modal salient beliefs sets include all beliefs that were mentioned by 3 respondents in the donating blood survey and 4 respondents in the not donating blood survey.

4.2.1.2 Results

4.2.1.2.1 Conceptual overlap between the salient behavioural beliefs of donating and not donating blood

The modal salient belief sets of each belief type for donating and not donating blood are presented in Table 4.3. Of the 10 modal salient behavioural beliefs, 2 beliefs are conceptually mirrored between donating and not donating blood (feel good about myself/feel disappointed in myself; take up my spare time/more time to do other things). A further 3 beliefs are conceptually related (help save lives/not help people who need blood; cause pain and discomfort/avoid pain and discomfort; make me feel nervous or tense/avoid feeling nervous or tense). Five beliefs are distinct between donating (inspire others to donate; make me feel faint) and not donating blood (less blood being available in blood banks; avoids the hassle of making an appointment; avoid being frightened of blood and/or needles). Distinct beliefs about donating blood are independent of beliefs about not donating blood, whereas

some beliefs about not donating blood appear to be anchored on donating blood as a reference point. For example, an individual must first believe that donating blood can cause pain or discomfort to believe that not donating blood will enable them to avoid this experience.

Table 4.3 - Modal salient belief sets for donating and not donating blood

Donating Blood	**Not Donating Blood**
Behavioural beliefs	
Help save lives (16) +	Not help people who need blood (15) -
Feel good about myself (10) +	More time to do other things (10) +
Cause me pain or discomfort (5) -	Less blood being available in blood banks (7)
Inspire other people to donate blood (5)	Avoids the hassle of making an appointment (6) +
Make me feel faint (4)	Feel disappointed in myself (5)
Take up my spare time (4) -	Avoid pain and discomfort (4) +
Make me feel nervous or tense (4)	Avoid feeling nervous or tense (4)
	Avoid being frightened of blood and/or needles (4)
Normative Beliefs	
Friends (12) +	Religious organisations (13) +
Family (12) +	Blood transfusion recipients (6) -
Partner (9) +	Friends (5) +
Health care workers (8) +	Healthcare Professionals (5) -
Religious organisations (7) -	Parents (4) +
	Family (4) +
	Blood donors (4) -
Control Beliefs	
Convenient locations (10) +	No convenient appointments (7) +
Not being eligible (8) -	Having other commitments (5) +
Illness (8) -	Having a busy schedule (4)
Convenient appointment dates and times (7) +	Not being aware of the blood donation sessions (4) +
Busy with other commitments (5) -	Friends donating blood (4)
Having to travel to donate(4) -	Someone I know wanting me to donate with them (4) -
	Someone I know needing blood (4)
Note: Beliefs for each type presented in order of most to least frequently reported. + indicates beliefs of positive valence, - indicates beliefs of negative valence	

The most frequently elicited behavioural belief for donating and not donating blood relates to helping (donating blood) and not helping (not donating blood) people who are in need of donated blood. Perceptions of oneself are also important salient beliefs across groups although this is more salient for donating (feel good about myself) than not donating blood (feel disappointed in myself). Various negative experiential aspects of donating and not donating blood (e.g. the pain or discomfort of donating blood; feeling nervous or tense) are also salient for both alternatives whereby the negative experience is salient for donating blood and avoiding the experience is salient for not donating blood. Whilst having more time to do other things by not donating blood is the second most frequently mentioned behavioural belief, having spare time taken up by donating blood is relatively less salient.

4.2.1.2.2 Conceptual overlap between the salient normative beliefs of donating and not donating blood

A total of 8 beliefs make up the normative modal salient belief sets. One belief is conceptually mirrored (religious organisations), two beliefs are conceptually related but not conceptually mirrored (friends; family) and a further six beliefs are distinct between donating (partner; health care workers) and not donating blood (blood transfusion recipients; parents; blood donors).

Religious groups are a conceptually mirrored belief believed to disapprove of donating blood and approve of not donating blood. Friends, family, my partner, and health care professionals are salient referents believed to approve of donating blood whereas some religious organisations are believed to disapprove of donating blood. Friends and family are also salient groups that would approve of not donating blood and so represent conceptually related but not mirrored normative referents. This finding may reflect the way different individual referents are salient within a normative group when people consider donating and not donating blood.

The only salient referent most likely to donate blood are health professionals who are also a salient referent believed to be the least likely to not donate blood. Blood donors are a distinct referent least likely to not donate blood. Religious groups are the sole referent considered least likely to donate blood and are also believed to be a group most likely to not donate blood. People who are ill are also a salient referent most likely to not donate blood.

Healthcare professionals, religious groups, and people who are ill are therefore related but not conceptually mirrored beliefs for donating and not donating blood.

4.2.1.2.3 Conceptual overlap between the salient control beliefs of donating and not donating blood

Control beliefs about donating and not donating blood are highly distinct. Of the 11 beliefs included in the modal salient sets, two are conceptual opposites (busy with other commitments/ having other commitments, having a busy schedule; convenient appointment dates and times, and convenient locations/no convenient appointments). Seven beliefs are unique which include 3 for donating (not being eligible, illness, having to travel to donate) and 4 for not donating blood (not being aware of the blood donation sessions, friends donating blood, someone I know wanting me to go with them, someone I known needing blood). The control belief sets for action and inaction, therefore, include both mirrored and distinct beliefs. While beliefs about donating blood are independent of beliefs about not donating blood, some beliefs about not donating blood are anchored on beliefs about donating blood. For example, an individual must consider making an appointment to donate blood before no convenient appointments can make it easy for them to not donate blood.

Beliefs related to convenience are salient for both donating and not donating blood. Sessions being held at convenient locations is the most salient control belief for donating blood. The availability of convenient appointment dates and times was also an important factor that would facilitate blood donation and a factor which would impede the donation of blood. Not being eligible to donate, being busy with other commitments, illness, and having to travel to donate were salient factors which would make it difficult or prevent blood donation. There being no convenient appointment available is the most salient factor that would make it easy to not donate blood. Not being aware of the blood donation sessions is a unique facilitating belief of not donating blood. Beliefs that a busy schedule and having other commitments would make it easy to not donate blood mirror two salient beliefs that would make it difficult to donate blood. Social forces are believed to make it difficult to not donate blood and are factors that would lead people who do not intend to donate blood to go on and actually donate. These salient beliefs include someone I know wanting me to go with them (to donate), friends donating blood, and someone I know needing blood. These social factors are distinct from control beliefs salient for donating blood which does not include a social component.

4.2.1.2.4 Study 1.1 discussion

This study is the first to conduct a full belief-elicitation study for both action and inaction to establish the extent to which beliefs that underpin the decision to perform and not perform a behaviour are conceptually mirrored. Modal salient behavioural, normative and control belief sets are all highly distinct between donating and not donating blood. Only a small number of beliefs of each type are conceptually mirrored. It is of note that for donating blood, distinct beliefs are independent of cognitions about not donating blood. Some unique behavioural and control beliefs salient for not donating blood are instead anchored on cognitions about donating blood. Bianchi et al. (2011) argue that this anchoring occurs in contexts where negations serve to signify that a concept is the opposite of another. As such, some beliefs about not donating blood are dependent on the individual's beliefs about donating blood. Distinct beliefs about not donating blood may be better defined as related but not conceptually mirrored. These results lend support to previous studies that have identified that the behavioural beliefs that underlie action and inaction may differ (Dodge & Jaccard, 2008) and that people may perform and not perform a target behaviour for different reasons (Chatzidakis et al., 2016; Richetin et al., 2011 study 2). However, these results are at odds with the complementarity assumption (Ajzen, 2017; Ajzen & Fishbein, 1980; Fishbein & Middlestadt, 1987; Sutton, 2004) because they suggest that even when a choice is between two mutually exclusive and largely exhaustive alternatives, action and inaction may be underpinned by different beliefs (research question 1.1).

4.3 Study 1.2 Application of the extended direct measure model to donating and not donating blood

The application of the extended direct measure TPB model to donating and not donating blood was explored using two approaches. Firstly, the extended direct measure action and inaction models are refined independently to produce a 'best case' model for each alternative. As TPB studies usually only investigate action or inaction, this approach shows how the models operate as they would typically be reported in the literature. Secondly, the extended direct measure action and inaction models are refined on a like-for-like basis so that the underlying factor structure and structural relationships may be directly compared across models.

4.3.1 Method

4.3.1.1 Sample

A purposive sample of 393 British students studying on an undergraduate or taught postgraduate programme at Bangor University completed the main blood donation study. Of these responses 22 were discounted on the basis that they were not fully completed, contained excessive missing data, had low variance in their responses, or there was indication that the respondent had not answered appropriately. The final sample consists of 371 cases (195 for donating blood, 176 for not donating blood). An overview of the sample characteristics is presented in Table 4.4.

Table 4.4 - Overview of the sample characteristics for the direct measure donating and not donating blood models

	Full sample (n = 371)	**Donating Blood** (n = 195)	**Not donating blood** (n = 176)
Age (M years, SD)	21.38 (3.20)	21.23 (3.09)	21.54 (3.33)
Gender (% female)	204 (55)	102 (52.3)	102 (58)
Course type (% undergraduate)	290 (78.2)	149 (76.4)	141 (80.1)
Eligibility belief	Frequency (%)		
Eligible	302 (81.4)	158 (81)	144 (81.8)
Not eligible	36 (9.7)	22 (11.3)	14 (8)
Don't know	33 (8.9)	15 (7.7)	18 (10.2)
Donor status	Frequency (%)		
I have never thought of donating blood myself	52 (14)	30 (15.4)	22 (12.5)
I have given some through to donating blood	84 (22.6)	43 (22.1)	41 (23.3)
I have seriously considered donating blood	71 (19.1)	38 (19.5)	33 (18.8)
I have applied for information	21 (5.4)	8 (4.1)	13 (7.4)
I am considering registering for blood donation this year	21 (5.4)	16 (8.2)	5 (2.8)
I am considering registering for blood donation this month	6 (1.6)	3 (1.5)	3 (1.7)
I am a blood donor	108 (29.1)	56 (28.7)	52 (29.5)
I am a blood donor, but am considering withdrawing my registration	2 (0.5)	0 (0)	2 (1.1)
I used to be a blood donor, but have withdrawn my registration	6 (1.6)	1 (0.5)	5 (2.8)

4.3.1.2 Materials and procedure

Two versions of the main TPB questionnaire were utilised in the study, one examining donating blood and the other not donating blood. Other than the behaviour, all instructions, questions and response options were the same in both questionnaires. Respondents were randomly directed to answer one of the two questionnaires. The questionnaires were formulated in accordance with Fishbein and Ajzen's (2010) guidelines. Scale items were adapted from published TPB studies which report high reliability and internal consistent amongst items of the construct and all items were assessed using 7-point scales. Table 4.5 presents the direct measures used across donating and not donating blood questionnaires.

Table 4.5 - Direct measure survey items

Item	Construct	Scale
	Intention (adapted from Shaw et al. 2006)	
Int1a	How likely are you to (not) donate blood at the next blood donation sessions at Bangor University?	0 Very unlikely to 6 very likely
Int1b	How strong is your intention to (not) donate blood at the next blood donation sessions at Bangor University?	0 No intention at all to 6 Very strong
Int1c	How much do you agree with this statement about you "I will (not) donate blood at the next blood donation sessions at Bangor University"?	0 Strongly disagree to 6 strongly agree
	Attitude (adapted from Armitage and Conner, 1999)	
	For me to (not) donate blood at the next blood donation sessions in Bangor University would be…	
ATT3a	Good (+3) to Bad (-3)	
ATT3b	Valuable (+3) to Worthless (-3)	
ATT3c	Beneficial (+3) to Harmful (-3)	
ATT3d	Satisfying (+3) to Unsatisfying (-3)	
ATT3e	Pleasant (+3) to Unpleasant (-3)	
ATT3f	Rewarding (+3) to Unrewarding (-3)	
ATT3g	Not frightening (+3) to Frightening (-3)	
	Subjective norm (adapted from Kothe et al., 2012)	
SN4a	People who are important to me would think I 'should'/'should not' (not) donate blood at the next blood donation sessions in Bangor University	+3 Should not donate to -3 Should donate
SN4b	People who are important to me would 'approve'/disapprove' of me (not) donating blood at the next blood donation sessions in Bangor University	+3 Approve to -3 Disapprove
SN4c	People who are like me would think I 'should'/'should not' (not) donate blood at the next blood donation sessions in Bangor	+3 Should not donate to -3 Should donate

	University.	
SN4d	People who are like me would 'approve'/disapprove' of me (not) donating blood at the next blood donation sessions in Bangor University	+3 Approve to -3 Disapprove
	Perceived behavioural control (adapted from Godin et al. 2010)	
PBC5a	For me, (not) donating blood at the next blood donation sessions in Bangor University would be…	+3 Easy to -3 Difficult
PBC5b	I am confident that I am able to (not) donate blood at the next blood donation sessions in Bangor University.	+3 Strongly agree to -3 Strongly disagree
PBC5c	I am confident that I am able to overcome any obstacles that would prevent me from (not) donating blood at the next blood donation sessions in Bangor University	+3 Strongly agree to -3 Strongly disagree
PBC5d	I am confident that I am able to overcome any obstacles that would prevent me from (not) donating blood at the next blood donation sessions in Bangor University	+3 Strongly agree to -3 Strongly disagree
	Anticipated Regret (adapted from Godin et al. 2005)	
	Thinking about the next blood donation sessions at Bangor University, if I choose to NOT donate blood at the sessions…	
AIR6a	I would regret it	0 Not at all to 6 Very much
AIR6b	It would bother me	
AIR6c	I would be disappointed	

A mixed-mode data collection strategy was utilised so that as many students were invited to take part as possible. Students in the Bangor Business School were invited to complete the questionnaire electronically on the Socialsci platform (socialsci.com) via an email invitation. A reminder email was distributed again two weeks after the first. Flyers and posters were also used as a means to recruit students across the university to complete the online survey. Respondents were invited to complete the paper-and-pencil version of the questionnaire across a wide range of locations across the university campus using face-to-face recruitment methods. Of the final sample, 110 responses were completed using the online survey and 261 completed using the paper-and-pencil questionnaire. Questionnaires were completed anonymously and no remuneration was offered for participation.

4.3.2 Comparison of the baseline donating and not donating blood models

4.3.2.1 Baseline donating blood model CFA

The baseline (unrefined) donating blood measurement model yields poor fit statistics (χ^2 (179) = .672.496, p < .001, Comparative Fit Index [CFI] = .872, Tucker Lewis Index [TLI] = .85, Normed Fit Index [NFI] = .835, Root Mean Square of Approximation [RMSEA] = .119, Akaike Information Criterion [AIC] = 776.496) according to the thresholds outlined by Hair et al. (1998) and Hu and Bentler (1999). The squared multiple correlations for three items fell below the advised threshold of .4 (ATT3e: .317, ATT3g: .158, PBC5c: .119) and the standard regression weights for these items also fell short of the recommended threshold of .7 (ATT3e: .56, ATT3g: .40, PBC5c: .35). These items were removed from the model in further analyses. High covariances are observed between the error terms of 3 attitude item pairings (e2: ATT3b, e3: ATT3c; e3: ATT3c, e4: ATT3d; e4: ATT3d, e6: ATT3f) and of 2 subjective norm item pairings (e8: SN4a, e9: SN4b; e9: SN4b, e10: SN4c) and were correlated accordingly in subsequent analyses.

4.3.2.2 Baseline not donating blood model CFA

The baseline not donating blood measurement model yields poor fit statistics (χ^2 (179) = .432.925, p < .001, CFI = .876, TLI = .855, NFI = .808, RMSEA = .090, AIC = .536.925). The squared multiple correlations for five items fell well below the advised threshold of .4 (ATT3g: .104, SN4b: .006, SN4d: .016, PBC5c: .128, PBC5d: .207) and the standard regression weights for these items also fell short of the recommended threshold of .7 (ATT3g: .323, SN4b: -.078, SN4d: .126, PBC5c: .358, PBC5d: .445). These items were removed from subsequent analysis and due to high covariance between the error terms of two attitude pairings (e2: ATT3b, e3: ATT3d; e4: ATT3d, e5: ATT3e) these error terms were covaried. The not donating blood model therefore yields a poorer fit to the data than the donating blood model (research question 2.1).

4.3.2.3 Assessing common method variance for donating and not donating blood models

Harmon's single factor method was the first of two procedures used to examine common method variance across donating and not donating blood models. Exploratory factor

analyses were conducted to determine whether a single factor accounts for the majority of variance within each of the models. When all substantive constructs were entered into the exploratory factor analysis in the donating blood model (intention, attitude, subjective norm, PBC, and AIR) the unrotated solution identified 4 factors with an eigenvalue of more than one which explain 79.86% of the variance. The first factor explains 43.58% of the variance which, whilst high, does not account for the majority of the covariance amongst the measures. In the not donating blood model the unrotated solution identified 4 factors with an eigenvalue of more than one which account for 80.45% of variance within the model and the first factor alone explains 45.41% of the variance. As recommended by Schaller et al. (2015a) common method variance was also examined using the correlational marker technique outlined by Lindell and Whitney (2001). Age was selected as the marker variable due to it being theoretically unrelated to the substantive constructs in the model as well as being captured within the same questionnaire and, thus, likely subject to the same bias as the other constructs. Lindell and Whitney (2001) state that artificial negative correlations (i.e. where a construct has a preponderance to negatively correlate with other constructs) should be eliminated from the model by reverse scoring items for the construct. Consistent with this recommendation items for both subjective norm and anticipated inaction affect in the not donating blood model were reverse scored. When common method variance was partialled out of the donating and not donating blood models all constructs which were significant remain so ($p < .10$) whilst all non-significant correlations remained insignificant ($p > .10$). Together, the results of Harmon's single factor method and correlational marker variable technique suggest that common method bias is not of concern for either the donating or not donating blood models.

4.3.3 Comparison of the independently refined donating and not donating blood measurement models

4.3.3.1 Independently refined donating blood CFA

The independently refined donating blood measurement model yields a good fit (χ^2 (120) = 237.987, $p < .001$, CFI = .967, TLI= .957, NFI = .935, RMSEA= .071, AIC = 339.987) according to the usual conventions (Hair, Black, Babin, & Anderson, 1998; Hu & Bentler, 1999). All indicators load significantly ($p < .001$) with factor loadings above .7 (range .81 - .97) with the exception of two indicators of SN (.656 and .624). Correlations between most

constructs are low (|r|>.7) with the exception of the attitude and subjective norm pair (r = .72), PBC and intention (r = .74). Table 4.6 reports the descriptive statistics and correlations between constructs. Construct reliability values are all above the suggested 0.6 level (Bagozzi & Yi, 1988) ranging from .85 to .98. The AVE values exceeded the recommended level of 0.5 (Fornell & Larcker, 1981) ranging from .60 to .95. Discriminant validity is evidenced according to the Fornell and Larcker criterion (1981) and HTMT ratio of correlations methods, with HTMT ration of correlations below .85 (range .26 to .73) (Henseler, Ringle, & Sarstedt, 2015; Voorhees et al., 2016).

Table 4.6 - Descriptive statistics and correlations between constructs in the independently refined donating blood model

Construct	Mean (SD)	α	AVE	CR	1	2	3	4
1. Intention	2.86 (2.23)	.97	.95	.98	-			
2. Attitude	1.87 (1.41)	.93	.70	.92	.36	-		
3.Subjective norm	1.79 (1.21)	.86	.60	.85	.30	.61	-	
4. PBC	0.32 (2.11)	.92	.80	.92	.69	.28	.31	-
5. AIR	2.74 (2.10)	.95	.87	.95	.52	.33	.33	.32

Notes: SD = standard deviation, α = alpha, AVE = average variance extracted, CR = construct reliability

4.3.3.2 Independently refined not donating blood CFA

The independently refined not donating blood measurement model yields a good fit (χ^2 (92) = 165.477, p < .001, CFI = .960, TLI = .948, NFI = .916, RMSEA = .068, AIC = 253.477) according to the usual conventions (Hair, Black, Babin, & Anderson, 1998; Hu & Bentler, 1999). All indicators load significantly (p < .001) with factor loadings above .7 (range .81 - .97) with the exception of an indicator of attitude (ATT_3e: .660) and correlations between all constructs are low (|r|>.7). Construct reliability values are all above the suggested .6 level (Bagozzi & Yi, 1988) ranging from .86 to .95. The AVE values exceeded the recommended level of 0.5 (Fornell & Larcker, 1981) ranging from .60 to .86. Table 4.7 provides an overview

of the descriptive statistics and correlations between constructs for this model. Discriminant validity is established across all constructs according to the Fornell & Larcker (1981) method and the HTMT ratio of correlations is below .85 for all construct pairings (range .09 to .58).

Table 4.7 - Descriptive statistics and correlations between constructs in the independently refined not donating blood model

Construct	Mean (SD)	α	AVE	CR	1	2	3	4
1. Intention	3.13 (1.93)	.80	.59	.81	-			
2. Attitude	-0.59 (1.58)	.91	.62	.91	.34	-		
3. Subjective norm	0.79 (1.78)	.84	.75	.86	-.34	-.18	-	
4. PBC	0.90 (1.80)	.74	.59	.74	.43	.19	-.10	-
5. AIR	2.87 (1.90)	.95	.86	.95	-.45	-.48	.24	-.50

Notes: SD = standard deviation, α = alpha, AVE = average variance extracted, CR = construct reliability

Alpha, AVE, and construct reliability values are higher for intention and PBC in the donating blood model than in the not donating blood model. The AVE for attitude is also higher in the donating than not donating model. However, alpha and construct reliability values for attitude and subjective norm are similar across models. Furthermore, the alpha value of subjective norm is higher in the not donating blood model than in the donating blood model. These findings show the psychometric properties of the direct measure TPB model are not equivalent when the model is applied to donating and not donating blood (research question 2.2).

4.3.3.3 Independently refined donating blood structural model

The donating blood structural model yields a good fit to the data (χ^2 (198) = 322.593, p < .001, CFI = .966, TLI = .952, NFI = .918, RMSEA = .057, AIC = 526.593) according to the usual conventions (Hair, Black, Babin, & Anderson, 1998; Hu & Bentler, 1999). Figure 4.2 provides an overview of the structural model results. PBC (ß = .600, p < .001) and AIR (ß =

.291, $p < .001$) significantly influence intention to donate blood. Attitude, subjective norm, and past behaviour are not significant determinants of intention however ($p > .10$). Age, eligibility, gender ($p > .001$), and education level ($p = .81$) do not influence intention. This model explains 65% of the variance in intention to donate blood.

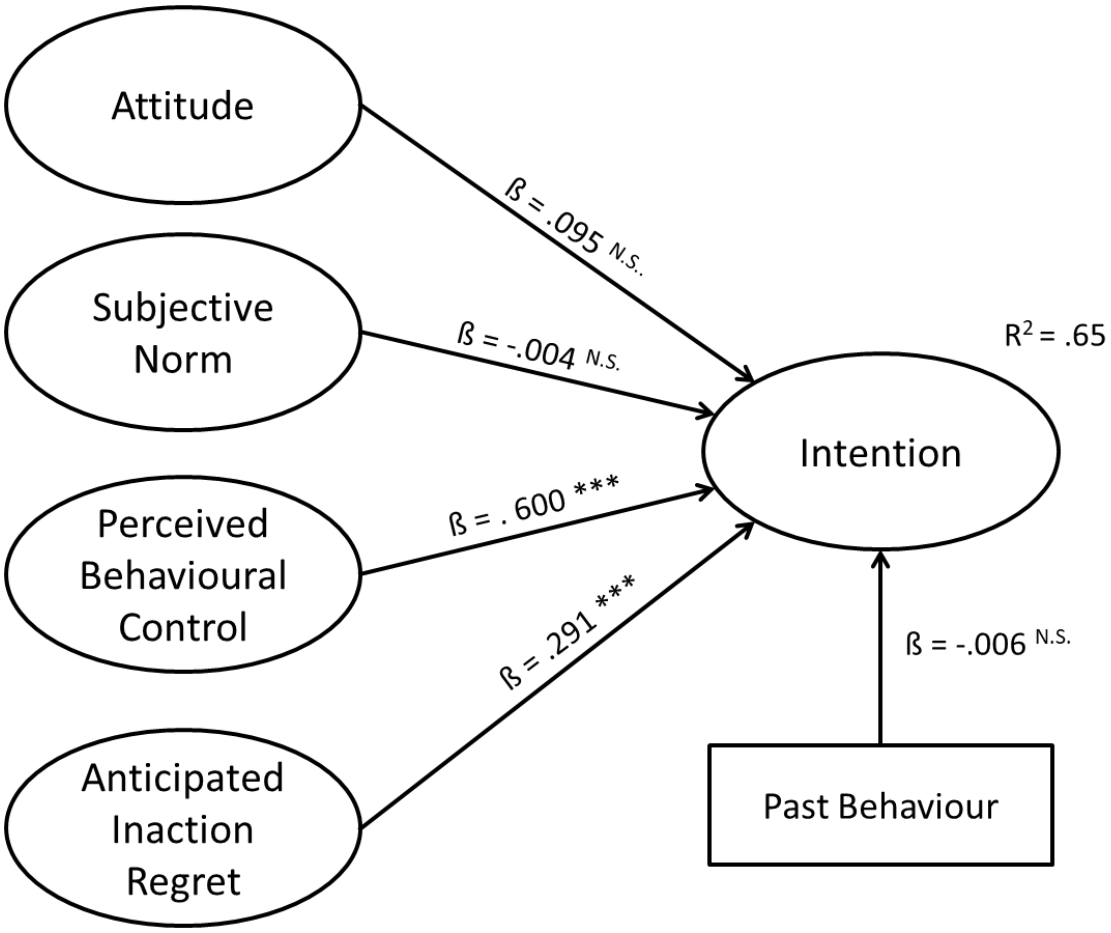

Figure 4.2 - Results for the independently refined donating blood structural model

Notes: * $p < .05$, ** $p < .001$, *** $p < .001$, N.S. = not significant

4.3.3.4 Independently refined not donating blood structural model

The not donating blood structural model yields a good fit (χ^2 (158) = 221.490, $p < .001$, CFI = .969, TLI = .954, NFI = .902, RMSEA = .048, AIC = 411.490). Results of the structural model are presented in Figure 4.3. PBC (ß = .449, $p < .001$) and subjective norm (ß = -.291, $p < .001$) significantly impact intention to not donate blood but AIR, attitude, and past behaviour are not ($p > .10$). Additionally, age, eligibility, gender, and education level ($p > .10$) do not influence intention. These findings show that intention to donate and not donate blood are

not underpinned by the same set of determinants (research question 1.3). This model explains 51% of the variance in intention to not donate blood which is lower than that explained by the donating blood model. Thus, the extended direct measure TPB model explains less variance in intention when applied to inaction than to action (research question 2.3).

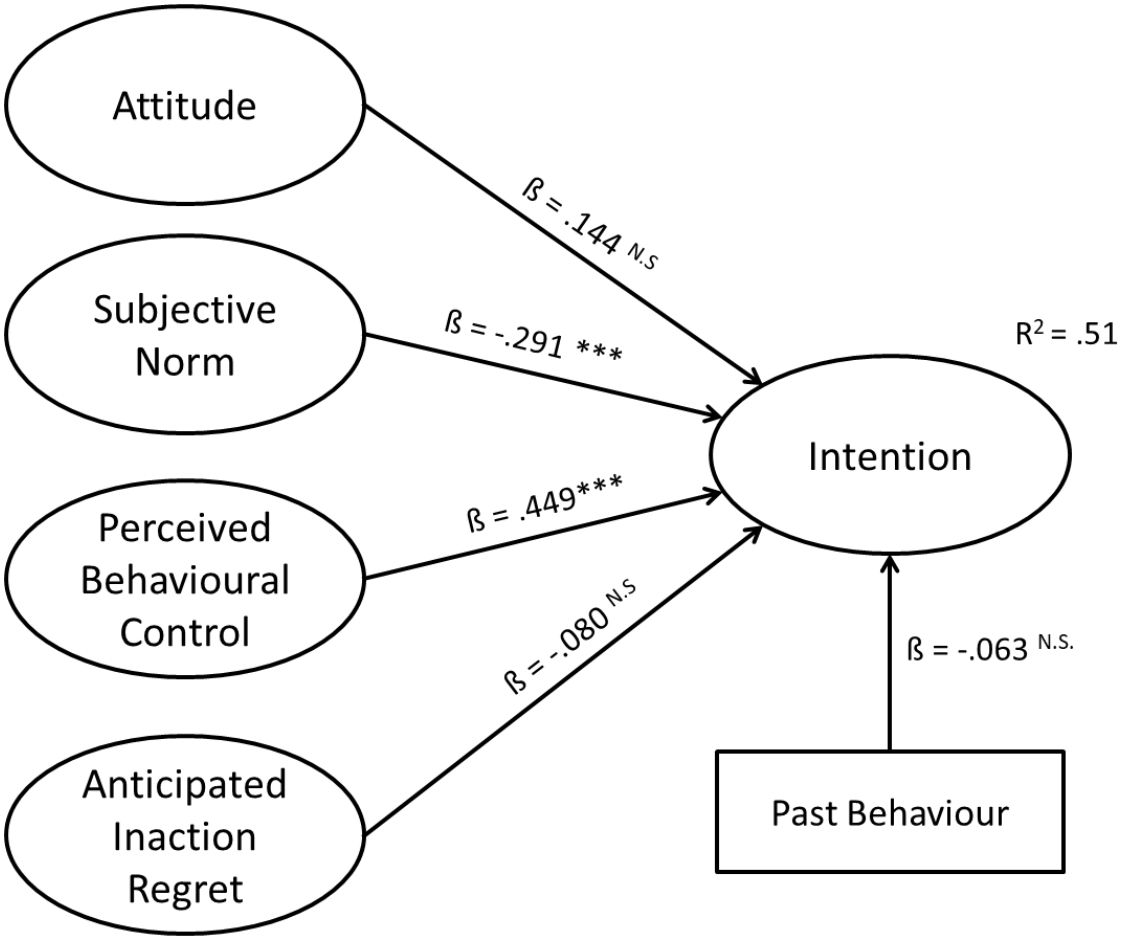

Figure 4.3 - Results for the independently refined not donating blood structural model

Notes: * $p < .05$, ** $p < .001$, *** $p < .001$, N.S. = not significant

4.3.4 Direct comparison of donating and not donating blood models

4.3.4.1 Baseline measurement model comparison

Using the baseline models reported in section 4.3.2 the donating and not donating blood models were refined on a like-for-like basis so that the structural relations between models can be compared. Both donating and not donating blood models yield a poor fit according to the thresholds outlined by Hair et al. (1998) and Hu and Bentler (1999). The baseline donating blood model yields a better fit (χ^2 (179) = 672.496, p < .01, CFI = .872, TLI = .85, NFI = .835, RMSEA = .106, AIC = .776.496) than the initial not donating blood model (χ^2 (179) = 432.925, p < .01, CFI = .879, TLI=.855, NFI = .808, RMSEA = .09, AIC = .536.925). The factor loadings of one attitude item (ATT_3g) and one PBC item (PBC5c) were low across models (.398 and .345 respectively). The squared multiple correlation of these indicators also falls below .4 in both models (ATT3g: .158 and .104, PBC5c: .119 and .128). These items were removed from subsequent analysis because they explain a small amount of variance in their respective constructs. In the not eating high-calorie snack model two items of subjective norm do not substantially load on their respective construct (p > .10) and standardized regression weights are very low (-.079, .126). Whilst these items load significantly and substantially on the subjective norm construct in the eating high-calorie snack model they were omitted from both models so that satisfactory alpha, CR, and AVE values are obtained to proceed with the analysis. Due to a high covariance between the error terms of three attitude item pairings (e2: ATT3b, e3: ATT3c; e2: ATT3b, e5: ATT3e; e4: ATT3d, e5: ATT3e) across both models these error terms were correlated.

4.3.4.2 Refined measurement model comparison

The donating blood measurement model yields an overall acceptable fit to the data (χ^2 (106) = 241.939, p < 0.01, CFI = .958, TLI = .946, NFI = .929, RMSEA = .081, AIC = 335.939). All indicators load significantly (p < .001) with factor loadings above .7 (range .70 to .97) with the exception of one indicator of attitude (.57). Table 4.8 presents the descriptive statistics and correlations between constructs. Correlations between most constructs are low (|r| > .7) with the exception of the PBC and intention pair (r = .74). The lowest alpha, construct reliability, and AVE values are .77, .77 and .62 respectively. Discriminant validity is evidenced across all construct pairings according to both the Fornell and Larcker (1981)

criterion and HMTM ratio of correlations method (Henseler et al., 2015) where correlations range from .34 to .73.

Table 4.8 - Descriptive statistics and correlations between constructs for donating and not donating blood

Construct	Mean (SD)	1	2	3	4	5
1. Intention	2.86 (2.23) [3.13 (1.93)]	-	.40	-.39	.52	-.53
2. Attitude	1.62 (1.39) [-.59 (1.58)]	.41	-	-.22	.20	-.53
3. Subjective norm	1.64 (1.33) [.79 (1.77)]	.38	.63	-	.10	.31
4. PBC	.32 (2.11) [.87 (1.55)]	.74	.32	.37	-	-.57
5. AIR	2.74 (2.10) [2.87 (1.90)]	.52	.35	.40	.33	-

Notes: SD= standard deviation; results in lower triangle are for donating blood and those in upper triangle are for not donating blood; all correlations are significant at $p < .01$ (2-tailed).

The not donating blood model approaches an acceptable fit to the data (χ^2 (106) = 200.020, $p < .001$, CFI = .950, TLI = .936, NFI = .901, RMSEA = .071, AIC = 294.020) according to the usual conventions (Hair, Black, Babin, & Anderson, 1998; Hu & Bentler, 1999). All indicators load significantly ($p < .001$) and standardized regression weights are .68 and above, except for one indicator of PBC (.42) and one indicator of intention (.59). All correlations between constructs are low (|r|>.7). Construct reliability values range from .71 to .95, AVE values range from .46 to .86, and alpha values range from .68 to .95. All constructs exhibit discriminant validity according to the Fornell and Larcker (1981) criterion and HMTM ratio of correlations method (Henseler et al., 2015) where the correlations between constructs range from .01 to .52.

4.3.4.3 Assessing measurement (factorial) invariance for the extended TPB model

Measurement invariance across action and inaction models was assessed to gain insight into the degree to which respondents conceptualise items and constructs in the same way for action and inaction. Configural and metric invariances were assessed using multi-group

confirmatory factor analyses (MCFAs) across donating blood and not donating blood groups. The configural invariance model yields good fit statistics (χ^2 (212) = 441.954, $p < .001$, CFI = .955, TLI = .943, NFI = .918, RMSEA = .054) which suggests that the factor structure is similar across groups and all factor loadings are significant for both groups with the exception of two SN items in the not donating blood group ($p > .10$). The results indicate that a common conceptual frame of reference is used to answer questions about donating blood and not donating blood.

Metric invariance refers to whether the relation between each scale item and its respective construct are the same across groups (Milfont & Fischer, 2010). A chi-square difference test between the configural invariance (fully unconstrained) and metric invariance (factor loadings fully constrained) models was conducted to establish metric invariance. Full metric invariance was not observed ($\Delta\chi^2$ (12) = 37.322, $p < .001$) between groups. The factor loadings relative to each subscale (construct) were then tested for invariance separately. Partial metric invariance is evidenced when one indicator of PBC and one indicator of intention are unconstrained ($\Delta\chi^2$ (10) = 16.238, $p = .093$).

Scalar invariance is examined using a chi-square difference test between the fully unconstrained model and a model in which all factor loadings and intercepts are constrained to be equal. Full scalar invariance is not achieved ($\Delta\chi^2$ (29) = 336.858, $p < .001$). Partial scalar invariance was tested using the partial metric invariance model and constraining the intercepts for each construct's items across models on a cumulative basis. Where intercepts for a given construct were found to be variant the constraints for each item were removed one by one, starting with the intercept with the highest difference in standardized regression weight across eating and not eating high-calorie snack models. Partial scalar invariance was not achieved when 5 intercepts of attitude, one intercept of subjective norm, two intercepts of PBC, and two intercepts of intention were unconstrained ($\Delta\chi^2$ (17) = 47.549, $p < .001$). An examination of the individual constructs shows that the attitude and subjective norm constructs are variant when all but one item intercept is unconstrained. The AIR construct is invariant across models, whereas intention and PBC are invariant when two item intercepts are unconstrained. Together, these findings show the extended direct measure action and inaction models do not exhibit measurement invariance (research question 1.2).

4.3.4.4 Comparing structural relationships between donating and not donating blood models

The donating and not donating blood models are comprised of five latent reflective constructs including intention, attitude, subjective norm, perceived behavioral control, and AIR. The donating blood structural model yields good fit statistics (χ^2 (178) = 313.632, p < .001, CFI = .960, TLI = .943, NFI = .913, RMSEA= .063, AIC = 509.632). This model explains 65.2% of the extracted variance in intention to donate blood. Attitude (ß = .137, p = .049), perceived behavioral control (ß = .600, p < .001), and AIR (ß = .291, p < .001) significantly predict intention to donate blood whereas subjective norm (ß = -.047, p > .10) and past behaviour (ß = -.007, p > .10) do not. Age, gender, past behaviour, eligibility (p > .10), and education level (p = .93) do not significantly impact intention. A comparison of the structural models for donating and not donating blood are presented in Figure 4.4.

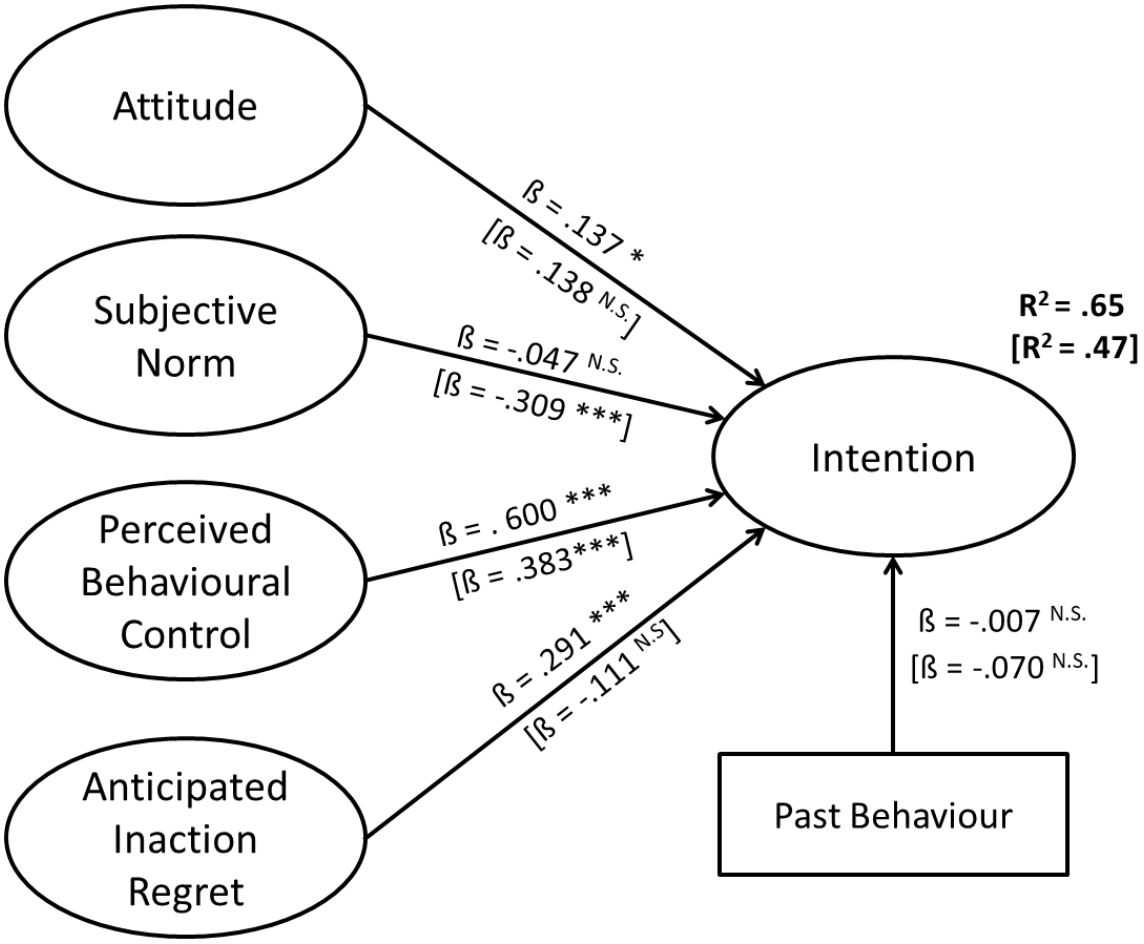

Figure 4.4 - Results for the direct comparison of the donating and not donating blood structural models

Notes: * $p < .05$, ** $p < .001$, *** $p < .001$, N.S. = not significant; values in square brackets are for not using sunscreen.

The not donating blood structural model yields good fit statistics (χ^2 (178) = 262.694, $p < .001$, CFI = .959, TLI = .942, NFI = .887, RMSEA = .052, AIC = 458.694). This model explains 47.5% of the variance of intention to not donate blood. Subjective norm (ß = -.309, $p < .001$) and PBC (ß = .383, $p < .001$) significantly influence intention whereas attitude, AIR and past behaviour ($p > .10$) do not. Age, gender, eligibility, and education level ($p > .10$) do not significantly impact intention.

4.3.4.5 Assessing differences across donating and not donating blood models

Chi-square difference tests were performed to determine whether the regression weights of the donating and not donating blood models are significantly different. Results are presented in

Figure 4.5. An assessment of the full structural equation models indicates that the donating blood and not donating blood models are nonequivalent ($\Delta\chi^2(5) = 19.122$, $p = .002$). A significant difference is found in the relationship between PBC and intention ($\Delta\chi^2(1) = 6.809$, $p = .009$), and AIR and intention ($\Delta\chi^2(1) = 14.947$, $p < .001$). Structural relationships are equivalent across the attitude and intention relation ($\Delta\chi^2(1) = .359$, $p > .10$), subjective norm and intention relationship ($\Delta\chi^2(1) = .376$, $p > .10$), and past behaviour and intention ($\Delta\chi^2(1) = .729$, $p > .10$) relationships. The results identify that structural relationships of the extended direct measure action and inaction models are not equivalent (research question 1.4).

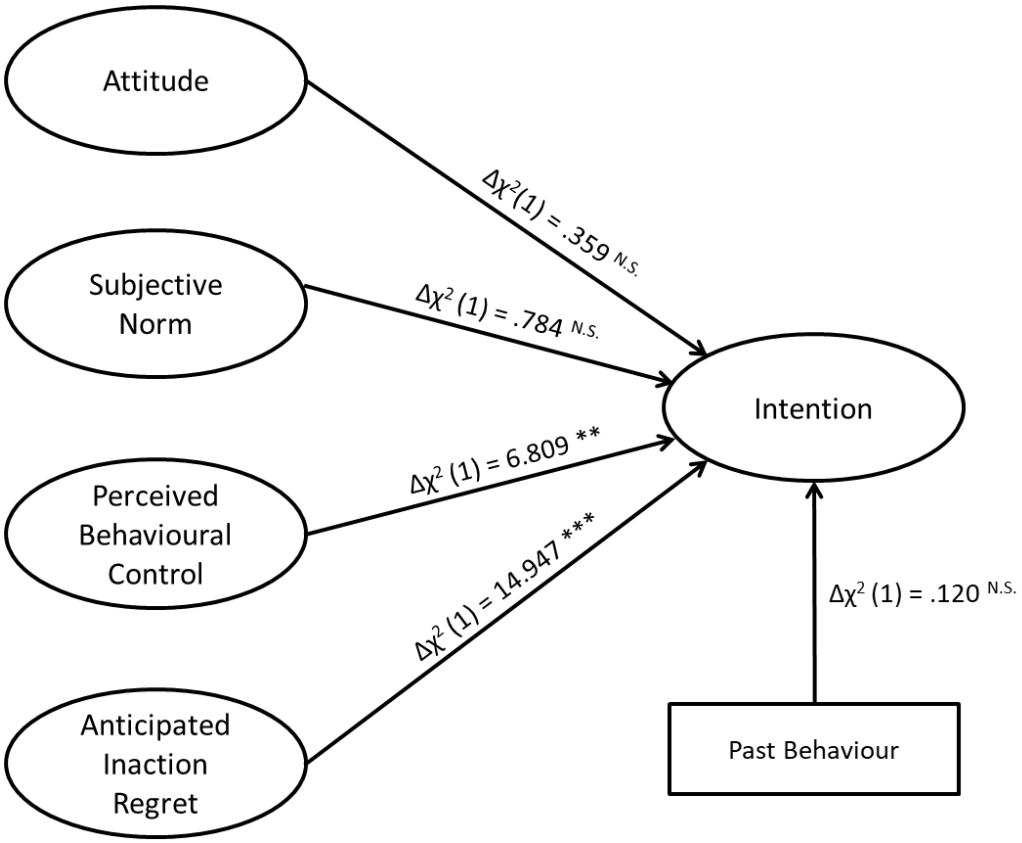

Figure 4.5 - Structural differences in the relationships between intention and its determinants
Notes: * $p < .05$, ** $p < .001$, *** $p < .001$

4.3.5 Study 1.2 discussion

This study tested whether the complementarity assumption holds when the extended direct measure TPB model is applied to action and inaction (research question 1). Configural and partial metric invariance were established which shows that respondents conceptualise constructs and most items of the donating and not donating blood models in the same way (Milfont & Fischer, 2010). Partial scalar invariance was not evidenced which shows observed scores relate differently to their respective latent scores across models. Donating and not donating blood are not conceptually mirrored concepts within the TPB framework because respondents do not always conceptualise and respond to questions relating to action and inaction in the same way. Furthermore, intention to donate and not donate blood are influenced by both common and different determinants. The differential pattern of prediction across action and inaction models lends further support to the view that action and inaction are not conceptually mirrored within the TPB. These findings lend support to previous studies that have also identified that different determinants can influence intention to act and not act (Ajzen & Sheikh, 2013; Middlestadt et al., 2014; Richetin et al., 2012, 2011).

The present research extends this extant literature by examining the equivalence of structural relationships across the donating and not donating blood models. The donating and not donating blood models are not structurally equivalent. The structural relationship between PBC and intention is non-equivalent because PBC exerts a significantly stronger influence on intention to donate blood than intention to not donate blood. The structural relationship between AIR and intention is also non-equivalent across models and can be attributed to AIR significantly influencing intention to donate blood, but not on intention to not donate blood. These results are consistent with earlier research showing that intention to perform and not perform a given behaviour may be motivated by different reasons (Chatzidakis et al., 2016) and in pursuit of different goals (Richetin et al., 2011 study 2).

This study also investigated whether the extended direct measure TPB model operates differently when applied to donating and not donating blood (research question 2). The independently refined donating blood model yields similar fit to the data than the not donating blood model, however, the not donating blood model required more extensive refinement to achieve acceptable model fit. Overall, the psychometric properties of the donating blood model are superior to those of the not donating blood model. These results are consistent with past literature that shows information processing tends to be more

difficult and prone to error when it relates to inaction than to action (Beckmann & Young, 2007; Glenberg et al., 1999; Johnston et al., 1990; Rassin, 2014). Examination of the predictive efficacy of the donating and not donating blood models indicates that substantially more variance in intention is explained in the donating than not donating blood model. It should be noted that nevertheless, a high portion of variance in intention to not donate blood is also explained. This is consistent with previous studies that show the direct measure TPB model affords superior prediction of intention when applied to action than inaction (Ajzen & Sheikh, 2013; Middlestadt et al., 2014; Richetin et al., 2012, 2011). Greater variance in intention may be explained when the TPB is applied to action than inaction because information processing tends to be more efficient when it relates to affirmation rather than negation (e.g. Carpenter et al., 1999; Clark & Chase, 1972; Eerland et al., 2012) and action rather than inaction (e.g. Astley et al., 2015; Beckmann & Young, 2007).

This study further finds that AIR exerts a differential influence on intention to donate and not donate blood (research question 3). This is evidenced by the non-equivalent structural relationship between AIR and intention across action and inaction models. Furthermore, AIR was shown to significantly predict intention to donate blood (a distal benefit behaviour) but not for not donating blood (an immediate hedonic behaviour). These finding are consistent with Sandberg et al.'s (2016) argument that AIR will influence intention for distal benefit behaviours, but will be a weak or non-significant predictor of intention for immediate hedonic behaviours. The structural equivalence of the relationship between AIR and intention is also non-equivalent across models.

Three important limitations should be considered in regard to the research presented in this chapter. The belief-elicitation study identified that modal salient belief sets for donating and not donating blood are comprised of distinct beliefs to at least a moderate degree. However, the study does not identify the specific beliefs that inform behavioural, normative, and control beliefs for donating and not donating blood. As such, the study cannot establish the extent to which donating and not donating blood are informed by mirrored or distinct beliefs. It is possible that donating and not donating blood are guided by the mirrored beliefs people hold about action and inaction, whereas distinct beliefs do not significantly inform the antecedents of intention. Further research should utilise the belief-based TPB model to identify the beliefs that significantly inform the belief-based constructs for action and inaction. In doing so, it would be possible to establish the extent to which the belief-based foundations of action and

inaction are conceptually mirrored. This approach would provide a stronger test of the complementarity assumption than simply evaluating the conceptual distinctness of the model salient belief sets of action and inaction.

A second limitation is that study 1.2 did not capture behaviour. It is estimated that only around 4% of the eligible UK population regularly donate blood and the frequency of blood donation is restricted (NHS Blood and Transplant, 2017). It was therefore unlikely that a sufficient number of respondents would donate blood within a given data collection period in order to meaningfully compare action and inaction models in regard to blood donation behaviour. Further research is necessary to establish whether TPB models incorporating behaviour operate differently when applied to action and inaction. More specifically, this work should identify whether behaviour is influenced by the same determinants across action and inaction models; if the structural relationships between behaviour and its antecedents are equivalent for action and inaction; and whether the TPB affords similar prediction of behaviour when it is applied to action and inaction. Addressing this limitation would provide a more in-depth view of how the TPB framework operates when applied to action and inaction.

In study 1.2 the direct measure TPB model was extended to incorporate a measure of AIR. This approach provides valuable insight into the differential influence that AIR exerts on intention to act and not act. However, several studies show that AAR may also influence intention in some behavioural contexts (e.g. Elliott & Thomson, 2010; Sandberg, Hutter, Richetin, & Conner, 2016). Study 1.2 does not provide insight into whether AAR influences intentions to act and not act differently within the TPB. Future research should capture AAR and AIR to establish whether both forms of regret exert a differential influence on intention to perform and not perform target behaviours. Taking this approach would provide greater insight into the way in which AR impacts intention within the TPB. Capturing both anticipated action and inaction regret would also facilitate the cross-validation of Sandberg et al.'s (2016) position that AR influences intention to perform a given behaviour differently depending on whether the target behaviour is an immediate hedonic or distal benefit behaviour.

4.4 Conclusion

This chapter has explored the application of the TPB framework to donating and not donating blood. Findings of a belief-elicitation and direct measure TPB study are reported. Overall the results provide strong support for the distinctness of action and inaction within the TPB framework. Differences are identified in the operation of the direct measure TPB model when applied to donating and not donating blood. AIR is also shown to exert a differential influence on intention to donate and not donate blood.

Chapter 5 Sunscreen Use

This chapter investigates the application of the TPB framework to using and not using sunscreen. This investigation is presented across a belief-elicitation study (study 2.1) and examinations of the belief-based (study 2.2) and extended direct measure models (study 2.3). The conceptual model for study 2.3 is depicted in Figure 5.1. Together, these studies serve to test whether the complementarity assumption holds in the context of using and not using sunscreen (research aim 1); assess whether the belief-based (research aim 2) and extended direct measure (research aim 3) TPB models operate differently when applied to using and not using sunscreen; and to determine whether AIR exerts a differential influence on intention to use and not use sunscreen (research aim 4).

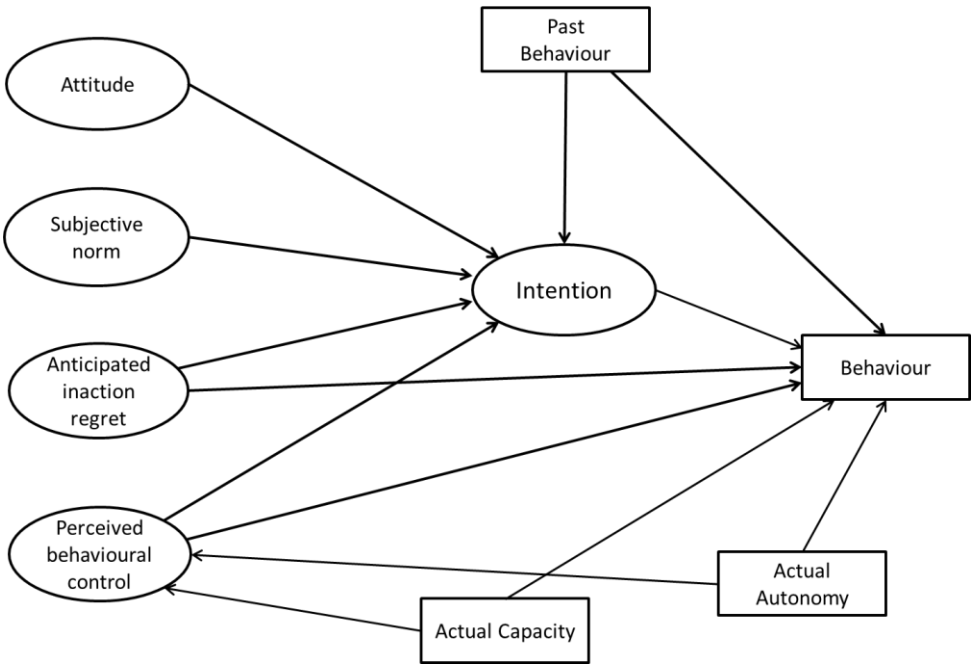

Figure 5.1 - Conceptual model for study 2.3

5.1 Literature review

Skin cancer is the most common form of cancer diagnosed in the United States and the disease represents a serious public health problem (Machlin, Ekwueme, & Yabroff, 2015; U.S. Department of Health and Human Services, 2014). An estimated 96,500 new cases of melanoma of the skin will be diagnosed in the U.S. in 2019 where the disease will result in over 7,200 deaths (American Cancer Society 2019). Around 5.4 million new cases of squamous cell carcinoma and basal cell carcinoma were diagnosed among 3.3 million people in the U.S. in 2012 (Rogers, Weinstock, Feldman, & Coldiron, 2015). Whilst the number of deaths attributed to skin cancer is falling in absolute terms the number of new cases diagnosed continues to rise (American Cancer Society 2019). In addition to the mortality associated with skin cancer the disease can also cause significant pain and disfigurement (U.S. Department of Health and Human Services, 2014). Treating skin cancer comes at a considerable cost too, which is estimated to be around $8.1 billion per year in the U.S. alone (U.S. Department of Health and Human Services, 2014).

Ultraviolet radiation (UVR) exposure is an important etiologic factor for all types of skin cancer. Melanoma of the skin is associated with episodic high-intensity exposure (Lee & Strickland, 1980; Vagero, Ringback, & Kiviranta, 1986) and on average an individual's risk of the disease doubles if they have experienced more than 5 sunburns (Pfahlberg, Kolmel, & Gefeller, 2001). Non-melanoma skin cancers are linked to the cumulative effects of sun exposure over time (Beral & Robinson, 1981). An estimated 90% of non-melanoma skin cancers diagnosed in the U.S. are associated with UVR exposure (Koh, Geller, Miller, Grossbart, & Lew, 1996). Taking measures to protect against UVR exposure is the primary prevention method to avoid skin cancer. Regular sunscreen use is shown to decrease the risk of melanoma skin cancer (Green, Williams, Logan, & Strutton, 2011) and squamous cell carcinoma in the long-term (van der Pols, Williams, Pandeya, Logan, & Green, 2006). Understanding the factors that motivate using and not using sunscreen is an important step toward the development of effective behaviour change interventions that influence sunscreen use behaviour.

5.1.1 Belief-based foundations of using and not using sunscreen

Few belief-elicitation studies have been conducted to explore the beliefs people hold about sunscreen use or, more generally, sun protective behaviours. Sunscreen related belief-elicitation studies have mostly focused on identifying readily accessible beliefs about using sunscreen amongst young people (e.g. Araujo-Soares, Rodrigues, Presseau, & Sniehotta, 2013; Robinson, White, Young, Anderson, & Hyde, 2008; White, Zhao, Robinson, & Hamilton, 2018; White & Robinson, 2008) or parent's beliefs about protecting their child from sun exposure (e.g. Hamilton, Cleary, White, & Hawkes, 2016). The salient beliefs people hold about not using sunscreen remain unexplored in the literature.

A number of behavioural, normative, and control beliefs are frequently reported in belief-elicitation studies into using sunscreen (e.g. Araujo-Soares et al., 2013; Hamilton et al., 2016; Robinson, White, et al., 2008; White et al., 2018; White & Robinson, 2008). Some of these beliefs have a conceptually mirrored counterpart that could reasonably be held simultaneously by an individual about not using sunscreen. For example, reported disadvantages of using sunscreen often include feeling greasy, it being messy, takes time to apply, is inconvenient, and expensive. Advantages of not using sunscreen may mirror some of these beliefs, such as having more time to do other things, greater convenience, and saving money. However, there are no strict conceptual opposites for the beliefs that using sunscreen will leave skin greasy or that sunscreen is messy. Rather, people may hold the belief that not using sunscreen may lead to the avoidance of greasy skin and mess during application.

Some of the normative beliefs people hold about using sunscreen could also be conceptually mirrored to those held in regard to not using sunscreen. For example, an individual could simultaneously believe that friends, family, and medical professionals approve of using sunscreen and disapprove of not using sunscreen. Interestingly, a qualitative study undertaken by Hamilton et al. (2016) reports that grandparents are a referent that would approve of a child using sunscreen but also think it is not always necessary for the child to do so. This shows that normative referents may not always fit into an approve/disapprove dichotomy as assumed by the belief-elicitation procedure. Some of the control beliefs people hold about using and not using sunscreen could also be conceptual opposites. A frequently

reported facilitating factor of using sunscreen is the availability of cheap sunscreen, whereas forgetting it is an impeding factor. An individual could simultaneously hold these beliefs in addition to the beliefs that a lack of cheap sunscreen would facilitate their not using sunscreen and remembering sunscreen would make it difficult to not use sunscreen.

Not all modal salient beliefs may significantly influence their respective constructs within the TPB model (Fishbein & Ajzen, 2010). This means that even when modal salient belief sets for action and inaction are largely conceptual opposites a differential set of beliefs may influence using and not using sunscreen. The relative importance of mirrored beliefs that influence both alternatives may also differ. Overall, it is possible that some of the readily accessible beliefs people hold about using and not using sunscreen are conceptually mirrored. However, not all commonly reported beliefs about using sunscreen have a conceptually mirrored alternative that may be held in regard to not using sunscreen. As such, people may hold both conceptually mirrored and distinct beliefs about using and not using sunscreen.

5.1.2 TPB and sunscreen use

Several studies have applied the direct measure TPB model to using sunscreen. In these studies between 28 and 37% of the variance in intention (Hillhouse, Adler, Drinnon, & Turrisi, 1997; Martin, Jacobsen, Lucas, Branch, & Ferron, 1999; Myers & Horswill, 2006; Pertl et al., 2010) and 13 to 49% of the variance in behaviour is explained (Hillhouse et al., 1997; Martin et al., 1999; Myers & Horswill, 2006). PBC emerges as the strongest predictor of intention followed by attitude then subjective norm. Intention tends to exert a stronger influence on behaviour than PBC. Consistent with the underutilisation of the belief-based model in TPB research, only Araujo-Soares (2013 study 2) appears to have applied the belief-based model to using sunscreen. After controlling for skin type and gender, the indirect measures of attitude, subjective norm, and PBC accounted for 28.5% of the variance in intention to use sunscreen. No known studies have investigated not using sunscreen using either the belief-based nor direct measure TPB model. The motivating factors that influence people to not use sunscreen are, therefore, poorly understood.

5.1.3 Action and inaction asymmetry in the domain of sunscreen use

A considerable body of literature shows that actions and inactions are not processed equivalently (see section 2.2 for review). Negated information tends to be processed less effectively than affirmed information (e.g. Bianchi et al., 2011; Mayo et al., 2004). Similarly, information about action is typically processed and utilised more effectively than information regarding inaction (e.g. Eerland & Rassin, 2012; Fazio et al. 1982; Hearst, 1991). This action-inaction asymmetry has been explained in regard to the differential salience of action and inaction. Negations tend to be processed less effectively than affirmations when they are of low salience, but with similar efficacy when they are of high salience (Glenberg et al., 1999). Similarly, Beckmann and Young (2007) find that people do not effectively use absent stimuli when learning unless the inaction is made highly salient. This research suggests that the TPB may operate more effectively when applied to the behavioural alternative for which people hold more readily accessible beliefs.

Not using sunscreen is the 'default' position assumed in regard to sunscreen use. It is the natural state that occurs when an individual has not considered using sunscreen, has decided to not using sunscreen, or fails to fulfil their intention to use sunscreen. For most people not using sunscreen is an inactive behaviour that requires no effort. As such, cognitions about not using sunscreen may typically be of low accessibility for most people. In contrast, cognitions about using sunscreen maybe more accessible in memory because it deviates from the default position and is an active behaviour that requires a degree of cognitive and physical effort to perform. Due to these factors, fewer beliefs may be formed in regard to not using sunscreen than for using sunscreen. Beliefs formed about not using sunscreen may also be less accurate and weaker than those held about using sunscreen. The direct and belief-based TPB models may, therefore, operate more effectively when applied to predict using rather than not using sunscreen.

5.1.4 Anticipated regret and sunscreen use

Little research on sunscreen use and sun-protective behaviours has examined the influence of AR on intentions and behaviour using the TPB. Adolescents that frequently use sunscreen report feeling greater AR in the event they get sunburn than infrequent users (de Vries, Mesters, Riet, Willems, & Reubsaet, 2006). Hamilton et al. (2017) explored the factors that

influence parent's intention to protect their young children from skin cancer by performing sun-protective behaviours using the TPB. AIR was a significant predictor of intention in the model that incorporated beliefs, attitude, subjective norm, PBC, role construction, AR and past behaviour. AR may, therefore, be an important determinant of intention to use and not use sunscreen and subsequent behaviour. Further research is necessary to better understand the influence of AR on sunscreen related intention and behaviour.

Sandberg et al. (2016) argue that AR will influence intention differently depending on whether the target behaviour is an immediate or distal benefit behaviour (see section 2.3.4 for a discussion). Using sunscreen is a distal benefit behaviour performed mainly so that the individual may maintain good health and appearance as they age. Conversely, not using sunscreen is more akin to an immediate hedonic behaviour because it is performed to satisfy proximal desires rather than for positive future outcomes. AIR is, therefore, expected to exert a significant influence on both using and not using sunscreen, but may be a relatively more important determinant of intention to use sunscreen.

Based on this literature, the following research questions are outlined:

1. Does the complementarity assumption hold for using and not using sunscreen?

1.1 To what extent are modal salient belief sets for using and not using sunscreen composed of conceptually mirrored beliefs?

1.2 How far are the belief-based constructs of the using and not using sunscreen models influenced by conceptually mirrored beliefs?

1.3 Do distinct beliefs about action and inaction explain additional variance in intention to use and not use sunscreen, over and above that explained by mirrored beliefs alone?

1.4 Do extended direct measure using and not using sunscreen models exhibit measurement invariance?

1.5 Are intention and behaviour influenced by the same belief-based constructs in the in using and not using sunscreen models?

1.6 Are structural relationships within the belief-based model equivalent across using and not using sunscreen models?

1.7 Do different determinants underlie intention and behaviour in the extended direct measure using and not using sunscreen models?

1.8 Are structural relationships of the extended direct measure using and not using sunscreen models equivalent?

2. Does the belief-based TPB model operate differently when applied to using and not using sunscreen?

2.1 Do the belief-based constructs of the using and not using sunscreen models exhibit similar validity?

2.2 Is the explanatory power of the belief-based using and not using sunscreen models similar for the prediction of intention and behaviour?

3. Does the extended direct measure TPB model operate differently when applied to using and not using sunscreen?

3.1 Do the extended using and not using sunscreen models exhibit similar model fit?

3.2 Are the psychometric properties of the using and not using sunscreen models similar?

3.3 Does the moderating role of actual capacity and actual autonomy on the intention-behaviour relationship differ across using and not using sunscreen models?

3.4 Is the explanatory power of the extended direct measure structural models similar across using and not using sunscreen models?

4. Does AIR exert a differential influence on intention and behaviour in regard to using and not using sunscreen within the extended direct measure TPB model?

4.1 Does AIR exert a differential influence on intention and behaviour across using and not using sunscreen models?

4.2 Is the structural relationship between AIR and intention, and AIR and behaviour equivalent across using and not using sunscreen models?

5.2 Study 2.1 Using and not using sunscreen belief-elicitation study

A belief-elicitation study was undertaken to identify the readily accessible behavioural, normative, and control beliefs people hold about using and not using sunscreen with an SPF of 15 or more the next time they engage in an outdoor leisure activity. This study explores the extent to which beliefs about using and not using sunscreen are conceptually mirrored

(research question 1). Furthermore, the modal salient sets inform the development of modal salient belief sets in the belief-based models (study 2.2).

5.2.1Method

5.2.1.1 Sample

A self-selected sample of 41 MTurk users residing in the US completed the sunscreen elicitation study on 12th July 2014. An overview of the demographic and background variables of the full, using and not using sunscreen samples are provided in Table 5.1. Twenty-two respondents completed the questionnaire about using sunscreen and 19 respondents completed the questionnaire about not using sunscreen.

Table 5.1 - Overview of the demographic and background characteristics of the full, using, and not using sunscreen sub-samples

Variable	**Full Sample** (n = 41)	**Using Sunscreen** (n = 22)	**Not Using Sunscreen** (n = 19)
Age (M, SD)	33.2 years (11.02)	33.6 years (11.1)	32.8 years (11.22)
Gender (% male)	53.7%	63.6%	42.2%
Race	Frequency (%)		
White non-Hispanic	22 (53.7)	13 (59.1)	9 (47.4)
White Hispanic	11 (26.8)	6 (27.3)	5 (26.3)
Asian/Pacific Islander	5 (12.2)	3 (13.6)	2 (10.5)
Black	2 (4.9)	1 (5.3)	1 (5.3)
Other	1 (2.4)	0 (0)	1 (5.3)
Skin Type	Frequency (%)		
Type 1	9 (22)	6 (27.3)	3 (15.8)
Type 2	6 (14.6)	4 (18.2)	2 (10.5)
Type 3	7 (17.1)	4 (18.2)	3 (15.8)
Type 4	9 (22)	2 (9.1)	7 (36.8)
Type 5	7 (17.1)	4 (18.2)	3 (15.8)
Type 6	3 (7.3)	2 (9.1)	1 (5.3)

5.2.1.2 Materials and procedure

The belief-elicitation study questionnaires were developed according to the TPB questionnaire construction guidelines (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 2010). Table 5.2 presents the belief-elicitation questions along with a breakdown of the modal salient beliefs elicited for each question in regard to using and not using sunscreen. Two versions of the belief-elicitation questionnaire were used in the study. One version elicited beliefs about using, and the other not using, sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity. Other than the behaviour, all instructions and questions were the same for both questionnaires with the exception of Q7. Respondents completing the elicitation study about using sunscreen were asked to imagine that they intend to use sunscreen with an SPF of 15 or more the next time they engaged in a leisure activity and list any factors that would make them actually not use sunscreen. The not using sunscreen questionnaire asked respondents to imagine that they intend to not use sunscreen with an SPF of 15 or more then next time they engaged in an outdoor leisure activity and list any factors that would make them actually use sunscreen. Respondents were provided with six text boxes to list their responses below each question and were instructed to leave any boxes that they did not need blank. The questionnaire also collected demographic and background information including age, nationality, and state of residence which were recorded using an open response format and gender, education level, ethnicity, and skin type which were recorded using a multiple choice format.

Table 5.2 – Modal salient behavioural, normative and control belief sets for using and not using sunscreen

Using sunscreen	Total (n=22)	%	**Not using sunscreen**	Total (n=19)	%
Behavioural beliefs					
Q1 - What do you see as the advantages of you (not) using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity?					
Prevent sunburn	21	95	Save time putting it on	11	58
Prevent skin cancer	17	77	Skin won't feel greasy	10	53
Protection from UV rays	5	23	Get a better tan	6	32
Ease my mind	5	23	Won't smell of sunscreen	6	32
			Save money	4	21

Q2 - What do you see as the disadvantages of you (not) using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity?					
I will feel sticky	11	50	Get sunburn	13	68
Cost me money	6	27	Get skin cancer	12	63
I will smell of sunscreen	6	27	Damage my skin	7	26
Takes time to apply	5	23			
Q3 - What else comes to mind when you think about (not) using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity?					
Healthy thing to do	5	23	Sunburn	6	32
			Skin damage	4	21
Normative Beliefs					
Q4a - Please list the individuals or groups who would approve of you (not) using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity?					
Parents	20	91	People who tan	4	21
Friends	10	45	Friends	4	21
Family	7	32			
Doctor	7	32			
Partner	5	23			
Q4b - Please list the individuals or groups who would disapprove of you (not) using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity?					
None			Family	9	47
			Doctors	9	47
			Partner	7	37
			Dermatologists	5	26
Q5a - Please list the individuals or groups who are most likely to (not) using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity?					
Family	8	36	People with darker skin tones	7	37
Parents	6	27	Younger adults	5	26
People who have had skin cancer	5	23			
Friends	5	23			
Q5b - Please list the individuals or groups who are least likely to (not) using sunscreen with an SPF					

of 15 or more the next time I engage in an outdoor leisure activity?					
People who do not care about the risks of not using sunscreen	6	27	People with a light skin tone	8	42
People with a dark skin tone	6	27	Doctors	6	32
Teenagers	5	23			
Control Beliefs					
Q6a - Please list any factors or circumstances that would make it easy or enable you to (not) using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity?					
Cheaper sunscreen	9	41	Forgetting to take it with me	7	37
Spray on sunscreen	8	36	Cloudy or not very hot weather	6	32
Available at locations you would use it	5	23	Being at a location with shade or under cover	5	26
If it was easy to carry around	5	23	Wearing clothing which covers up my skin	4	21
			Greasy sunscreen	4	21
Q6b - Please list any factors or circumstances that would make it difficult or prevent you from (not) using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity?					
Not having the money to buy sunscreen	10	46	Having sunburn	8	42
Forgetting to take it out with you	5	23	Very hot weather	6	32
Q7 - Imagine that you intend to (not) use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity? What factors do you think **might lead you to actually (not)** use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity??					
Forgetting to take it out with you	11	50	Having sunburn	10	53
Not having sunscreen when you want it	5	23	Someone I know getting cancer	4	21

Respondents were randomly directed to answer one or the other questionnaire and were only permitted to take part in the study once. Payment was made for completing the questionnaire to a satisfactory standard.

5.2.1.3 Analysis procedure

Content analysis was used to construct modal salient behavioural, normative, and control belief sets which is consistent with the standard approach to analysing elicitation study data (Ajzen & Fishbein, 1980). Separate analyses were conducted for the using and not using sunscreen studies to generate separate modal salient belief sets for the two behavioural alternatives. Details of the content analysis procedure are described in section 3.3.6.1. Analyses involved reviewing the responses to each type of belief and collating a list of the main recurring themes. For each question the beliefs elicited from each respondent were categorised according to the main themes and the frequency of each response was recorded. A 20% decision rule was used whereby all beliefs which are mentioned by at least 20% of the sample are included in the modal salient belief sets and those which are reported less frequently are discounted. Thus, the modal salient belief sets generated from the using and not using sunscreen elicitation studies include all beliefs that were elicited from at least 5 (n = 22) and 4 (n = 19) respondents, respectively.

5.2.2 Belief-elicitation results

5.2.2.1 Conceptual overlap between the salient behavioural beliefs of using and not using sunscreen

There is a moderate degree of conceptual overlap in behavioural beliefs sets across using and not using sunscreen. Of the 11 different behavioural beliefs elicited, 6 are conceptually mirrored (preventing sunburn/get sunburn; prevent skin cancer/get skin cancer; I will feel sticky/skin won't feel greasy; cost me money/save money; protection from UV rays/damage my skin; takes time to apply/save time putting it on), 3 are distinct beliefs about using sunscreen (ease my mind, I will feel uncomfortable, healthy thing to do) and 1 is unique to not using sunscreen (get a better tan). Table 5.3 presents the modal salient beliefs for using and not using sunscreen.

Table 5.3 - Modal salient behavioural, normative, and control belief sets for using and not using sunscreen

Using sunscreen	**Not using sunscreen**
Behavioural beliefs	
Prevent sunburn (21) +	Get sunburn (13) -
Prevent skin cancer (17) +	Get skin cancer (12) -
I will feel sticky (11) -	Save time putting it on (11) +
Cost me money (6) -	Skin won't feel greasy (10)
I will smell of sunscreen (6) -	Damage my skin (7) -
Protection from UV rays (5) +	Get a better tan (6) +
Ease my mind (5) +	Won't smell of sunscreen (6) +
Takes time to apply (5) -	Save money (5) +
Healthy thing to do (5)	
Normative Beliefs	
Parents (20) +	Family (9) -
Friends (10) +	Doctors (9) -
Family (7) +	People with a light skin tone (8) -
Doctor (7) +	People with darker skin tones (7) +
People with a dark skin tone (6) -	Parents (5) -
People who do not care about the risks of not using sunscreen (6) -	Dermatologists (5) -
People who have had skin cancer (5) +	Young adults (5) +
Partner(5) +	People you know who tan (4) +
Teenagers you know (5) -	Friends (4) +
Control Beliefs	
Forgetting to take it out with you (11) -	Having sunburn (8) -
Not having the money to buy sunscreen (10) -	Forgetting to take it with me (7) +
Cheaper sunscreen (9) +	Cloudy or not very hot weather (6) +
Spray on sunscreen (8) +	Being at a location with shade or under cover (5) +
Not having sunscreen when you want it (5)	Wearing clothing which covers up my skin (4) +
If it was easy to carry around (5) +	Greasy sunscreen (4) +
Available at locations you would use it (5) +	Someone I know getting skin cancer (4)

Note: Beliefs for each type presented in order of most to least frequently reported. + indicates beliefs of positive valence, - indicates beliefs of negative valence.

Preventing sunburn is the most salient behavioural belief for using sunscreen and is listed as an advantage by 95% of respondents. Preventing skin cancer is also a highly salient advantage of using sunscreen, whereas protection from UV rays and easing my mind are comparatively less salient. Getting sunburn is the most salient behavioural belief for not using sunscreen. It is, however, relatively less salient than preventing sunburn is for using sunscreen with 68% of respondents listing it as a disadvantage. Getting skin cancer is the second most salient disadvantage of not using sunscreen and damaging my skin (which relates to being protected from UV rays) is also an important factor. Beliefs about the sensory experience of sunscreen is salient for both using and not using sunscreen, with feeling sticky the most frequently elicited disadvantage of not using sunscreen and not feeling greasy the second most salient advantage of not using sunscreen. The smell of sunscreen is also important across groups, with smelling of sunscreen a disadvantage of using sunscreen and not smelling of sunscreen an advantage of not using sunscreen. The cost of sunscreen and time it takes to apply are also salient disadvantages of using sunscreen and advantages of not using it. Getting a better tan is a unique advantage of not using sunscreen whereas being a healthy thing to do is a distinct belief related to using sunscreen. As such, most of the salient behavioural beliefs for using and not using sunscreen are common yet mirrored across groups.

Several behavioural beliefs in regard to using sunscreen depend on a respondent's knowledge about the likely outcomes of not using sunscreen. For example, the belief that preventing sunburn is an advantage of using sunscreen is dependent on an understanding that if one does not use sunscreen they are more likely to burn than if they use it. This is also true for other salient advantages of using sunscreen, including preventing skin cancer and protection from UV rays. Behavioural beliefs about the disadvantages of using sunscreen, however, are independent of not using sunscreen, such as feeling sticky and the cost of sunscreen. The advantages of not using sunscreen also depend on an understanding of the qualities of using sunscreen, such as it taking time to put on, that it feels greasy, has a particular smell, getting a better than, and that it costs money. On the other hand, beliefs about the disadvantages of not using sunscreen are more independent from thoughts about using sunscreen, with respondents able to consider the implications of not using sunscreen without first considering the outcome of using sunscreen as a reference point. Such beliefs include getting sunburn, getting skin cancer, and skin damage.

5.2.2.2 Conceptual overlap between the salient normative beliefs of using and not using sunscreen

Normative beliefs of using and not using sunscreen have a moderate conceptual overlap, with 6 out of the 12 modal salient beliefs related (parents; friends; family; doctor; people with a dark/darker skin tone; teenagers you know/ younger adults). There are 3 unique salient referents for using sunscreen (people who do not care about the risks of not using sunscreen; people who have had skin cancer; partner) and 3 distinct referents about not using sunscreen (people with a light skin tone; dermatologists; people you know who tan).

Parents are the most salient referent that would approve of using sunscreen and was mentioned by 91% of respondents. Friends, family, doctors, and partners were also important referents for using sunscreen. Interestingly, friends were also a salient referent believed to approve of not using sunscreen, whereas people who tan are a unique referent who would approve of not using sunscreen. Whereas friends were not listed as a referent that would disapprove of not using sunscreen, family, doctors, and partners were, which mirrors salient referents that would approve of using sunscreen. Dermatologists are a unique referent who would disapprove of not using sunscreen. There were no salient referents who would disapprove of using sunscreen.

Referents that are most likely to use sunscreen include family, parents, people who have had skin cancer, and friends. There is no overlap between these beliefs and salient referents that are most likely or least likely to not use sunscreen. People with darker skin tones are a salient referent that are least likely to use sunscreen and most likely to not use sunscreen, whereas those with a light skin tone are least likely to not use sunscreen. Teenagers are also an important referent that would be least likely to use sunscreen, whereas younger adults (whilst not necessarily covering the same age group specifically) are believed to be most likely to not use sunscreen. People who do not care about the risks of not using sunscreen are a unique referent that is least likely to use sunscreen whilst doctors are a distinct referent that is least likely to not use sunscreen. Salient individuals or groups who are least likely to use sunscreen include people who do not care about the risks of not using sunscreen, people with a dark skin time, and teenagers. People with darker skin tones and teenagers are also salient referents who are most likely to not use sunscreen and therefore mirror the using sunscreen counterparts.

5.2.2.3 Conceptual overlap between the salient control beliefs of using and not using sunscreen

Salient control beliefs sets are highly distinct between using and not using sunscreen, with only one common salient belief across behavioural alternatives out of 13 (forgetting to take it out with you/me). Cheaper sunscreen, spray on sunscreen, being available at locations that it would be used, and it being easy to carry around are factors which would make it easy to use sunscreen. None of these facilitating factors were common with salient facilitating or impeding factors of not using sunscreen. Instead, factors which would make it easy to not use sunscreen include forgetting to take it with me, cloudy or not very hot weather, being at a location with shade or under cover, wearing clothing which covers up my skin, and greasy sunscreen. Forgetting to take it with me is also a salient impeding factor of using sunscreen, but none of the other factors that would make it easy to not use sunscreen are also salient impeding factors of using sunscreen. Factors that would make it difficult to use sunscreen include not having the money to buy sunscreen and forgetting to take it out with you. These salient beliefs are distinct from the circumstances that would make it difficult to not use sunscreen which cover having sunburn, and very hot weather. Salient factors that may lead people to not use sunscreen when they intend to use it include forgetting to take it out with me and not having sunscreen when you want it. On the other hand, when intending to not use sunscreen, having sunburn and someone I know getting cancer are factors which might lead the respondent to actually use sunscreen.

Control beliefs in regard to the factors that would make it easy to use sunscreen are largely independent from cognitions about not using sunscreen, such as having spray on sunscreen, and sunscreen being available at locations where the respondent would use it. Two of the four salient factors that would make it easy to not use sunscreen appear to depend on cognitions about using sunscreen including forgetting to take it with me, and greasy skin. Salient disadvantages of both using and not using sunscreen are relatively distinct from thoughts about the alternative behaviour, however.

5.2.3 Study 2.1 discussion

The belief-elicitation study was conducted to examine the degree to which salient beliefs about using and not using sunscreen are conceptually mirrored (research question 1.1). Results of the study show that modal behavioural and normative beliefs sets for using and not using sunscreen are mirrored to a moderate degree, whereas only one out of the 13 modal salient control beliefs was conceptually mirrored. The distinction between control beliefs for action and inaction captures the way in which using sunscreen is an active behaviour that requires resources, abilities, and a degree of autonomy whereas not using sunscreen is the default, inactive behaviour that does not require anything of the individual. Together these findings show that salient beliefs in regard to using and not using sunscreen are not largely conceptually mirrored. The modal belief sets for all belief types contain distinct beliefs in regard to both using and not using sunscreen. This indicates that the belief based foundations of neither using nor not using sunscreen are simply anchored on the other alternative, as both action and inaction are perceived to possess unique qualities not shared across behavioural alternatives.

An unexpected finding is that the normative referent 'friends' were believed to approve of both using and not using sunscreen. A possible explanation for this is that different specific referents are salient when the individual thinks about using and not using sunscreen. However, Hamilton et al. (2016) report that grandparents are a salient referent believed to generally approve of a child using sun-protection, but would also think that it is not always necessary for the child to use sun-protection. It is possible that even when belief-elicitation questions all refer to the same target, context and time, questions in regard to using and not using sunscreen are answered with different circumstances in mind. A think aloud study highlights that respondents sometimes struggle to answer TPB questionnaire items because they feel their answer depends on further information that is not specified in the question (French et al. 2007). Therefore, respondents may use different mentally generated scenarios as a means to answer questions about using and not using sunscreen. This finding implies that mirrored beliefs for action and inaction may not always be 'true' conceptual opposites because their meaning can be different across behavioural alternatives.

5.3 Applying the theory of planned behaviour to using and not using sunscreen

A study was conducted to examine whether the TPB operates differently when applied to using and not using sunscreen. The findings of this study are presented as two sub-studies; the first is a comparison of the belief-based model when applied to using and not using sunscreen (study 2.2). The second is an examination of an extended direct model when applied to using and not using sunscreen (study 2.3).

5.3.1 Method

5.3.1.1 Sample

A self-selected sample of MTurk workers residing in the US completed one of two questionnaires about using and not using sunscreen. A total of 282 respondents completed the questionnaire about using sunscreen and 284 about not using sunscreen. Of this sample, 390 (using sunscreen n = 194, not using sunscreen n = 196) were required to complete both direct and belief-based measures, whereas a further 176 respondents were required to complete only direct measures (n = 88 for using and not using sunscreen).

A follow-up questionnaire was disseminated to respondents who had completed the full (direct and belief-based measure) questionnaire two weeks after they had completed the first questionnaire. The follow-up questionnaire was completed by 293 respondents (using sunscreen n = 151, not using sunscreen n = 142). An overview of the demographic and background features of the sample is presented in Table 5.4.

Table 5.4 - Demographic and background characteristics for the full, using, and not using sunscreen sample sub-groups for studies 2.2 and 2.3.

Variable	**Full Sample** (n = 566)	**Using Sunscreen** (n = 282)	**Not Using Sunscreen** (n = 284)
Age M years (SD)	33.69 (12)	32.77 (11.54)	34.6 (12.40)
Gender (% male)	317 (56)	161 (57.1)	156 (54.9)
Race	Frequency (%)		
White non-Hispanic	307 (54.2)	151 (53.5)	156 (54.9)
White Hispanic	195 (34.5)	98 (34.8)	97 (34.2)
Asian/Pacific Islander	30 (5.3)	19 (6.7)	11 (3.9)
Black	31 (5.5)	13 (4.6)	18 (6.3)
Native American	3 (.5)	1 (.4)	2 (.7)
Skin Type	Frequency (%)		
Type 1	65 (11.5)	33 (11.7)	32 (11.3)
Type 2	95 (16.8)	52 (18.4)	43 (15.1)
Type 3	204 (36)	98 (34.8)	106 (37.3)
Type 4	120 (21.2)	66 (23.4)	54 (19)
Type 5	54 (9.5)	24 (8.5)	30 (10.6)
Type 6	28 (4.9)	9 (3.2)	19 (6.7)

Data for the main study were collected in the summer months, between 26th July and 22nd August 2014. Respondents were randomly directed to answer one or the other questionnaire and were only permitted to take part in the study once. Payment was made for completing the questionnaire to a satisfactory standard and the remuneration rate was equivalent to the hourly rate suggested by MTurk. MTurk workers were only eligible to take part in the study so long as they were located in the US, had a past HIT approval rating of greater than or equal to 95%, and had more than 5,000 previously approved HITS.

5.3.1.2 Materials and procedure

Respondents were required to complete the questionnaire about either using or not using sunscreen. Full questionnaires are presented in appendix 0. All questions in each questionnaire corresponded with one or the other behavioural alternative. Other than the behavioural context referred to, all instructions, direct measures, and demographic and background questions were the same across questionnaires. Belief-based measures were

assessed using the same question branch. However, individual belief items differed between using and not using sunscreen questionnaires because the modal salient belief sets contain different beliefs for each behavioural alternative.

Belief based measures were formulated from the modal salient behavioural, normative, and control belief sets constructed in the elicitation study (study 2.1). All questions conformed to the recommendations set forth by Ajzen and Fishbein (1980) and Fishbein and Ajzen (2010). The strength of each belief was assessed in addition to its outcome evaluation (behavioural beliefs), motivation to comply (normative beliefs), or power of the control factor (control beliefs). Composite scores for each belief-based construct are used for the path analyses. The composite score for the behavioural belief construct (A_B: attitude toward the behaviour) was calculated by multiplying the belief strength (b_i) by the outcome evaluation (e_i), and summing the resulting products over all accessible behavioural outcomes as shown in the equation below.

$$A_B \propto \sum b_i e_i$$

The composite normative belief construct (SN: subjective norm) was formulated by multiplying the belief strength (n_i) by the motivation to comply (m_i), and the resulting products were summed over all accessible normative outcomes as shown in the following equation.

$$SN \propto \sum n_i m_i$$

To obtain the composite control belief construct (PBC: perceived behavioural control) the control belief strength (c_i) was multiplied by the power of the control factor (p_i), and the resulting product was summed over all accessible control belief outcomes as below.

$$PBC \propto \sum c_i p_i$$

Data for the belief-based measures contains 26 missing values across 17 respondents. All of the missing values were for the normative belief items. Missing values constitute valid responses from respondents to whom particular normative referents are not applicable (e.g. 'my partner'). Missing values were therefore retained in the data. The composite normative belief construct included in the path analysis is calculated based on the average score across all applicable normative beliefs for each respondent. All direct measures were formulated according to the guidelines set forth by Fishbein and Ajzen (2010) and were adapted from published TPB articles which report high reliability and internal consistency amongst items assessing the same construct.

5.3.2 Study 2.2 Comparing the application of the belief-based model to using and not using sunscreen

Structural equation modelling in Amos 22 was used to examine the belief-based TPB model when applied to using and not using sunscreen. Comparisons are made in regard to the modal salient beliefs that significantly influence each of the belief-based constructs for action and inaction (research question 1.2), validity of the using and not using sunscreen models (research question 2.1), which belief-based constructs predict intention and behaviour for using and not using sunscreen (research question 1.5), and the relative predictive power of the formative models when applied to using and not using sunscreen (research question 2.2). Furthermore, the structural equivalence of the relationships between models is evaluated using path analysis (research question 1.6), and the contribution of mirrored and distinct beliefs in the prediction of intention and behaviour is also examined (research question 1.3).

The belief-based using and not using sunscreen models are comprised of 3 latent formative constructs including behavioural beliefs, normative beliefs, and control beliefs. Each formative construct was identified by two reflective indicators. These reflective indicators were selected on the basis that they significantly load onto their respective reflective construct and had high factor loadings and squared multiple correlations across action and inaction models. The belief-based using and not using sunscreen models included all beliefs in their respective modal salient belief set developed in the belief-elicitation study. The

models also include intention which is a reflectively measured latent construct, and behaviour which is observed.

5.3.2.1 Assessment of construct and indicator validity for the using sunscreen model

In the using sunscreen belief-based model behavioural, normative, and control belief constructs are formed from 10, 9, and 7 beliefs, respectively. Formative indicators cannot be assessed in regard to their internal consistency because items may be positively or negatively correlated and still provide important information about their underlying construct (Nunnally, & Bernstein, 1994). The validity of formative models can instead be assessed at the indicator and construct levels (Henseler et al. 2009). The correlation between each belief-based construct and its corresponding directly measured construct provides an insight into the extent to which formatively measured items capture the full meaning of the construct. Correlations between all belief-based and directly assessed constructs are significant ($p < .001$). The correlation between the behavioural belief construct and attitude is moderately high ($r = .56$) which indicates that behavioural beliefs capture overall attitudes well. A somewhat lower correlation is found between control beliefs and PBC ($r = .30$) nevertheless, this shows that the important control factors related to using sunscreen are captured. In contrast, the mean of the weighted normative beliefs is not highly correlated to subjective norm ($r = .26$). von Haeften et al. (2001) state that this may be attributed to either the formative research not identifying important underlying normative referents or that the weighted normative beliefs and subjective norm assess two different psychological constructs. The validity of the belief-based items was further assessed by examining the variance inflation factor (VIF) which was below 10 for all indicators (range 1.48 to 6.75). This shows that multicollinearity is not a concern.

Construct validity is established when the model produces satisfactory explanatory power and the relationships between constructs are consistent with expectations. Behavioural belief items explain a high proportion of the variance in the behavioural belief construct ($R^2 = .565$). Control belief items explain a substantial proportion of the extracted variance in the control belief construct ($R^2 = .298$). Normative belief items, however, afford a very low level of explanatory power of the normative belief construct as they explain only 14.5% of the extracted variance. Overall these results evidence the validity of the model, although the

normative belief construct may not include all relevant normative referents pertinent to using sunscreen.

5.3.2.2 Using sunscreen formative model assessment

Of the 10 behavioural beliefs which form the behavioural belief construct 4 significantly inform the behavioural belief construct. Significant beliefs include ‘preventing skin cancer’ ($\beta = .230$, $p = .037$), ‘protecting myself from UV rays’ ($\beta = .213$, $p = .037$), ‘easing my mind’ ($\beta = .162$, $p = .024$), ‘healthy thing to do’ ($\beta = .249$, $p < .001$). Family is the only normative belief item out of 9 which significantly contributes to the normative belief construct ($\beta = .489$, $p < .001$). Three of the 7 control belief items significantly contribute to the control belief construct including ‘sunscreen available at the locations you would use it’ ($\beta = .443$, $p < .001$), ‘easy to carry around’ ($\beta = .200$, $p = .05$), and ‘not having the money to buy it’ ($\beta = -.294$, $p < .001$). Table 5.5 presents a summary of the results for the using sunscreen model.

Table 5.5 - Means, standard deviations, and β's for using sunscreen behavioural, normative and control beliefs

Belief-based item	Mean (SD)	β
Behavioural beliefs		
a. Prevent sunburn	29.96 (8.34)	-.022
b. prevent skin cancer	28.39 (8.24)	.230 **
c. protect me from UV rays	29.51 (8.74)	.213*
d. ease my mind	24.93 (10.61)	.162*
e. cost me money	10.21 (7.79)	-.048
f. make me smell of sunscreen	12.53 (8.47)	-.021
g. take time to apply	12.79 (7.28)	.104
h. make my skin feel sticky	7.74 (6.66)	.008
i. feel uncomfortable	5.79 (5.85)	-.032
j. be a healthy thing to do	29.02 (9.77)	.249***
Normative beliefs		
a. Your friends	13.89 (10.54)	.489***
b. Your family	15.24 (12.02)	.099
c. Your partner	14.83 (13.12)	.063
d. Your parents	14.80 (12.22)	-.141
e. Your doctor	15.94 (12.73)	-.169
f. People you know who have/have had skin cancer	16.77 (12.05)	-.163
g. Teenagers you know	7.86 (7.58)	-.016
h. People you know who have a dark skin tone	8.97 (7.34)	.011
i. People you know who don't care about the risks of not using sunscreen	4.93 (6.16)	-.009
Control beliefs		
a. Cheaper sunscreen	21.04 (11.79)	.003
b. Having spray on sunscreen	20.72 (12.46)	-.151
c. Sunscreen being available at the locations	25.02 (10.59)	.443***
d. Sunscreen being easy to carry around	23.93 (10.95)	.200*
e. Not having the money to buy sunscreen	16.42 (13.29)	-.294***
f. Forgetting to take sunscreen out with you	23.21 (11.09)	.135
g. Not having sunscreen when you	22.16 (11.12)	-.059

Notes: *** $p < .001$, ** $p < .01$, * $p < .05$

The structural relationships of the using sunscreen belief-based model are presented in Figure 5.2. This model explains 56.5% of the extracted variance in intention. Control beliefs (β = .659, p < .001) and normative beliefs (β = .175, p = .007) significantly contribute to the prediction of intention whereas behavioural beliefs do not (p > .10). A considerable 34.6% of the variance in behaviour is explained by the model, with intention a significant predictor (β = .682, p < .001) while the control beliefs construct is nonsignificant (p > .10).

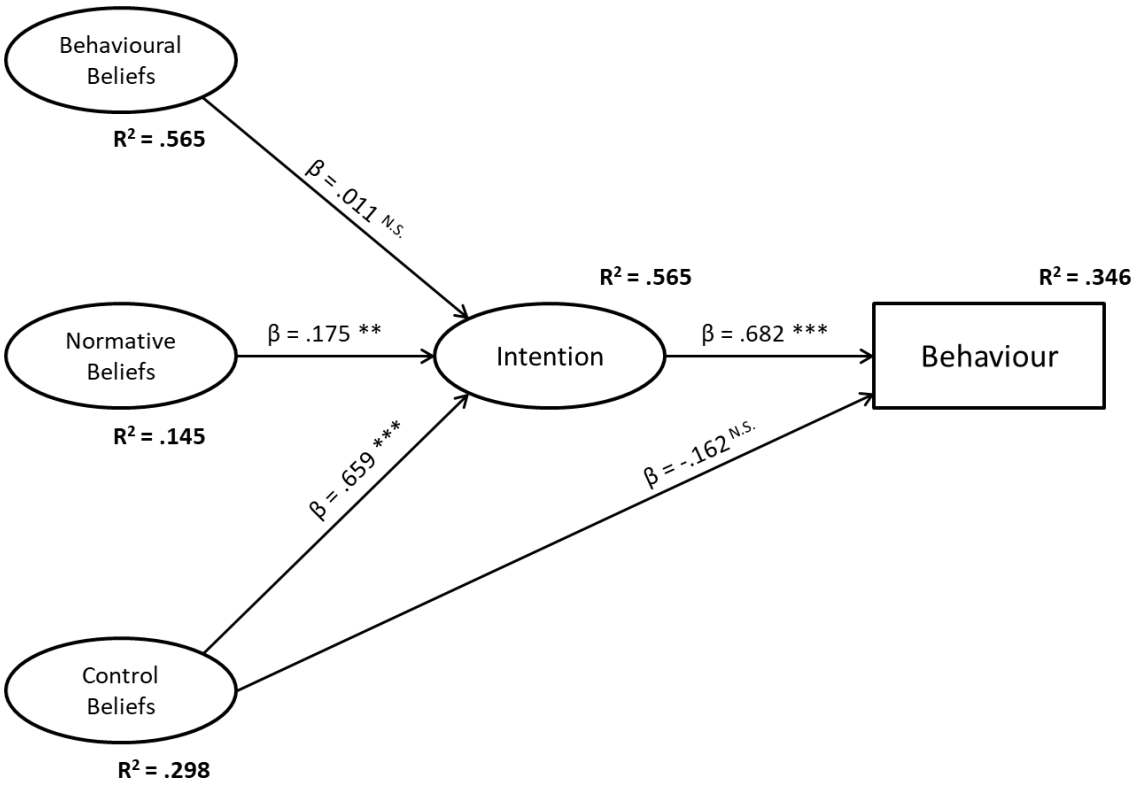

Figure 5.2 - Structural relationships of the using sunscreen belief-based model

Notes: * p < .05, ** p < .01, *** p < .001, N.S. = not significant

5.3.2.3 Assessment of construct and indicator validity for the not using sunscreen model

In the formative not using sunscreen model there are 8 behavioural beliefs, 9 normative beliefs, and 7 control beliefs. The validity of the belief-based items was first assessed by examining the variance inflation factor (VIF) which was below 10 for all indicators (range 1.31 to 5.09). This shows that multicollinearity is not a concern. Individual indicator validity was examined by taking the mean weighted belief-based measures for each construct and

assessing whether these belief-based measures are correlated to their respective reflectively measured constructs. The mean of the underlying behavioural beliefs (weighted by outcome evaluations) is not significantly correlated with attitude toward the behaviour (r = .111; p > .10) and the weighted mean of normative beliefs is also not significantly correlated with subjective norm (r = .076; p > .10). Control beliefs are, however, significantly correlated to PBC (r = .362; p < .001). These results suggest that the behavioural and normative beliefs included in the modal salient belief sets do not adequately capture important and relevant beliefs about not using sunscreen. Alternatively, these findings may signify that behavioural beliefs and attitude, and normative beliefs and subjective norm are tapping into two separate psychological constructs (von Haeften et al., 2001).

An examination of the explanatory power of the model shows that only a very small portion of the variance in behavioural beliefs (R^2 = .10) and normative beliefs (R^2 = .025) is explained by their respective belief items. These results are consistent with the view that the behavioural and normative belief items do not capture key referents relevant to not using sunscreen. A moderate amount of variance in the control belief construct is explained by its respective items (R^2 = .248) which suggests that some important control factors were identified in the elicitation study. These findings show that the validity of the belief-based TPB model is poorer when applied to not using sunscreen than to using sunscreen (research question 2.1).

5.3.2.4 Not using sunscreen formative model assessment

Of the 8 behavioural beliefs which form the behavioural belief construct ‘I will get a better tan’ (β = .207, p = .007) is significant. Of the 9 normative beliefs only ‘my doctor’ (β = -.334, p = .037) significantly influences the normative belief construct. Two of the 7 control beliefs items are significant covering ‘if it were cloudy and not very hot’ (β = .181, p < .001) and ‘forgetting to take it with me’ (β = .393, p = .035). Table 5.6 presents an overview of the belief-based measure results for the not using sunscreen model.

Table 5.6 - Means, standard deviations, and β for not using sunscreen behavioural, normative and control beliefs

Belief-based item	Mean (SD)	β
Behavioural beliefs		
a. I will get sunburn	2.45 (4.14)	.048
b. I will increase my risk of skin cancer	1.63 (4.20)	-.077
c. My skin won't feel greasy	9.95 (6.93)	-.128
d. I will save time putting it on	16.68 (9.84)	.090
e. I will get a better tan	10.78 (9.56)	.207 **
f. I won't smell of sunscreen	18.47 (9.47)	-.112
g. I will save money	20.84 (11.21)	-.046
h. It will damage my skin	1.76 (3.15)	.078
Normative beliefs		
a. Your friends	3.12 (5.04)	-.092
b. Your family	2.82 (4.87)	.158
c. Your partner	3.22 (5.95)	.016
d. Your dermatologist	1.50 (3.60)	.251
e. Your doctor	1.58 (3.64)	-.334 *
f. People you know who tan	6.44 (6.74)	-.048
g. Young adults you know	5.12 (5.91)	-.049
h. People you know who have a light skin tone	2.96 (4.49)	-.025
i. People you know who have a dark skin tone	5.69 (6.09)	.075
Control beliefs		
a. Forgetting to take it with me	25.81 (12.11)	.181 *
b. Being at a location with shade or under cover	21.66 (11.52)	.025
c. If it were cloudy or not very hot	20.24 (12.54)	.393 ***
d. If I wore clothing which covered up my skin	23.72 (11.86)	-.093
e. If the sunscreen was greasy	12.33 (11.92)	.107
f. Having sunburn	15.70 (14.51)	.092
g. Someone I know getting skin cancer	15.28 (15.18)	-.123

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$

The structural relationships of the not using sunscreen belief-based model are depicted in Figure 5.3. The model explains 63.9% of the variance in intention to not use sunscreen. Control beliefs (β = .648; *p* < .001) and behavioural beliefs (β = 466; *p* < .001) significantly impact intention whereas normative beliefs do not (*p* > .10). A total of 21.5% of the variance in behaviour is explained by the model. Intention (β = .277; *p* = .030) and control beliefs (β = .234, *p* = .048) significantly predict not using sunscreen behaviour.

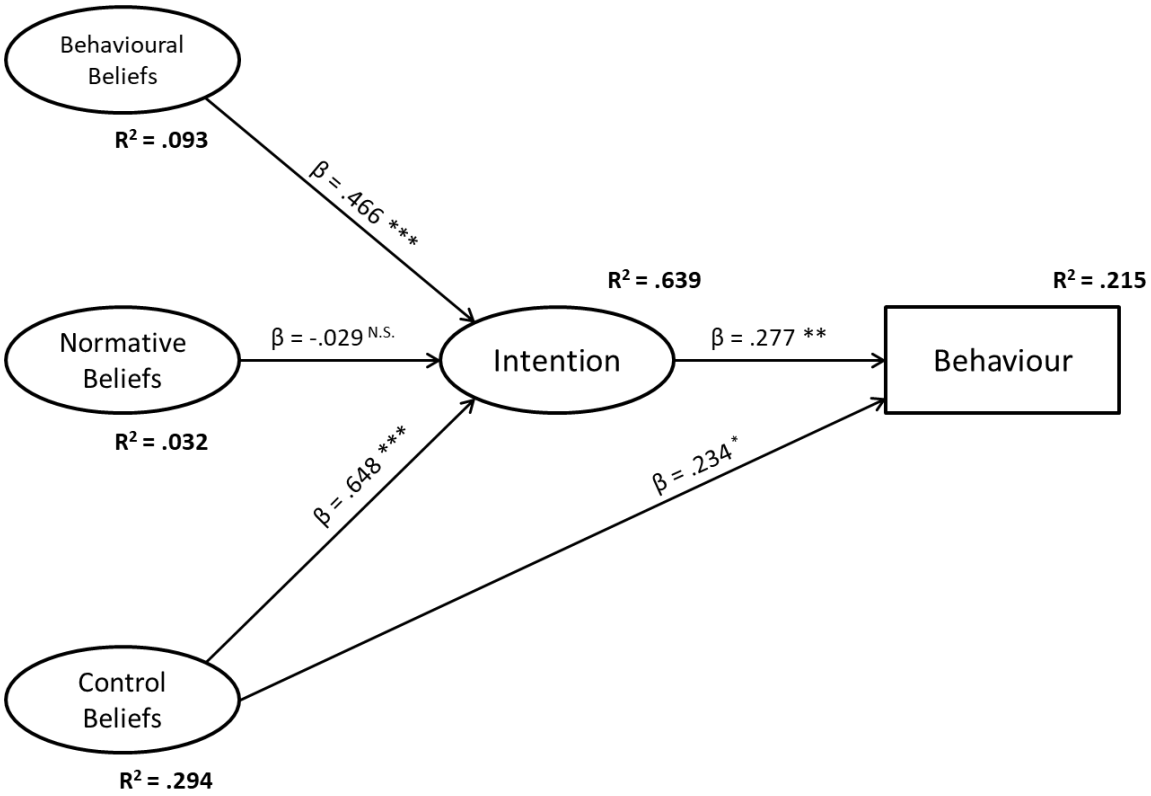

Figure 5.3 - Structural relationships for the not using sunscreen belief-based model

Notes: * *p* < .05, ** *p* < .01, *** *p* < .001, N.S. = not significant

These findings identify that a combination of common and different factors influence intention and behaviour for using and not using sunscreen (research question 1.5). Furthermore, greater variance in intention is explained when the belief-based model is applied to not using sunscreen, but greater variance in behaviour when applied to using sunscreen (research question 2.2).

5.3.2.5 Comparing structural relationships between belief-based measures of using and not using sunscreen

A path analysis was conducted in Amos (version 22) to compare the structural relationships of the belief-based using and not using sunscreen models. Path analysis facilitates the direct comparison of using and not using sunscreen belief-based models which is not otherwise possible because the using and not using sunscreen models include a different number of beliefs. For using and not using sunscreen models separately a composite score for each belief-based construct were formed from all modal salient beliefs of that construct. Non-significant beliefs were not omitted because discarding these items would change the meaning of the underlying construct (Jarvis et al. 2003). The path model is comprised of behavioural, normative, and control belief composite constructs, a composite construct of intention derived from its reflectively measured items, and behaviour which is an observed variable.

The using sunscreen path model explains 16% of the variance in intention. Behavioural beliefs (β = .317, $p < .001$) significantly influence intention but normative beliefs (β = .091, $p > .10$) and control beliefs do not (β = .112, $p > .10$). The explanatory power of the model is considerably better for the prediction of behaviour where 34% of the extracted variance is explained. Intention (β = .587, $p < .001$) is a significant predictor of behaviour while the control belief construct is not (β = -.018, $p > .10$). The not using sunscreen path model explains 19.8% of the variance in intention. Behavioural (β = .307, $p < .01$) and normative beliefs (β = .272, $p < .001$) significantly influence intention to not use sunscreen whereas control beliefs do not ($p > .10$). The model accounts for 14.5% of the variance in behaviour. Intention (β = .380, $p < .001$) is a significant predictor of behaviour but control belief is not ($p > .10$).

Chi-square difference tests show that overall, the structural relations of the using and not using sunscreen models are variant ($\Delta\chi^2$ (5) = 13.045, $p = .023$). The structural relationships between the normative belief construct and intention ($\Delta\chi^2$ (1) = 9.611, $p = .002$) are nonequivalent. The nonequivalence of this relationship is explained by the normative belief construct being a significant predictor of intention to not use sunscreen but not a significant predictor of intention to use sunscreen. The relations between the behavioural belief construct and intention, the control belief construct and intention, the control belief construct and behaviour ($p > .10$), and intention and behaviour ($p = .099$) do not significantly differ.

Figure 5.4 provides an overview of these results. This finding shows that the relationships between constructs of the belief-based model are not all equivalent when the model is applied to using and not using sunscreen (research question 1.6).

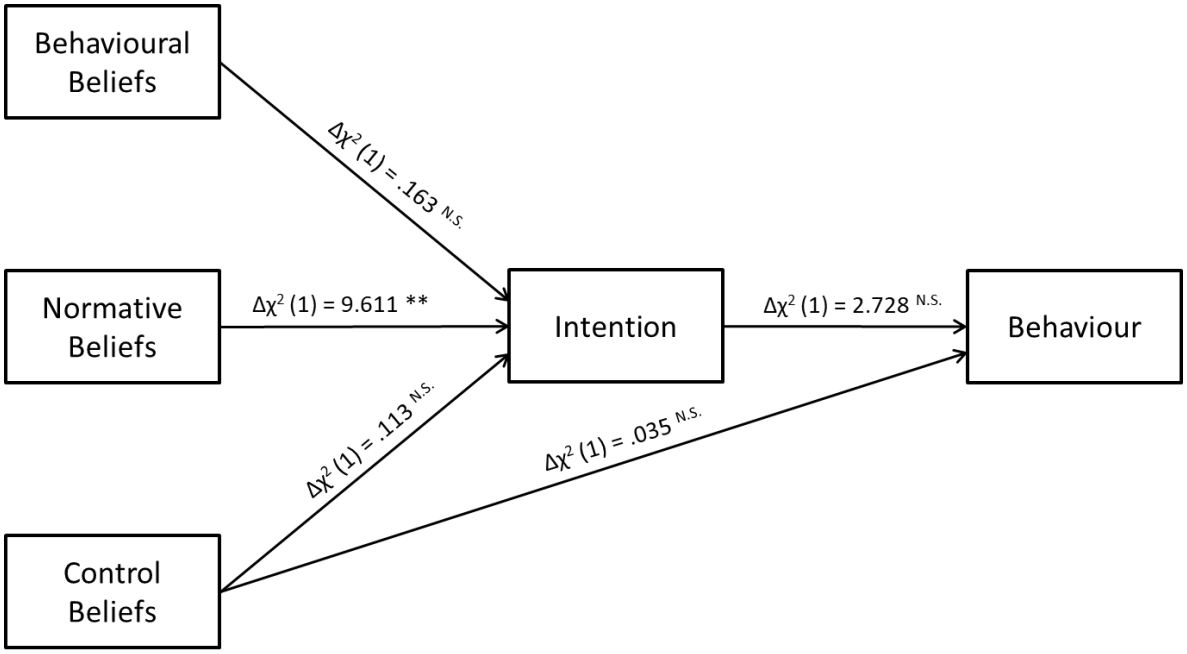

Figure 5.4 - Results for the chi-square difference test of structural relationships for the using and not using sunscreen belief-based models

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$, N.S. = not significant; values in square brackets are for not using sunscreen

5.3.2.6 Exploring the influence of mirrored and distinct beliefs for using and not using sunscreen

A three-step approach was taken to determine whether distinct beliefs about using and not using sunscreen explain additional variance in intention and behaviour, over and above that explained by the mirrored beliefs between action and inaction alone (research question 1.3). In the first step separate analyses were performed for using and not using sunscreen models that included only beliefs that are conceptually mirrored between action and inaction. This step shows how well mirrored beliefs people hold about action and inaction explain intention and behaviour. In the second step hierarchical regression analyses were undertaken to assess whether the inclusion of distinct beliefs significantly enhances the prediction of

intention to use and not use sunscreen after controlling for mirrored beliefs between action and inaction.

5.3.2.6.1 Comparison of the using and not using sunscreen mirrored belief models

The validity of the mirrored belief-based models is evidenced when beliefs relevant to each construct explain a substantial portion of variance in that belief-based construct. In the mirrored belief using sunscreen model a considerable amount of variance in the behavioural belief construct is explained by the mirrored behavioural belief items (R^2 = .543). A comparatively low amount of variance in the normative belief construct is explained by the normative belief items (R^2 = .155) and mirrored control belief items explain little variance in the control belief construct (R^2 = .020). In the not using sunscreen mirrored belief model a very small portion of variance in the behavioural (R^2 = .063) and normative belief (R^2 = .056) constructs is explained by their respective belief items. Control belief items explain 13.1% of the variance in the control belief construct. These results show that mirrored behavioural beliefs capture important determinants of attitude toward using sunscreen, whereas they do not adequately capture important determinants of attitude toward not using sunscreen. Furthermore, the low explained variance in the normative and control belief constructs for both action and inaction suggest that subjective norm and PBC may be underpinned by important beliefs that are not conceptually mirrored.

5.3.2.6.2 Comparing the belief-based determinants of using and not using sunscreen

None of the mirrored beliefs for using and not using sunscreen are significant across both action and inaction. Significant beliefs for using sunscreen cover ‘prevent skin cancer’ (β = .325, p < .001), ‘protect me from UV rays’ (β = .361, p < .001), and ‘take time to apply’ (β = .169, p = .011). For not using sunscreen ‘won’t feel greasy’ (β = -.161, p = .022) and ‘forgetting to take it with me’ (β = .395, p < .001) are significant beliefs. An overview of the belief-based results for using and not using sunscreen are presented in Table 5.7.

Table 5.7 – Comparison of the means, standard deviations, and β's for mirrored beliefs for using and not using sunscreen

Belief-based item	**Mean (SD)**	**β**
Behavioural beliefs		
a. Get/prevent sunburn	29.96 (8.34) [2.45 (4.14)]	.050 [.089]
b. Prevent/increase my risk of skin cancer	28.39 (8.24) [1.63 (4.20)]	.325 *** [-.090]
c. Protect me from UV rays/ damage my skin	29.51 (8.74) [1.76 (3.15)]	.361 *** [.079]
d. Cost/save money	10.21 (7.79) [20.84 (11.21)]	-.055 [.008]
e. Make me/won't smell of sunscreen	12.53 (8.47) [18.47 (9.58)]	-.023 [-.105]
f. Take time to apply/save time putting it on	12.79 (7.28) [16.68 (9.84)]	.169 * [.118]
g. Make my skin feel sticky/ won't feel greasy	7.74 (6.66) [9.95 (6.93)]	-.022 [-.161 *]
Normative beliefs		
a. Your family	15.24 (12.02) [2.82 (4.87)]	.325 [.226]
b. Your friends	13.89 (10.54) [3.12 (5.04)]	.050 [.000]
c. Your doctor	15.94 (12.73) [1.58 (3.64)]	-.157 [.051]
d. People you know who have a dark skin tone	8.97 (7.34) [5.69 (6.09)]	.074 [.091]
e. Teenagers you know	7.86 (7.58) [5.12 (5.91)]	-.134 [-.162]
Control beliefs		
a. Forgetting to take it with me	23.21 (11.09) [25.81 (12.11)]	.148 [.395 ***]

Notes: *** $p < .001$, ** $p < .01$, * $p < .05$, N.S. = not significant; values in square brackets are for not using sunscreen

In the using sunscreen model behavioural (β = .154, p = .010) and control beliefs (β = .619, p < .001) significantly impact intention but normative beliefs do not (p > .10). In total 40.7% of the variance in intention is explained by the model. Intention (β = .671, p < .001), but not control beliefs (p < .10), predict behaviour for which 35.2% of the variance is explained. In the not using sunscreen model behavioural (β = .480, p < .001) and control beliefs (β = .627, p < .001) are significant predictors of intention but normative beliefs are not (p > .10). This model explains 62.4% of the variance in intention and 22.1% of the variance in behaviour. Intention (β = .281, p = .023) and control beliefs (β = .240, p = .035) significantly impact behaviour. A comparison of the using and not using sunscreen mirrored belief models is shown in Figure 5.5.

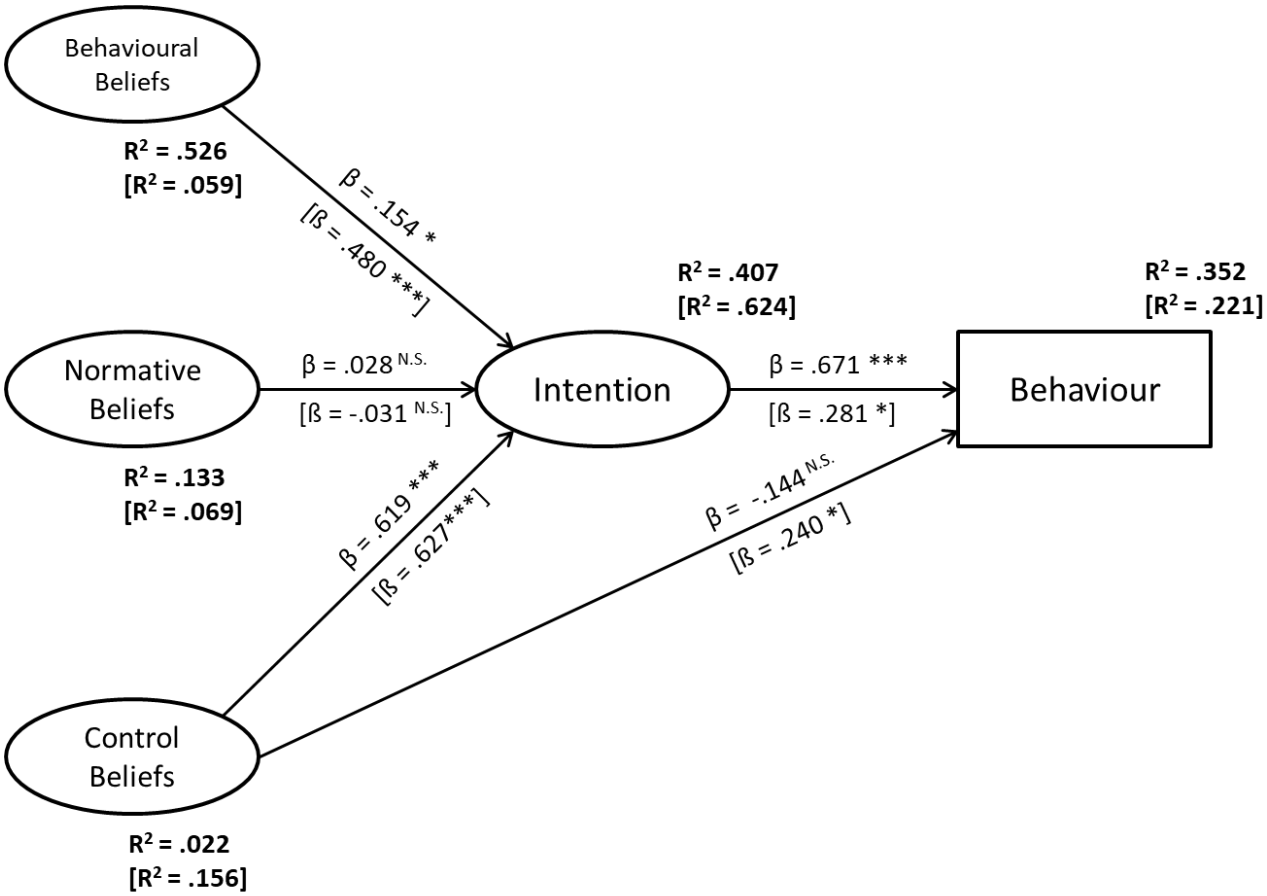

Figure 5.5 - Comparison of the structural relationships of the mirrored using and not using sunscreen models

Notes: * p < .05, ** p < .01, *** p < .001, N.S. = not significant; values in square brackets are for not using sunscreen

5.3.2.6.3 Assessing the contribution of distinct beliefs over and above that of the mirrored beliefs in the prediction of intention

Section 5.3.2.2 reports that a belief-based model consisting of all modal salient beliefs (mirrored and distinct) in regard to using sunscreen explains 56.5% of the variance in intention and 34.6% of the variance in behaviour. The explanatory power of this model explains considerably more variance in intention to use sunscreen than a model which includes only mirrored beliefs between action and inaction ($R^2 = .407$). The model consisting of only mirrored beliefs, however, explains slightly more variance in behaviour ($R^2 = .352$) than the model which includes both distinct and mirrored beliefs. As reported in section 5.3.2.4, a model that includes all modal salient beliefs about not using sunscreen explains 42.8% of the variance in intention to not use sunscreen. The predictive power of this model is lower than that of a belief-based model including only mirrored beliefs between action and inaction which was found to explain 62.4% of the variance in intention to not use sunscreen. The mirrored ($R^2 = .221$) and full-belief based model ($R^2 = .215$) explain a similar amount of variance in behaviour, however.

Hierarchical regression analyses were conducted in SPSS (version 24) to establish whether distinct beliefs relevant to using and not using sunscreen explain additional variance in intention over and above that explained by the mirrored beliefs between action and inaction. In the first regression model, mirrored beliefs relevant to using sunscreen were entered in step 1 and explained 21.1% of the variance in intention. Adding distinct beliefs about using sunscreen into the regression equation in step 2 significantly increased the explained variance in intention to 48.9% ($p < .001$). In the second regression model, mirrored beliefs about not using sunscreen were entered in step 1 and explained 27.9% of the variance in intention to not use sunscreen. In step 2 the addition of distinct beliefs about not using sunscreen significantly increases the explained variance in intention to 38.6% ($p < .001$). These findings identify that distinct beliefs about using and not using sunscreen significantly enhance the explanatory power of the belief-based model (research question 1.3).

5.3.2.7 Study 2.2 discussion

This study is the first to compare the application of the belief-based TPB model to action and inaction. The first contribution of the study is to show that none of the modal salient behavioural, normative, or control beliefs significantly inform their respective constructs for both using and not using sunscreen. This finding extends the work of Dodge and Jaccard (2008) whom identified that using and avoiding performance enhancing substances are guided by mostly different behavioural beliefs, but did not explore the normative or control beliefs that underpin action and inaction (research question 1.2). Furthermore, this study shows that distinct beliefs significantly raise the extracted variance in intention over and above that explained by mirrored beliefs alone in both using and not using sunscreen models (research question 1.3). Contrary to the complementarity assumption, these results show that the belief-based foundations of using and not using sunscreen are not conceptual opposites. Distinct beliefs play an important role in the decision to both perform and not perform the behaviour. This study further finds that both common and distinct determinants influence intentions and behaviour in regard to using and not using sunscreen (research question 1.5). Building upon this, the structural relationship between SN and intention is significantly different across using and not using sunscreen models (research question 1.6). These findings provide strong support to the view that action and inaction are underpinned by different rather than conceptually opposite determinants.

This study also sought to identify whether the belief-based TPB model operates differently when applied to action and inaction. The behavioural and normative belief constructs of the using sunscreen model exhibit considerably higher indicator and construct validity that that demonstrated in the not using sunscreen model (research question 2.1). This shows that the belief-based model was more effective in capturing important behavioural and normative beliefs underlying action than inaction. Furthermore, the belief-based model explains greater variance in behaviour, but less variance in intention, when applied to using sunscreen (research question 2.2). These results are consistent with literature on the action-inaction asymmetry where information processing is not equivalent when it relates to action and inaction (e.g. Hearst, 1991; Newman et al., 1980; Rassin, 2014), and affirmation and negation (e.g. Eerland & Rassin, 2012; Mayo et al., 2004). Combined, the findings of this study show that the belief-based model does not function equivalently when applied to using and not using sunscreen.

5.4 Study 2.3 Comparing the application of the direct measure TPB models to using and not using sunscreen

Two approaches were used to compare the application of the TPB to using and not using sunscreen. Firstly, the using and not using sunscreen models are analysed separately to present 'best case' models for each behavioural alternative. Because TPB studies usually only consider action or inaction, these 'best cases' models show how the TPB functions when applied to predict using and not using sunscreen as they would be analysed in the literature. Comparisons are made between using and not using sunscreen models in regard to their model fit and refinements required (research question 3.1), psychometric properties (research question 3.2), the determinants that guide intention and behaviour (research question 1.7), and the model's relative predictive power (research question 3.4). The models are also examined in regard to whether AIR exerts a differential influence on intention and behaviour in the using and not using sunscreen models (research question 4.2). Furthermore, the moderating role of actual capacity and actual autonomy is also examined to establish whether the actual control factors moderate the intention-behaviour relationship differently for using and not using sunscreen (research question 3.3). Secondly, the using and not using sunscreen models are refined on a like-for-like basis so that the factor structure and structural relationships between models can be directly compared. The models are examined in regard to measurement invariance (research question 1.4) and the structural equivalence of relationships across action and inaction models (research question 1.8 and 4.3).

The using and not using sunscreen models are comprised of 6 reflective latent variables covering attitude, subjective norm, PBC, AIR, actual behavioural control, and intention. Observed variables include behaviour and past behaviour. Because actual behavioural control was measured in the follow-up questionnaire there are missing values present in the data. Amos does not produce modification indices for variables with missing values and so the initial using and not using sunscreen CFAs were conducted without ABC. After refinements were made to each of the initial models further CFAs were conducted which included ABC. Table 5.8 presents the measures used to assess the direct measures for using and not using sunscreen.

Table 5.8 - Direct measure using and not using sunscreen questionnaire items and scales

Construct	Scale
Intention (Adapted from Shaw et al. 2006)	
INT1a. How likely are you to (not) use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?	0 Very unlikely to 6 Very likely
INT1b. How strong is your intention to (not) use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?	0 No intention at all to 6 Very strong
INT1c. How much do you agree with this statement about you "I will (not) use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity"?	0 Strongly disagree to 6 Strongly agree
Attitude (Adapted from Armitage and Conner, 1999)	
For me to (not) use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity would be ATT2a. Pleasant (+3) to Unpleasant (-3) ATT2b. Enjoyable (+3) to Unenjoyable (-3) ATT2c. Beneficial (+3) to Harmful (-3) ATT2d. Satisfactory (+3) to Un**s**atisfactory (-3) ATT2e. Good (+3) to Bad (-3) ATT2f. Positive (+3) to Negative (-3)	
Subjective Norm (Adapted from Kothe et al. 2012)	
SN3a. People who are important to me would think I 'should'/'should not' (not) use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity	+3 Should to -3 Should not
SN3b. People who are important to me would 'approve'/disapprove' of me (not) using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity.	+3 Approve to -3 Disapprove
SN3c. People who are like me would think I 'should'/'should not' (not) use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity.	+3 Strongly agree to -3 Strongly disagree
SN3d. People who are like me would 'approve'/disapprove' of me (not) using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity.	+3 Strongly agree to -3 Strongly disagree
Perceived Capacity (Adapted from Godin et al. 2010)	
PBC4a. For me, (not) using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity would be	+3 Easy to -3 Difficult
PBC4b. I am confident that I am able to (not) use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity.	+3 Strongly agree to -3 Strongly disagree
PBC4c. (Not) using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity is completely up to me.	+3 Strongly agree to -3 Strongly disagree
PBC4d. I am confident that I am able to overcome any obstacles that would prevent me from (not) using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity	+3 Strongly agree to -3 Strongly disagree

AIR (Taken from Godin et al. 2005)	
If I choose to NOT use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity… AIR5a. I would regret it AIR5b. It would bother me AIR5c. I would be disappointed	0 Not at all to 6 Very much
Actual Behavioural Control (Adapted from Godin et al. 2010)	
ABC6a. For me, (not) eating high-calorie snacks in the last two weeks was…	0 Difficult to 6 Easy
ABC6b. (NOT) eating high-calorie snacks was completely up to me	0 Strongly disagree to 6 Strongly agree
ABC6c. I was able to overcome any obstacles that would prevent me from (NOT) eating high-calorie snacks in the last two weeks	0 Strongly disagree to 6 Strongly agree
Past Behaviour	
PB7. In the last two weeks, how often have you eaten high-calorie snacks?	0 Never to 6 Several times a day
Behaviour	
BEH8. On how many days did you (NOT) eat high-calorie snacks in the last two weeks?	0-14 days

5.4.1.1 Comparison of the baseline donating and not donating measurement models

5.4.1.1.1 Baseline using sunscreen model CFA

The baseline using sunscreen model yields poor fit statistics (χ^2 (160) = 778.033, $p < .001$, CFI = .877, TLI = .853, NFI = .850, RMSEA = .117, AIC = .878.03). Factor loadings are low for two attitude items (ATT2a: .556, ATT2b: .521) and one indicator of PBC (PBC4c: .486). The squared multiple correlations of these items are also below .4 (ATT2a: .32, ATT2b: .271, PBC4c: .236) and on this basis these indicators were removed from subsequent analysis. Due to high covariation between the error terms of two subjective norm items (SN3c and SN3d) these error terms e9 and e10 were correlated in further analyses.

5.4.1.1.2 Baseline not using sunscreen model CFA

The baseline CFA for the not using sunscreen model yields poor fit statistics (χ^2 (160) = 966.239, p < .001, CFI = .822, TLI = .789, NFI = .796, RMSEA = .133, AIC = .1066.239). Factor loadings are low (< .7) for two items of intention (Int1a: .66, INT1b: .615), two indicators of subjective norm (SN3b: .50, SN3d: .49), and two indicators of PBC (PBC4c: .449, PBC4d: .57). Squared multiple correlations for several of these indicators also fell below .4 (INT1b: .378, SN3b: .254, SN3d: .326, PBC4c: .202, PBC4d: .326). On this basis one item of intention (INT1b), two items of subjective norm (SN3b and SN3d), and two items of PBC (PBC4c and PBC4d) were removed from subsequent analyses. High covariance were observed between error terms of several attitude item pairings and were covaried (e1 and e2, e1 and e4, e1 and e5, e2 and e4, e2 and e5).

5.4.1.1.3 Assessing common method variance for using and not using sunscreen

Common method variance was first examined using Harmon's single-factor test followed by the correlational marker technique (Lindell & Whitney, 2001). Separate exploratory factor analyses was conducted for the using and not using sunscreen models including intention, attitude, subjective norm, PBC, and anticipated inaction. In the using sunscreen model the unrotated solution identified 4 factors with eigenvalues of greater than 1 which account for 78.5% of the variance in the model and the first factor explains 48.66% the variance in the model. In the not using sunscreen model 5 factors with eigenvalues greater than one were identified and the first factor explains 35.7% of the variance in the model. As recommended by Schaller et al. (2015a) common method variance was also examined using the correlational marker technique outlined by Lindell and Whitney (2001) with age as the marker variable. Lindell and Whitney (2001) state that artificial negative correlations (i.e. where a construct has a preponderance to negatively correlate with other constructs) should be eliminated from the model by reverse scoring items for the construct. In line with this recommendation all items of AIR were reverse scored for the not using sunscreen model. After common method variance was partialled out of the model all correlations between constructs which were significant prior to CMV-correction remained significant (p < .10) and all correlations that were non-significant before correction were also non-significant post-correction (p > .10) across using and not using sunscreen models. Together, these results show that common method variance is not of concern in the using and not using sunscreen models.

5.4.1.2 Comparison of the independently refined using and not using sunscreen models

5.4.1.2.1 Independently refined using sunscreen CFA

The refined using sunscreen model yields a good fit to the data (χ^2 (108) = 265.322, p < .001, CFI = .964, TLI = .954, NFI = .94, RMSEA = .072, AIC = 335.322). All indicators load significantly (p < .001) with factor loadings above .7 (range .72 to .97) whereas correlations between constructs are all low (|r|>.7). Construct reliability values are all above the suggested 0.6 level (Bagozzi & Yi, 1988) ranging from .83 to .98. The AVE values exceeded the recommended level of 0.5 (Fornell & Larcker, 1981) ranging from .62 to .95 (see Table 5.9). Discriminant validity was evidenced according to the Fornell & Larcker (1981) criterion and HTMT ratio of correlations are below .85 (range: .38 to .72).

Table 5.9 - Descriptive statistics and correlations between constructs for the using sunscreen independently refined model

Construct	Mean (SD)	α	AVE	CR	1	2	3	4
1. Intention	3.96 (1.93)	.97	.91	.97	-			
2. Attitude	1.84 (1.21	.91	.83	.91	.41	-		
3. Subjective norm	2.56 (1.13)	.91	.69	.90	.38	.61	-	
4. PBC	1.68 (1.28)	.83	.62	.83	.54	.59	.53	-
5. AIR	3.07 (1.94)	.93	.82	.93	.68	.39	.35	.41

Notes: SD = standard deviation, α = alpha, AVE = average variance extracted, CR = construct reliability

5.4.1.2.2 Independently refined using sunscreen model with ABC

The inclusion of the actual behavioural control construct into the model produces favourable fit statistics (χ^2 (154) = 323.278, $p < .001$, CFI = .962, TLI = .949, NFI = .931, RMSEA =.063, AIC = .475.278). Indicators of ABC load significantly ($p < .010$) onto the ABC construct, have high factor loadings (ABC6a: .855, ABC6c: .806) and squared multiple correlations (ABC6a: .731, ABC6c: .649). One indicator (ABC6b) loads poorly on the ABC construct (.230) and exhibits a low square multiple correlation (.053). These results show that ABC does not operate effectively as a construct. On this basis ABC6a (as the stronger indicator of actual capacity) and ABC6b (the only indicator of actual autonomy) were included in the structural model as two separate observed items (actual capacity and actual autonomy).

5.4.1.2.3 Independently refined using sunscreen structural model

The independently refined using sunscreen structural model yields a good fit (χ^2 (268) = 574.300, $p < .001$, CFI = .936, TLI = .897, NFI = .891, RMSEA = .064, AIC = 966.300). Figure 5.6 presents an overview of the structural model results. In total 66.2% of the variance in intention is explained. Significant predictors of intention cover PBC (ß = .338, $p < .001$), AIR (ß = .4401 $p < .001$), and past behaviour in the last two weeks (ß = .283, $p < .001$). Attitude and subjective norm, age, gender, education level, skin sensitivity, and race ($p > .10$) were not found to significantly influence intention. The model accounts for 41.1% of the variance in PBC and both actual capacity (ß = .578, $p < .001$) and actual autonomy (ß = .152, $p = .032$) significantly influence PBC. A very high portion of variance in behaviour is explained by the model ($R^2 = .75$). Intention (ß = .270, $p < .001$), PBC (ß = -.282, $p < .001$), actual capacity (ß = .396, $p = .001$), past behaviour (ß = .495, $p < .001$), and age (ß = .139, $p = .001$) significantly impact sunscreen use behaviour. Perceived autonomy, skin sensitivity, education level, gender, and race do not impact behaviour ($p > .10$).

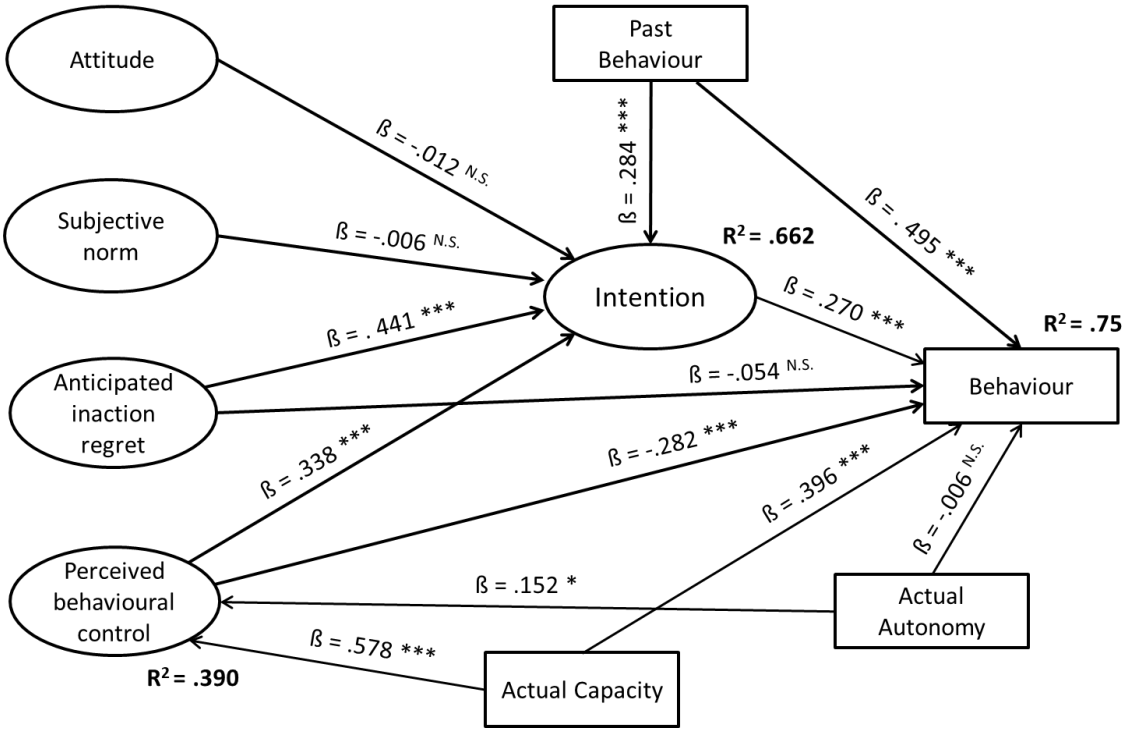

Figure 5.6 - Structural relationships for the independently refined using sunscreen model

Notes: * $p < .05$, ** $p < .001$, *** $p < .001$, N.S. = not significant

5.4.1.2.4 Independently refined not using sunscreen model CFA

The independently refined not using sunscreen model yields good fit statistics (χ^2 (76) = 135.056, $p < .001$, CFI = .985, TLI = .979, NFI = .966, RMSEA = .052, AIC = 223.056). All indicators load significantly ($p < .001$) with all factor loadings above .7 (range .72 to .97) with the exception of one indicator of intention (Int1a: .63) and correlations between constructs are all low (|r|>.7). Construct reliability values are all above the suggested 0.6 level (Bagozzi & Yi, 1988) ranging from .86 to .95. The AVE values exceeded the recommended level of 0.5 (Fornell & Larcker, 1981) ranging from .70 to .82 (see Table 5.10). Discriminant validity was evidenced according to the Fornell & Larcker (1981) criterion and HTMT ratio of correlations are all above .85, (range: .02 to .67). Overall model fit is superior in this model than the independently refined using sunscreen model (research question 3.1) but the psychometric properties are generally better when the extended measure model is applied to using sunscreen (research question 3.2).

Table 5.10 - Descriptive statistics and correlations between constructs of the independently refined not using sunscreen model

Construct	Mean (SD)	α	AVE	CR	1	2	3	4
1. Intention	2.53 (1.86)	.70	.70	.87	-			
2. Attitude	-0.72 (1.77)	.96	.75	.95	.42	-		
3. Subjective norm	0.16 (1.88)	.86	.75	.86	.04	.15	-	
4. PBC	0.59 (1.84)	.85	.75	.86	.52	.37	.08	-
5. AIR	2.84 (2.07)	.93	.82	.93	-.39	-.39	-.02	-.48

Notes: SD = standard deviation, α = alpha, AVE = average variance extracted, CR = construct reliability

5.4.1.2.5 Independently refined not using sunscreen model with ABC

The inclusion of the actual behavioural control construct into the model produces good fit statistics (χ^2 (118) = 237.695, p < .001, CFI = .970, TLI = .957, NFI = .943, RMSEA = .060, AIC = .379.695). The alpha value for the ABC construct is .35 showing poor internal consistency. On this basis actual capacity (ABC6a) and actual autonomy (ABC6c) were included in the structural model as separate observed items.

5.4.1.2.6 Independently refined not using sunscreen structural model

The independently refined not using sunscreen structural model yields a good fit (χ^2 (212) = 352.650, p < .001, CFI = .967, TLI = .942, NFI = .925, RMSEA = .048). An overview of the structural model results are presented in Figure 5.7. The model explains 55.2% of the variance in intention to not use sunscreen. Attitude (ß = .235, p < .001), PBC (ß = .371, p < .001), AIR (ß = -.197, p = .005), and past behaviour in the last two weeks (ß = .302, p < .001) are significant predictors of intention. Subjective norm, age, gender, race, and skin sensitivity do not significantly impact intention (p > .10). In total 34.9% of the variance in PBC is accounted for in the model. Actual capacity (ß = .589, p < .001) significantly influences PBC but actual autonomy does not (p > .10). A high portion of variance in behaviour is explained by the model (R^2 = .537). Actual capacity (ß = .325, p < .001) and

past behaviour (ß = .424, $p < .001$) significantly influence behaviour, whereas people who identify as Asian Pacific Islander are less likely to use sunscreen than those who identify as being White non-Hispanic (ß = -.150, $p = .017$). Intention, subjective norm, PBC and AIR as well as age, gender, skin sensitivity, and race (other than Asian Pacific Islander) ($p > .10$), and perceived autonomy ($p = .063$) do not significantly impact not using sunscreen behaviour.

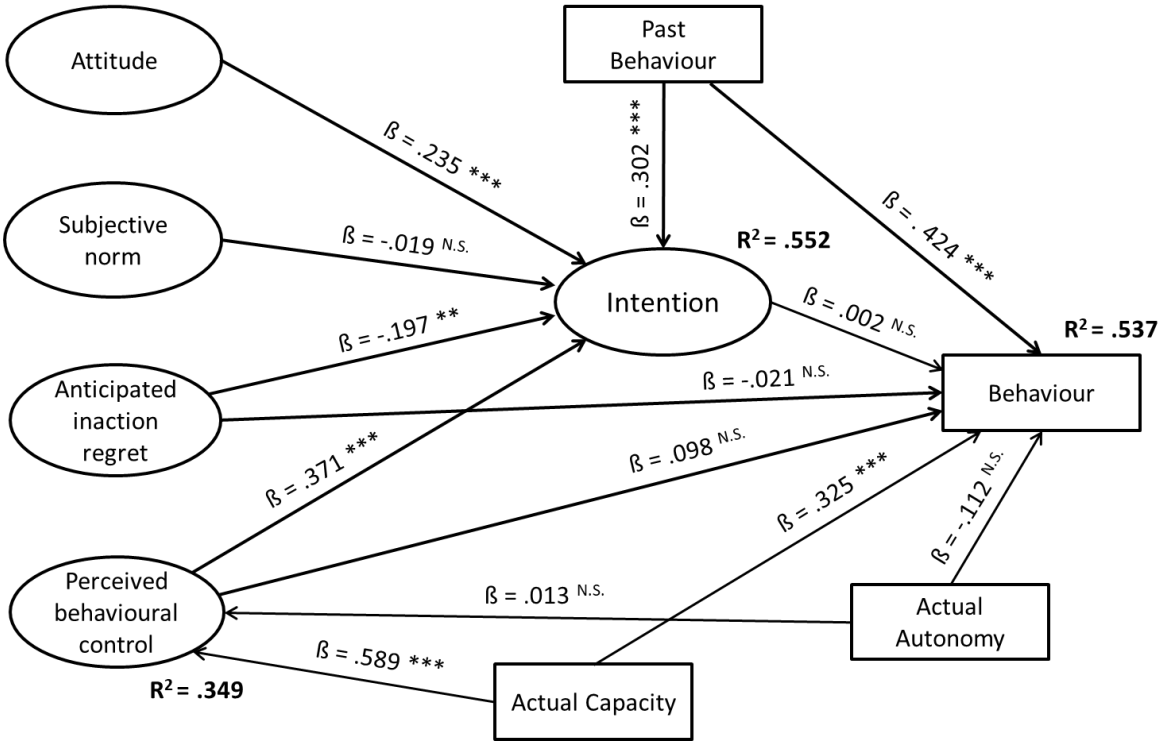

Figure 5.7 - Structural relationships for the independently refined not using sunscreen model

Notes: * $p < .05$, ** $p < .001$, *** $p < .001$, N.S. = not significant

These results show intention and behaviour are influenced by a differential set of determinants in the using and not using sunscreen models (research question 1.7). Furthermore, the extended direct measure TPB model explains greater variance in intention and behaviour when applied to using than not using sunscreen (research question 3.4).

5.4.1.3 Assessing the moderating role of ABC

The moderating role of actual capacity and actual autonomy on the intention-behaviour relationship is compared across using and not using sunscreen models. This identifies whether actual control factors influence the way in which intention translates into behaviour differently for using and not using sunscreen. The interaction effects of actual capacity and actual autonomy on the intention-behaviour relation are analysed separately in SPSS using PROCESS, Model 1 (Hayes, 2013). Figure 5.8 presents the conceptual moderation model.

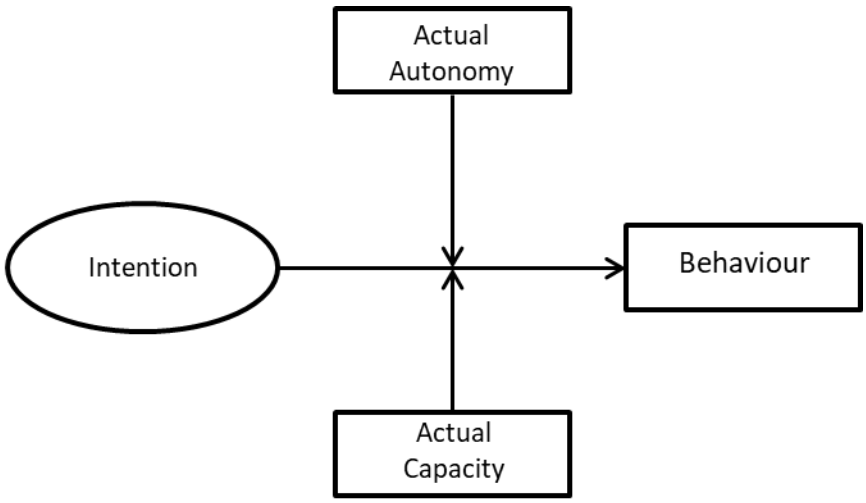

Figure 5.8 - Conceptual moderation model

5.4.1.3.1 Moderating role of actual capacity for using sunscreen

The model which includes actual capacity explains 53% of the variance in using sunscreen behaviour ($F (3, 147) = 123.63$, $p < .001$). Intention ($b = 9.15$, $t(147)$, $p < .001$), actual capacity ($b = 9.43$, $t(147)$, $p < .001$), and the interaction term ($b = 1.86$, $t(147)$, $p = .001$) all significantly contribute to the prediction of behaviour. The significance of the interaction term shows that actual capacity moderates the intention-behaviour relation. Figure 5.9 illustrates the interaction by showing the simple slopes of the relation between intention and behaviour at low, medium, and high (-1 SD, mean, +1 SD) levels of actual capacity. Actual capacity significantly moderates the intention-behaviour relationship across all 3 levels. The intention-behaviour relation is strongest when actual capacity is high ($b = 13.22$, $t(147) = 5.87$, $p < .001$) and weakest when actual capacity is low ($b = 5.08$, $t(147) = 4.04$, $p = .001$).

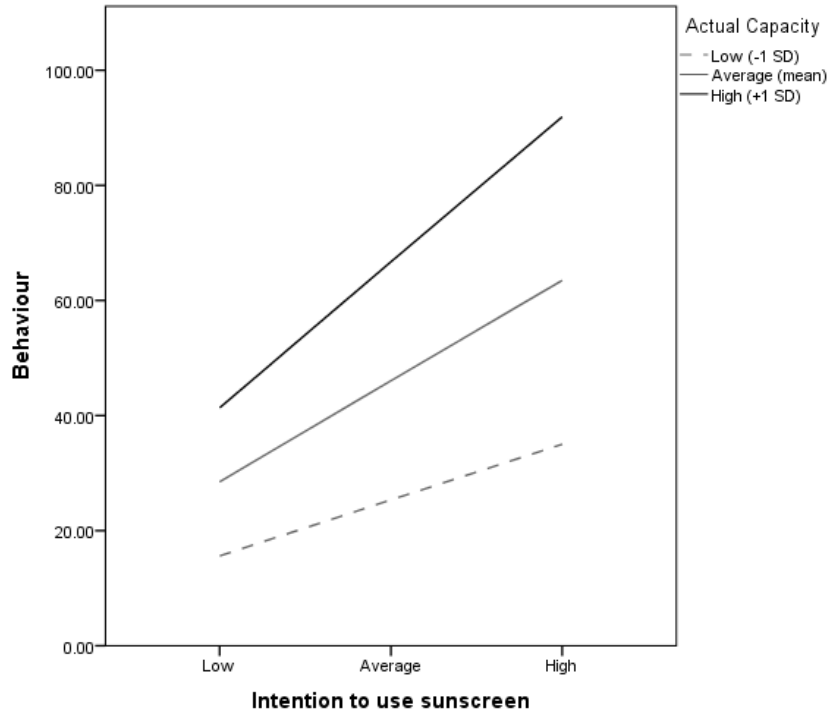

Figure 5.9 - Moderating role of actual capacity on the intention-behaviour relationship in the using sunscreen model

5.4.1.3.2 Moderating role of actual autonomy for using sunscreen

The model that includes actual autonomy explains 35% of the variance in using sunscreen behaviour (F (3, 147) = 45.28, $p < .001$). Main effects are observed for intention (b = 13.07, t(147) = 11.58, $p < .001$) but not actual autonomy (b = 1.22, t(147) = .57, $p > .10$). The interaction term is significant (b = 1.43, t(147) = 2.02, $p = .045$) which shows that actual autonomy moderates the intention-behaviour relation. An examination of the simple slopes, as illustrated in Figure 5.10, shows that there is significant interaction at low, medium, and high (-1 SD, mean, +1 SD) levels of actual autonomy. The intention-behaviour relation is strongest when actual autonomy is high (b = 13.79 t(147) = 11.45, $p < .001$) and weaker when actual autonomy is low (b = 1.43, t(147) = 8.48, $p < .001$) than when it is at an average level (b = 13.07, t(147) = 11.58, $p < .001$).

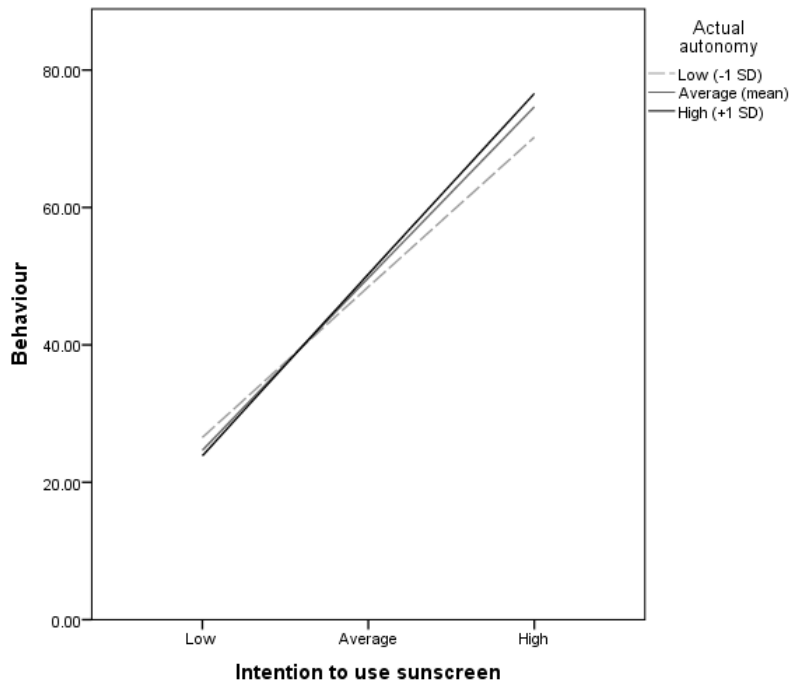

Figure 5.10 - Moderating role of actual autonomy on the intention-behaviour relationship in the using sunscreen model

5.4.1.3.3 Moderating role of actual capacity for not using sunscreen

The model that includes actual capacity explains 38% of the variance in not using sunscreen behaviour (F (3, 138) = 38.77, $p < .001$). Main effects are observed for intention (b = 4.01, t(138) = 2.21, $p = .029$) and actual capacity (b = 9.04, t(138) = 7.23, $p < .001$), however, the interaction term is not significant which shows that the intention-behaviour relationship is not moderated by actual capacity.

5.4.1.3.4 Moderating role of actual autonomy for not using sunscreen

The model containing actual autonomy explains 18% of the variance in not using sunscreen behaviour (F (3, 138) = 12.40, $p < .001$). Intention (b = 7.50, t(138) = 4.16, $p < .001$), but not actual autonomy (b = -2.08, t(138) = -1.12, $p > .10$), significantly influence not using sunscreen behaviour. The interaction between intention and actual autonomy is significant (b = 4.07, t(138) = 2.98, $p = .003$) which shows there is a moderation effect. The relation between intention to not use sunscreen and behaviour is stronger when actual autonomy is higher (+1 SD: b = 10.72, t(138) = 5.86, $p < .001$) than when the level of actual autonomy is

at an average level (b = 7.50, t(138) = 4.16, p = .001). When actual autonomy is low (-1 SD) however, no interaction effect occurs (b = 1.03, t(138) = .32, p > .10). Overall, moderation analyses identify that the moderating role of actual capacity and actual autonomy differ across using and not using sunscreen models (research question 3.3).

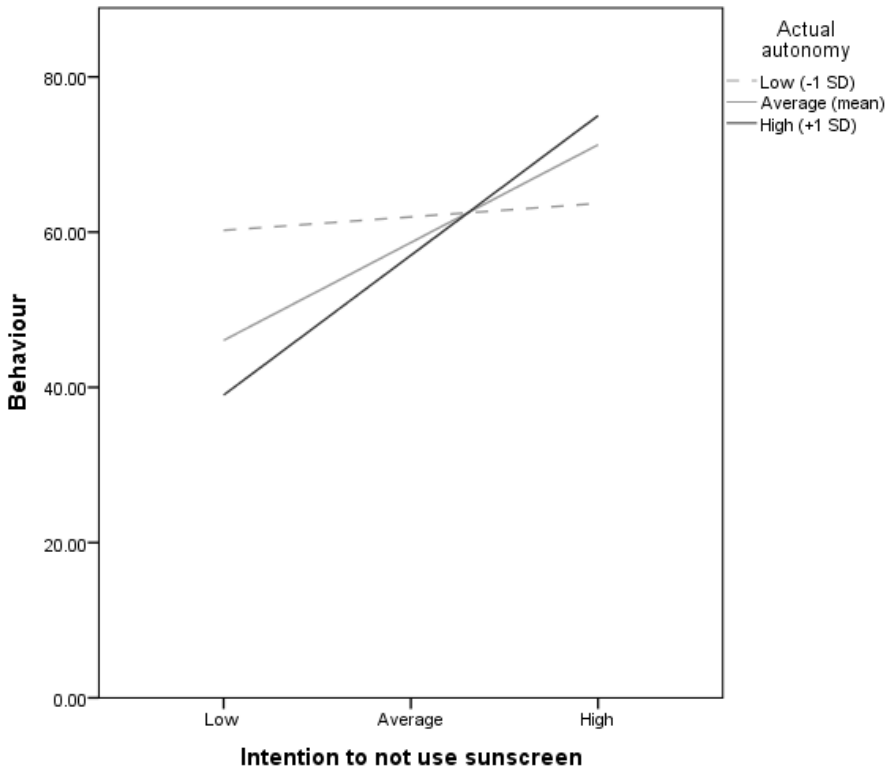

Figure 5.11 - Moderating role of actual autonomy on the intention-behaviour relationship in the not using sunscreen model

5.4.1.4 Direct comparison of using and not using sunscreen models

5.4.1.4.1 Comparison of the baseline using and not using sunscreen model CFAs

The baseline models reported in sections 5.4.1.1.1 and 5.4.1.1.2 were refined on a like-for-like basis so that the psychometric properties, predictive power, and structural relationships between using and not using sunscreen models could be directly compared. The using sunscreen baseline model yields poor fit statistics (χ^2 (160) = 778.033, p < .001, CFI = .877,

TLI = .853, NFI = .850, RMSEA = .117, AIC = .878.03) as does the baseline not using sunscreen model (χ^2 (160) = 966.239, p < .001, CFI = .822, TLI = .789, NFI = .796, RMSEA = .133, AIC = .1066.239). One item of PBC (PBC4c) falls below .7 across using (.486) and not using sunscreen models (.449) and the squared multiple correlations for this item are also below .4 (using: .236, not using: .202). The error terms of two attitude items (e1 and e2) are also highly covaried. In subsequent analyses item PBC4c was removed from the model and error terms e1 and e2 were correlated in using and not using sunscreen models.

5.4.1.4.2 Refined measurement models for using and not using sunscreen

The using sunscreen model yields an acceptable fit (χ^2 (141) = 375.806, p < .001, CFI = .952, TLI = .941, NFI = .925, RMSEA = .077, AIC = 473.806) according to the usual conventions (Hair, Black, Babin, & Anderson, 1998; Hu & Bentler, 1999). All indicators load significantly (p < .01) and most factor loadings are above .7 (range .72 - .97) other than two indicators of attitude (.54, .49). Correlations between constructs are low (|r|>.7). Construct reliability values are all above the suggested 0.6 level (Bagozzi & Yi, 1988) ranging from .83 to .98. The AVE values exceed the recommended level of 0.5 (Fornell & Larcker, 1981) ranging from .57 to .95 (see Table 5.11). Discriminant validity was evidenced using the Fornell & Larcker (1981) criterion and all HTMT ratio of correlations are below .85 (range: .38 to .72).

Table 5.11- Descriptive statistics and correlations between constructs for using and not using sunscreen models

Construct	Mean (SD)	α	AVE	CR	1	2	3	4	5
1. Intention	3.96 (1.96) [2.30 (1.71)]	.97 [.75]	.91 [.59]	.97 [.81]	-	.44	.10	.47	-.37
2. Attitude	1.35 (1.17) [-0.72 (1.77]	.88 [.96]	.57 [.76]	.88 [.95]	.46	-	.27	.34	-.39
3. Subjective norm	2.06 (1.13) [-0.26 (1.52)]	.91 [.79]	.72 [.49]	.91 [.78]	.38	.54	-	.11	.35
4. PBC	1.68 (1.28) [0.74 (1.61)]	.83 [.80]	.62 [.59]	.83 [.81]	.54	.60	.53	-	.41
5. AIR	3.07 (1.94) [2.84 (2.07)]	.93 [.93]	.82 [.82]	.93 [.93]	.68	.42	.03	-.40	-

Notes: SD = standard deviation, α = alpha, AVE = average variance extracted, CR = construct reliability; values in square brackets are for not using sunscreen, correlations in upper diagonal are for not using sunscreen, values in lower diagonal are for not using sunscreen

The not using sunscreen model approaches an acceptable fit (χ^2 (141) = 493.439, p < .001, CFI = .919, TLI = .902, NFI = .891, RMSEA = .094, AIC = 591.439) according to the usual conventions (Hair, Black, Babin, & Anderson, 1998; Hu & Bentler, 1999). All indicators load significantly on their respective constructs (p < .01). Factor loadings are above .7 (range .74 to .97) with the exception of two indicators of subjective norm (.50, .49), one indicator of PBC (.53) and two indicators of intention (.66, .62). Correlations between constructs are all low (|r|>.7). Construct reliability values are all above the suggested 0.6 level (Bagozzi & Yi, 1988) ranging from .78 to .95 and AVE values range from .49 to .82. All constructs exhibit discriminant validity the Fornell and Larcker (1981) criterion and HTMT ratio of correlations (range: .12 to .60).

5.4.1.4.3 Assessing measurement invariance for the extended TPB model

Configural and metric invariances were assessed using multi-group confirmatory factor analyses (MCFAs) across using sunscreen and not using sunscreen groups. The configural invariance model yields acceptable fit statistics (χ^2 (282) = 869.243, $p < .01$, CFI= .936, TLI= .923, NFI = .90, RMSEA = .061). All factor loadings are significant for both groups. The results indicate that a common conceptual frame of reference is used by both using sunscreen and not using sunscreen groups in response to the measurement items and that the factor structure is equivalent across groups.

Metric invariance was determined via a chi-square difference test between the configural invariance (fully unconstrained) and metric invariance (factor loadings fully constrained) models. Full metric invariance was not observed ($\Delta\chi^2$ (14) = 84.027, $p < .001$) between groups. The factor loadings relative to each subscale (construct) were then tested for invariance separately. Partial invariance ($\Delta\chi^2$ (9) = 12.887, $p > .10$) was achieved when the constraints of one indicator of intention, one indicator of attitude, two indicators of subjective norm, and one indicator of PBC were removed.

Scalar invariance was examined to establish whether the meaning and level of constructs is equivalent across using and not using sunscreen models by comparing the factor loadings and intercepts of items between groups. Full scalar invariance ($\Delta\chi^2$ (33) = 822.941, $p < .001$) is not observed between models. Building upon the partial metric invariance model, partial scalar invariance ($\Delta\chi^2$ (16) = 1173.246, $p < .001$) is also not evidenced when the constraints of all but one intercept of attitude, subjective norm, PBC, and intention are removed. These results show that differences in item means between using and not using sunscreen models cannot be explained by differences in the means of the respective construct for the model as a whole (Steenkamp & Baumgartner, 1998). Together, these findings show that the using and not using sunscreen models do not evidence measurement invariance (research question 1.4).

5.4.1.4.4 Comparing structural relationships between using and not using sunscreen structural models

The using sunscreen structural model yielded acceptable fit statistics (χ^2 (325) = 721.419, p < .001, CFI = .926, TLI = .887, NFI = .877, RMSEA = .066) and the not using sunscreen model exhibits poor fit statistics (χ^2 (325) =773.390, p < .001, CFI = .906, TLI = .857, RMSEA = .070). An overview of the structural relationships of the using and not using sunscreen models is presented in Figure 5.12. The using sunscreen model explains 66% of the variance in intention whereas the not using sunscreen explains 55%. Common predictors of intention for using (U) and not using (NU) sunscreen are PBC (U: ß = .335, p < .001; NU: ß = .365, p < .001), AIR (U: ß = .442, p < .001; NU: ß = -.178, p < .001) and past behaviour (U: ß = .238, p < .001; NU: ß = .294, p < .001). Attitude significantly impacts intention to not use sunscreen (ß = .280, p < .001) but not to use sunscreen. Subjective norm, background and demographic factors age, education level, skin sensitivity, and race/ethnicity did not significantly influence intention to use or not use sunscreen (p > .10).

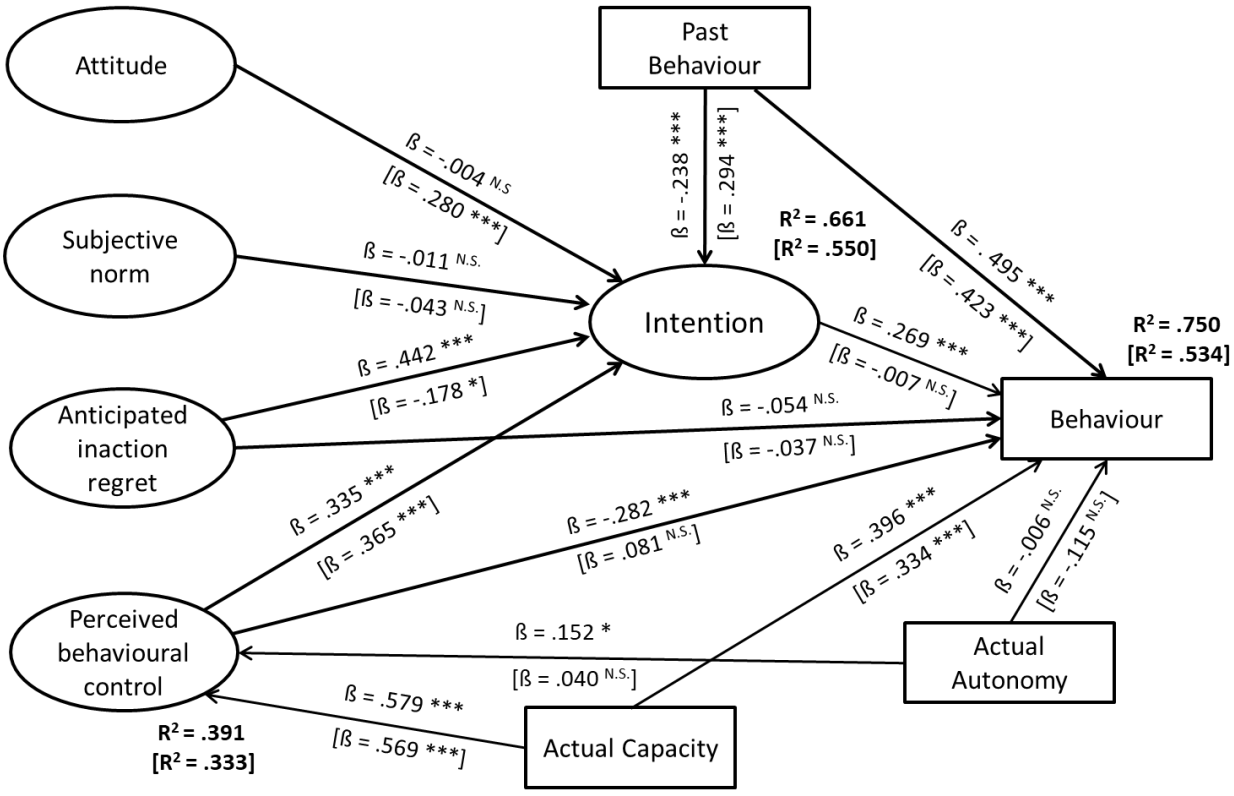

Figure 5.12 - Structural relationships of the using and not using sunscreen structural models

Notes: * p < .05, ** p < .001, *** p < .001, N.S. = not significant; values in square brackets are for not using sunscreen.

In the using and not using sunscreen models respectively, 39.1% and 33.3% of the variance in PBC is explained. Actual capacity significantly impacts PBC across models (U: ß = .579, $p < .001$; NU: ß = .569, $p < .001$) while actual autonomy is a significant predictor of PBC for using sunscreen (ß = .152, $p = .032$) but not for not using sunscreen ($p > .10$)

The using sunscreen model explains considerably greater variance in behaviour ($R^2 = .750$) than the not using sunscreen model ($R^2 = .534$). Common determinants of behaviour across models include past behaviour (U: ß = .495, $p < .001$; NU: ß = .423, $p < .001$) and actual capacity (U: ß = .396, $p < .001$; NU: ß = .334, $p < .001$). Unique predictors of using sunscreen behaviour include intention (U: ß = .269, $p < .001$; NU: $p > .10$) PBC (ß = -.282, $p < .001$; U: $p > .10$) while older respondents are more likely to use sunscreen than younger people (ß = .139, $p < .001$). In the not using sunscreen model respondents who identify as Asian Pacific Islander do not use sunscreen on less occasions than those who identify as white non-Hispanic (ß = -.149, $p = .018$). Across models AIR and actual autonomy are not significant determinants of behaviour. Furthermore, no differences are observed in gender, education level, race (other than for the Asian Pacific Islander group in the not using sunscreen model) or skin sensitivity ($p > .10$).

Together, these findings show that intention, behaviour and PBC are not influenced by the same determinants in the extended direct measure model when applied to using and not using sunscreen (research question 1.7). Greater variance in intention and behaviour is explained when the model is applied to using sunscreen than not using sunscreen (research question 2.2).

5.4.1.4.5 Assessing differences in the structural relationships of the using and not using sunscreen structural models

Chi-square difference tests were performed to determine whether the structural relationships of using sunscreen and not using sunscreen models significantly differ (research questions 1.8 and 4.3). Results are summarised in Figure 5.13. An assessment of the full structural models indicates that the using sunscreen and not using sunscreen models are

nonequivalent ($\Delta\chi^2(13) = 74.156$, $p < .001$). A significant difference was found in the relationship between PBC and intention ($\Delta\chi^2(1) = 4.992$, $p < .025$), and AIR and intention ($\Delta\chi^2(1) = 47.508$, $p = .004$). The relation between attitude and intention ($\Delta\chi^2(1) = 3.418$, $p = .064$), subjective norm and intention ($\Delta\chi^2(1) = .012$, $p > .10$) and past behaviour and intention ($\Delta\chi^2(1) = .458$, $p > .10$) are not significantly different across groups. Paths between actual capacity and PBC are non-equivalent ($\Delta\chi^2(1) = 4.733$, $p = .030$) whereas the relation between actual autonomy and PBC is not significantly different ($\Delta\chi^2(1) = 1.349$, $p > .10$).

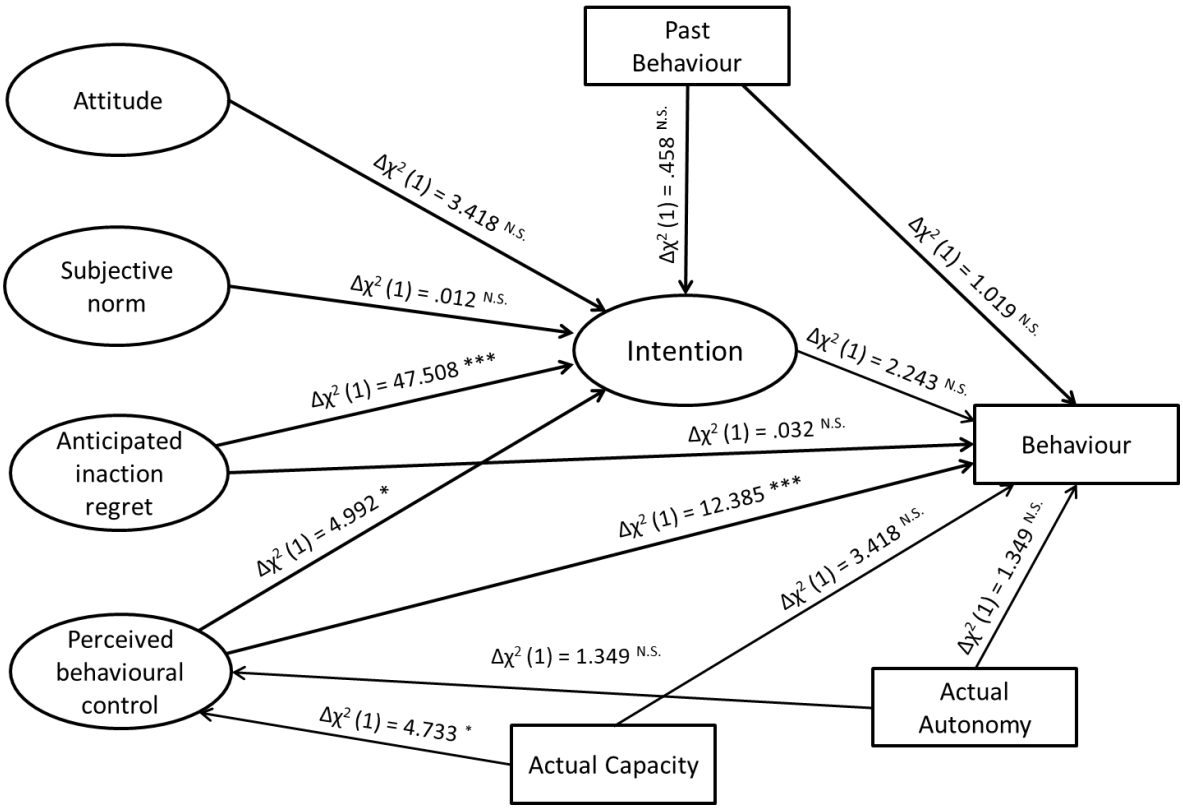

Figure 5.13 - Comparison of the structural relations between using and not using sunscreen models

Notes: * $p < .05$, ** $p < .001$, *** $p < .001$, N.S. = not significant

The structural relation between PBC and behaviour is non-equivalent across using and not using sunscreen models ($\Delta\chi^2(1) = 12.385$, $p < .001$). The relationships between intention and behaviour ($\Delta\chi^2(1) = 2.243$, $p > .10$), AIR ($\Delta\chi^2(1) = .032$, $p > .10$), actual capacity ($\Delta\chi^2(1) = 1428$, $p > .10$), actual autonomy ($\Delta\chi^2(1) = 1.349$, $p > .10$), and past behaviour ($\Delta\chi^2(1) = 1.019$, $p > .10$) are not significantly different.

5.4.1.5 Study 2.3 discussion

This study was conducted to compare the application of an extended direct measure TPB model to using and not using sunscreen. Intention and behaviour are determined by both common and different determinants across using and not using sunscreen models (research question 1.7). Common determinants of intention and behaviour also tend to differ in their relative impact across models. These findings are consistent with those of several previous studies that apply the direct measure TPB model to action and inaction (Ajzen & Sheikh, 2013; Middlestadt et al., 2014; Richetin et al., 2012, 2011). However, none of these studies have sought to establish whether differences in the determinants of intention are significant for action and inaction. This study identifies that the using and not using sunscreen models are not structurally equivalent. There are significant differences in the way constructs of the using and not using sunscreen models impact intention and behaviour. Thus, the results lend support to the view that using and not using sunscreen are not conceptual opposites within the TPB framework.

Measurement invariance was evaluated to determine whether respondents conceptualised items and constructs relating to using and not using sunscreen in the same way (research question 1.4). Configural and partial metric invariance were established which show that respondents conceptualised all constructs of the using and not using sunscreen model in the same way, but there were differences in the conceptualisation of some items. Full and partial scalar invariance were not established, meaning that differences in latent and observed means were not consistent across using and not using sunscreen models. Comparison of mean scores across models cannot, therefore, be meaningfully made (Byrne, Shavelson, & Muthén, 1989). These results suggests that using and not using sunscreen are not conceptual opposites within the TPB framework.

This study also explores whether the extended direct measure TPB model operates equivalently when applied to using and not using sunscreen (research question 3).The baseline model fit was superior in the using sunscreen model, whereas the not using sunscreen model required more extensive refinement to achieve acceptable model fit (research question 3.1). However, the refined not using sunscreen model exhibited better model fit than the refined using sunscreen model. The psychometric properties are generally better in the using sunscreen model, although some values are superior in the not using sunscreen model (research question 3.2). Furthermore, alpha, CR and AVE values are

similar for the AIR construct across models. These findings reflect the way psychometric properties were evaluated following model refinement. They show that the direct measure TPB model can achieve a good fit to the data and exhibit good psychometric properties when applied to both action and inaction. Overall poorer initial model fit and generally lower psychometric properties suggests that the survey instrument was not as effective when applied to not using sunscreen than it was to using sunscreen. French et al. (2007) identify that respondents can encounter challenges when completing TPB questionnaire items. These challenges relate to question comprehension, information retrieval, and the use of mentally generated simulations for the basis of answers. These challenges may be exasperated when respondents complete questions about not using sunscreen because information containing negation and about non-occurrences tends to be processed less effectively than information containing affirmation and about occurrences (e.g. Carpenter et al., 1999; Eerland et al., 2012; Newman et al., 1980; Rassin, 2014). These difficulties would therefore be evident in poorer model fit and psychometric properties in the not using sunscreen model relative to the using sunscreen model.

The moderating role of actual capacity and actual autonomy are also shown to differ across using and not using sunscreen models (research question 3.3). This may reflect the way in which control factors differ considerably for using and not using sunscreen. Using sunscreen is an effortful behaviour for which an individual must possess prerequisite resources (e.g. money) and abilities (e.g. remembering to acquire it, to take it out where needed, to apply it) in order to perform it. On the other hand, not using sunscreen is the default behaviour that does not require any resources or abilities on the individual's part. As such, there are a greater number of impeding factors that may be encountered when an individual intends to use rather than not use sunscreen. Accordingly, actual capacity and actual autonomy may play a less important role in the translation of intention into behaviour in the not using sunscreen model.

The extended direct measure TPB model explains greater variance in intention and behaviour when it is applied to using than not using sunscreen (research question 3.4). The finding that greater variance in intention is explained when the direct measure TPB model is applied to action is consistent with the findings of study 1.2 of this thesis and previous applications of the direct measure TPB model to action and inaction outlined in the literature (Ajzen & Sheikh, 2013; Middlestadt et al., 2014; Richetin et al., 2012, 2011). Richetin et al.

(2011: study 1) also found that the direct measure TPB model explained greater variance in behaviour when applied to action than inaction. This pattern of prediction further suggests that the direct measure TPB model is more effective when applied to action than to inaction.

This study also sought to establish whether AIR exerts a differential influence on intention and behaviour across using and not using sunscreen models (research question 4). AIR significantly influences intention to both use and not use sunscreen, but is not a significant predictor of behaviour in either model (research question 4.1). Despite AIR being a common determinant of intention across models, the structural relationship between AIR and intention is significantly different across using and not using sunscreen models (research question 4.2). This can be attributed to AIR exerting a very strong influence on intention in the using sunscreen model, but a weaker influence on intention in the not using sunscreen model. As such, AIR exerts a differential influence on intention to use and not use sunscreen. The finding that AIR is a significant predictor of both intention to use and not use sunscreen is consistent with Sandberg et al.'s (2016) behaviour type categories. Sandberg et al. (2016) argue that AIR may influence intention for distal benefit and immediate hedonic behaviours, although it may be a more impactful determinant of intention for distal benefit behaviours. Using sunscreen is a distal benefit behaviour because it is mainly performed in pursuit of positive future outcomes (e.g. avoiding an increased risk of skin cancer and other skin damage). Not using sunscreen is more akin to an immediate hedonic behaviour because it is often performed to avoid negative short-term sensory experiences (e.g. avoid skin feeling greasy, having to take the time to apply it etc.). Consistent with Sandberg et al.'s (2016) findings, AIR exerts a strong significant influence on intention to use sunscreen, but a weaker significant influence on intention to not use sunscreen.

A limitation of this study is that it did not capture AAR. Due to this, is was not possible to establish whether AAR exerts a differential influence on intention and behaviour when the extended direct measure model was applied to action and inaction. Furthermore, not capturing AAR meant that it was not possible to determine whether the behaviour type categories of AR outlined by Sandberg et al. (2016) hold when the extended direct measure TPB model is applied to not using sunscreen. To address these limitations, future research should examine the influence of both AAR and AIR on intentions and behaviour for action and inaction.

5.5 Conclusion

This chapter has examined the application of the TPB framework to using and not using sunscreen. A belief-elicitation study and main TPB study were conducted, with the findings of the belief-based and direct measure TPB model analyses reported as separate sub-studies. Study 2 finds that the complementarity assumption does not hold across using and not using sunscreen. There are differences in the way the belief-based and extended direct measure TPB models operate when applied to using and not using sunscreen. AIR is also found to exert a differential influence on intention to use and not use sunscreen within the extended direct measure TPB model.

Chapter 6 High-Calorie Snack Consumption

This chapter explores the application of the TPB framework to eating and not eating high-calorie snacks. This exploration is presented across a belief-elicitation study (study 3.1) and examination of the belief-based (study 3.2) and an extended direct measure model (study 3.3) when applied to eating and not eating high-calorie snacks. The conceptual model for study 3.3 is shown below (Figure 6.1). Together, these studies test the complementarity assumption by establishing the degree to which eating and not eating high-calorie snacks are distinct concepts within the TPB framework (research aim 1); assess whether the belief-based (research aim 2) and extended direct measure TPB (research aim 3) models operate differently when applied to eating and not eating high-calorie snacks; and determine whether AAR and AIR exert a differential influence on intention and behaviour across eating and not eating high-calorie snack models (research aim 4).

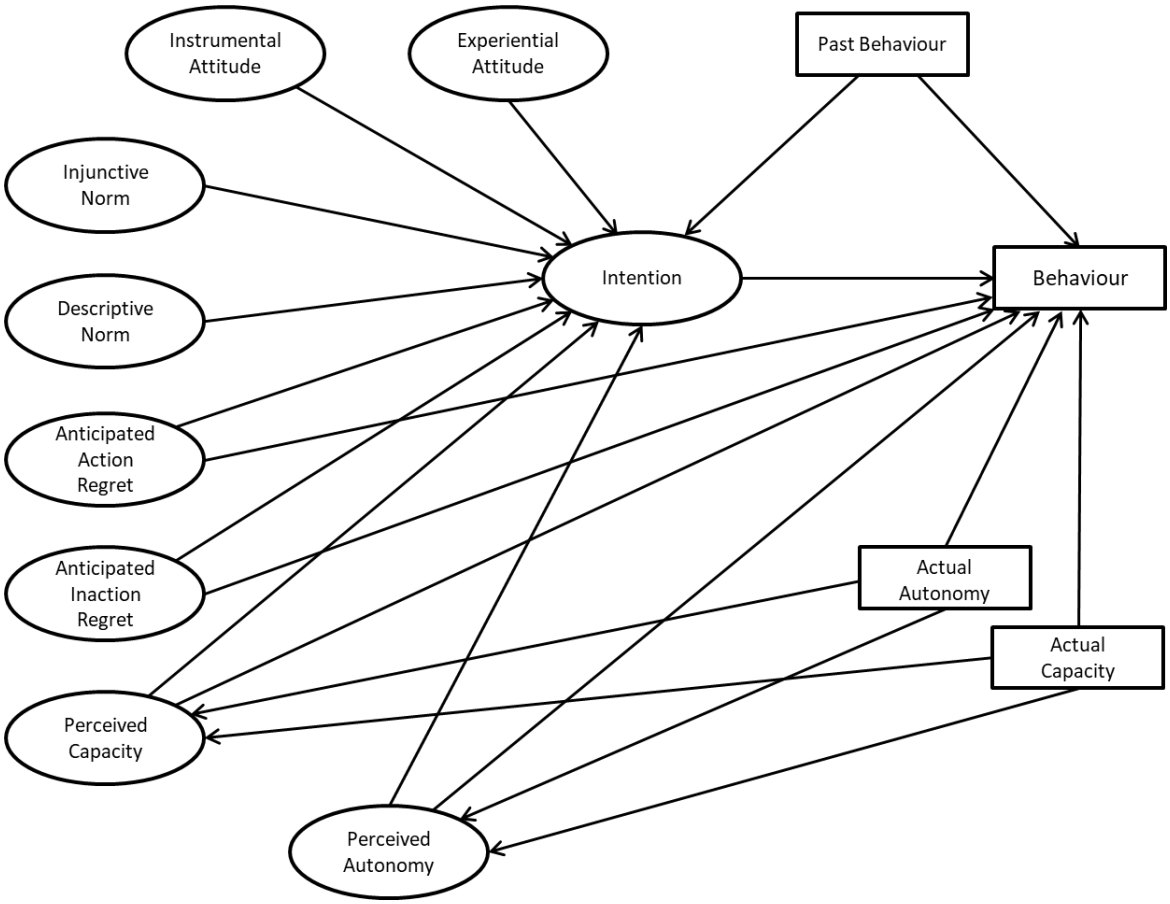

Figure 6.1 - Conceptual model for study 3.3

6.1 Literature review

Obesity is a major public health challenge worldwide (U.S. Department of Health and Human Services, 2010) where it is estimated that 39% of adults were overweight and 13% were obese in 2016 (World Health Organization 2018). In the year 2015-2016 18% of U.S. children and adolescents and almost 40% of U.S. adults over the age of 20 were obese (National Center of Health Statistics 2018). The incidence of obesity continues to rise (National Center of Health Statistics 2018). Obesity is an important etiological factor for numerous non-communicable health conditions such as musculoskeletal disorders, cardiovascular diseases, type 2 diabetes, stroke, gallbladder disease, respiratory problems, and some cancers[1] (National Heart, Lung, and Blood Institute 1998). Obesity is thought to contribute to around 112,000 deaths in the U.S. each year in addition to social stigmatization, discrimination and psychological problems (U.S. Department of Health and Human Services 2010), such as low-confidence and depression (NHS, 2016).

The root cause of obesity and overweight is the imbalance between the calories consumed and expended which result from an array of factors. The most pertinent behavioural factors include increasingly sedentary lifestyles and excessive consumption of energy-dense foods (World Health Organization, 2018a). Snack consumption increasingly contributes to overall energy intake (Schuz, Papadakis, & Ferguson, 2018). In 2006, over a quarter of children's daily caloric intake was derived from snacks in the U.S. (Piernas & Popkin, 2010). Overall energy intake is shown to increase with snacking frequency (Bertéus Forslund, Torgerson, Sjöström, & Lindroos, 2005). The consumption of 'junk' food snacks—those that are highly calorific but have little nutritional value—are noted as particularly problematic (Morrill & Chinn, 2004). The consumption of high-calorie snacks is thought to be increasing due, in part, to effective advertising, availability and affordability (Anschutz, Engels, Zwaluw, & Strien, 2011; Lobstein & Dibb, 2005; Swinburn et al., 2011). High-calorie snack consumption therefore represents an important risk to public health.

[1] Cancers linked to obesity include those of the colon, prostate, endometrium, and breast.

6.1.1 The complementarity assumption in the context high-calorie snack consumption

Elicitation studies have been undertaken to identify the salient beliefs that underpin a variety of dietary related health promotion and health risk behaviours, such as eating breakfast (Middlestadt et al., 2011), eating a low-fat diet (Armitage & Conner, 1999a), eating a healthful diet (Close, Lytle, Chen, & Viera, 2017), and mothers' control over their children's sugar snack intake (Vichayanrat et al., 2018). This past literature focuses on identifying the beliefs that underpin performing the target behaviour and not those that underpin not performing the target behaviour. Little is known about the beliefs that underpin the decision to not perform dietary related behaviours, including to not eating high-calorie snacks.

The complementarity assumption holds that when a choice is between two mutually exclusive and exhaustive alternatives (such as to eat or not eat high-calorie snacks), the beliefs that underpin each alternative will usually be largely conceptually mirrored (Ajzen, 2017; Fishbein & Middlestadt, 1987). An exploration of beliefs that underpin mothers' control over her children's sugary snack intake provides some insight into the basis of this assumption (Vichayanrat et al., 2018). Examples of modal salient behavioural beliefs reported in the study cover preventing tooth decay and helping save money. Mothers could reasonably also believe that not controlling their children's sugary snack intake would cause tooth decay and cost money. Modal salient facilitating control factors cover the child's willingness and the mother having time to care. It is plausible that the mother could simultaneously hold the belief that her children's unwillingness and her not having time to care would facilitate her ability to not control her children's sugary snack intake. In contrast, normative beliefs appear less likely to be conceptually mirrored. Modal salient normative referents believed to think mothers' should control her children's sugary snack intake included her husband, family, and parents. It is unlikely that the mother would simultaneously believe that these referents would think she should not control her children's sugary snack intake. As such, modal salient beliefs about mothers' controlling and not controlling her children's sugary snack intake may not be strictly conceptually mirrored.

The psychological foundations of eating and not eating high-calorie snacks may not be strictly conceptually mirrored even if modal salient belief sets are comprised of strictly mirrored beliefs. This is because not all modal salient beliefs significantly inform their

respective construct (Fishbein & Ajzen, 2010). The relative influence of each belief may also vary when the TPB model is applied to action and inaction (Fishbein & Ajzen, 2010). It is, therefore, possible that distinct beliefs relevant to eating and not eating high-calorie snacks are important determinants of intention and behaviour for both behavioural alternatives.

6.1.2 The belief-based and extended direct measure TPB models applied to eating and not eating high-calorie snacks

The belief-based TPB model facilitates the understanding and explanation of the performance or non-performance of a behaviour by providing a means by which researchers can identifiy specific beliefs that influence intention and behaviour (Sutton, 1998). Such insight cannot be gleaned using the direct measure TPB model alone (Sutton, 1998). Despite this, the belief-based model is underutilised in the TPB literature as most TPB studies are conducted using the direct measure model. Vichayanrat et al. (2018) explored the belief-based determinants of mothers' control over her children's sugary snack intake, whereas Armitage and Conner (1999a) applied the belief-based model to eating a low-fat diet. However, no known studies have utilised the belief-based model to investigate not performing dietary related behaviours, such as not eating high-calorie snacks. This highlights an important gap in the literature regarding the factors that influence people to not eat high-calorie snacks and, more generally, to not perform other dietary related behaviours. Furthermore, no previous studies have examined whether the belief-based TPB model operates equivalently when applied to action and inaction.

The direct measure TPB model has been used to predict a variety of snack related behaviours. Most of this research investigates the performance of snacking related behaviour such as consuming snacks (Collins & Mullan, 2011); controlling children's sugary snack intake (Vichayanrat et al., 2018); biscuit consumption (Sparks, Hedderley, & Shepherd, 1992); consuming sugared snacks and drinks (Nordrehaug Åstrøm, 2004); eating lower-calorie snack food (Branscum & Sharma, 2011); and eating fruit and vegetables as snacks (Canova & Manganelli, 2016). Churchill et al. (2008) investigated the avoidance of high-calorie snacks, however, the study focused on the prediction of behaviour only, and not intention. Because few studies apply the TPB to inaction, relatively little is known about the factors that influence not performing snack-related behaviours. Furthermore, it is not known

whether the direct measure TPB model operates in the same way when applied to eating and not eating high-calorie snacks.

6.1.3 Action and inaction asymmetry in the domain of high calorie snack consumption

The psychological processes that guide the decision to perform and not perform a behaviour may not be equivalent (see section 2.2 for a review). Negations tend to be attended to and utilised less effectively than affirmations (e.g. Bianchi et al., 2011; Clark & Chase, 1972), except when the negation is highly salient (Glenberg et al. 1999). Similarly, information about inaction tends to be noticed, recalled, and used less effectively in decision-making than information relating to occurrences (e.g. Eerland et al., 2012; Eerland & Rassin, 2012; Healy et al., 1983). However, several studies identify that the feature positive effect can be reduced or eliminated when inactions are of high salience (Astley et al., 2015; Beckmann & Young, 2007; Rassin, 2014). Together, research into the affirmation-negation asymmetry and the feature positive effect suggests that when cognitions relating to action and inaction are of similar accessibility in memory the belief-based and direct measure TPB models may operate effectively when applied to both action and inaction. However, when cognitions about action and inaction differ in accessibility, the TPB models may operate more effectively when applied to the behavioural alternative for which people hold a more readily accessible belief set.

For many people, eating high-calorie snacks is the 'default' option that occurs when they intend to eat high-calorie snacks, fail to not eat high-calorie snacks, or have no intention in regard to their high-calorie snack intake. Eating high-calorie snacks requires minimal effort because the individual may simply eat any type of snack available to them whenever they wish to. Eating high-calorie snacks may also be largely habitual. On the other hand, not eating high-calorie snacks constitutes a challenging behaviour for many people. Not eating high-calorie snacks entails considerable psychological effort in the form of resisting temptation and evaluating the caloric values of any snacks that are available. Beliefs about not eating high-calorie snacks may therefore be more accessible in memory than those the individual holds about eating high-calorie snacks. The belief-based and direct measure TPB models could operate more effectively when applied to not eating high-calorie snacks than to eating high-calorie snacks. Furthermore, eating and not eating high-calorie snacks require

different prerequisite resources and abilities. Actual capacity and actual autonomy may influence the way in which intention translates into behaviour differently for eating and not eating high-calorie snacks.

6.1.4 The influence of anticipated action and inaction regret on intention and behaviour

The influence of AR on intention and behaviour has been largely unexplored in the TPB snack consumption and dietary literature. Churchill (2008) identified that AIR did not significantly influence behaviour in regard to avoiding high-calorie snacks. Anticipated emotions (both positive and negative) have been shown to significantly influence intention and behaviour in the context eating filled chocolates (De Pelsmaeker et al., 2017). AR has also been shown to significantly predict intention to diet, but not of dieting behaviour (Lash, Smith, & Rinehart, 2016). Within the wider TPB literature, most studies that extend the TPB to incorporate a measure of AR only assess AIR (Sandberg & Conner, 2008). This has led to a dearth of understanding about how AAR impacts intention and behaviour.

Sandberg et al. (2016) argue that the relative importance of AAR and AIR on intention depends on whether the target behaviour is an immediate hedonic or distal benefit behaviour (see section 2.3.4 for a review). Eating high-calorie snacks is an immediate hedonic behaviour because it is primarily performed to satisfy an immediate want. On the other hand, not eating high-calorie snacks represents a distal benefit behaviour performed largely to maintain or improve health and wellbeing over the longer-term. In line with Sandberg et al. (2016), both AAR and AIR may influence intention to eat and not eat high-calorie snacks. However, AAR is expected to exert the stronger influence on intention to eat high-calorie snacks whereas AIR is expected to be a stronger predictor of intention to not eat high-calorie snacks. Sandberg et al. (2016) did not explore the influence of AAR and AIR on intention to not perform target behaviours. It is, therefore, unknown whether the pattern of regret outlined in the literature holds when the TPB is applied to inaction. This study is the first to examine whether both AAR and AIR exert a differential influence on intention to perform and not perform a target behaviour.

A number of research questions form the basis of this exploration in the context of high-calorie snack consumption:

1. Does the complementarity assumption hold in the context high-calorie snack consumption?

1.1 To what extent are modal salient belief sets for eating and not eating high-calorie snacks composed of conceptually mirrored beliefs?

1.2 How far are the belief-based constructs of the eating and not eating high-calorie snack models influenced by conceptually mirrored beliefs?

1.3 Do distinct beliefs about action and inaction explain additional variance in intention to eat and not eat high-calorie snacks, over and above that explained by mirrored beliefs alone?

1.4 Do extended direct measure eating and not eating high-calorie snack models exhibit measurement invariance?

1.5 Are intention and behaviour influenced by the same belief-based constructs in the in eating and not eating high-calorie snack models?

1.6 Are structural relationships within the belief-based model equivalent across eating and not eating high-calorie snack models?

1.7 Do different determinants underlie intention and behaviour in the extended direct measure eating and not eating high-calorie snack models?

1.8 Are structural relationships of the extended direct measure eating and not eating high-calorie snack models equivalent?

2. Does the belief-based TPB model operate differently when applied to eating and not eating high-calorie snacks?

2.1 Do the belief-based constructs of the eating and not eating high-calorie snack models exhibit similar validity?

2.2 Is the explanatory power of the belief-based eating and not eating high-calorie snack models similar in the prediction of intention and behaviour?

3. Does the extended direct measure TPB model operate differently when applied to eating and not eating high-calorie snacks?

3.1 Do the extended eating and not eating high-calorie snack models exhibit similar model fit?

3.2 Are the psychometric properties of the eating and not eating high-calorie snack models similar?

3.3 Does the moderating role of actual capacity and actual autonomy on the intention-behaviour gap differ across eating and not eating high-calorie snack models?

3.4 Is the explanatory power of the extended direct measure structural models similar across eating and not eating high-calorie snack models?

4. Do AAR and AIR exert a differential influence on intention and behaviour in regard to eating and not eating high-calorie snacks within the extended direct measure TPB model?

4.1. Does AAR exert a differential influence on intention and behaviour across eating and not eating high-calorie snack models?

4.2 Does AIR exert a differential influence on intention and behaviour across eating and not eating high-calorie snack models?

4.3 Are the structural relationships between AR constructs and those of intention and behaviour equivalent across eating and not eating high-calorie snack models?

6.2 Study 3.1 Belief-elicitation study

A belief-elicitation study was conducted to identify the modal salient beliefs that underpin eating and not eating high-calorie snacks and to establish the degree to which these modal salient belief sets are conceptually mirrored (research question 1.1). The belief-elicitation study also serves to inform the development of modal salient belief sets for the belief-based models of study 3.2.

6.2.1 Method

6.2.1.1 Respondents

A self-selected sample of 45 MTurk users residing in the U.S. completed the elicitation study in exchange for payment in accordance with MTurk's recommended rate. Respondents were randomly directed to complete the questionnaire about either eating (n= 22) or not eating (n = 23) high-calorie snacks in the next two weeks. An overview of the demographic variables of the full, eating, and not eating high-calorie snack samples are provided in Table 6.1.

Table 6.1 - Overview of the demographic and background characteristics of the full, eating, and not eating high-calorie snack sub-samples

Variable	**Full Sample** (n = 45)	**Eating high calorie snacks** (n = 22)	**Not eating high calorie snacks** (n = 23)
Age (M, SD)	37.8 years (14.26)	38.5 years (14.1)	37.1 years (14.7)
Gender (% male)	42.2%	50%	34.8%
Past behaviour (M, SD)	4.84 days (3.61)	3.77 days (3.02)	5.87 days (3.87)
Weight Aim	Frequency (%)		
Lose weight	26 (57.8)	15 (68.2)	11 (47.8)
Maintain weight	18 (40)	6 (27.3)	12 (52.2)
Gain weight	1 (2.2)	1 (4.5)	0 (0)

6.2.1.2 Materials and procedure

Other than the behavioural context specified all instructions and questions were the same for both versions of the questionnaire. The questionnaire was formulated in accordance with the TPB questionnaire construction guidelines (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 2010). Several researchers argue that the standard belief-elicitation questions serve to elicit mainly instrumental behavioural beliefs and do not adequately capture experiential behavioural beliefs (e.g. Conner & Armitage, 1998; Sparks, 1994). The elicitation studies were therefore extended to ensure that both instrumental and experiential beliefs were adequately captured. Table 6.2 presents the belief-elicitation questions along with a breakdown of the modal salient beliefs elicited for each behavioural alternative.

Table 6.2 – Comparison of the behavioural, normative and control modal responses per question for eating and not eating high-calorie snacks in the next two weeks

Eating high-calorie snacks	Total (n=22)	%	Not eating high-calorie snacks	Total (n=23)	%
Behavioural beliefs					
Q1a - What do you see as the advantages of you (not) eating high-calorie snacks in the next two weeks?					
More energy	9	41	Weight loss	18	78
Satisfy cravings and hunger	8	36	Better health	10	44
Taste	8	36	More energy	8	35
Convenience	7	32	Healthier food	7	30
Enjoyable	7	32	Feel better	7	30
			Save money	5	22
Q1b - Please list the things that you would like or enjoy about (not) eating high-calorie snacks in the next two weeks?					
Taste	20	91	Feel more healthy	10	44
Convenience	7	32	Weight loss	9	39
Enjoyment	6	27	Feel better about myself	8	35
			Save money	8	35
Q2a - What do you see as the disadvantages of you (not) eating high-calorie snacks in the next two weeks?					
Unhealthy	12	55	Miss them	7	30
Weight gain	11	50	Not as convenient	5	22
Q2b - Please list the things that you would dislike or hate about (not) eating high-calorie snacks in the next two weeks?					
Gain weight	12	55	Miss them	11	48
Low energy	5	23	Feel hungry	5	22
			Craving	5	22
Q3 - What else comes to mind when you think about (not) eating high-calorie snacks in the next two weeks?					
Taste	5	23	Healthier	9	39
Q4 - What do you think are the possible outcomes of you (not) eating high-calorie snacks in the next two weeks?					
Gain weight	12	55	Lose weight	15	65
Long-term health problems	6	27	Feel better	12	52
			Save money	5	22
Normative Beliefs					
Q5 - Please list the individuals or groups who would approve of you (not) eating high-calorie snacks in the next two weeks.					

Snack retailers	8	36	My doctor	7	30
Friends	7	32	Friends	6	26
			Parents	6	26
			Family	5	22
Q6 - Please list the individuals or groups who would disapprove of you (not) eating high-calorie snacks in the next two weeks.					
My family	10	45	Snack companies	9	39
My doctor	8	36	My family	8	35
My fitness trainer/instructor	5	23	Friends	5	22
Q7 - Please list the individuals or groups who are most likely to (not) eat high-calorie snacks in the next two weeks.					
Overweight people	9	41	People trying to lose weight	11	48
Kids	8	36	Health conscious people	8	35
People with a low income	5	23	Health professionals	6	26
			People with diet related health problems	5	22
Q8 - Please list the individuals or groups who are least likely to (not) eat high-calorie snacks in the next two weeks.					
Active people	12	55	Overweight people	8	35
Health conscious people	8	36	Family	5	22
Control Beliefs					
Q9 - Please list any factors or circumstances that would make it easy or enable you to (not) eat high-calorie snacks in the next two weeks.					
Easily available	10	45	Lower calorie snacks	9	39
Low cost	7	32	Don’t buy any	5	22
Special/social occasion	7	32			
Q10 - Please list any factors or circumstances that would make it difficult or prevent you from (not) eating high-calorie snacks in the next two weeks.					
Health concerns	6	27	Social occasions	8	35
Not having them around	5	23	Available close by	5	22
Watching my weight	5	23	Busy	5	22
No money	5	23			
Q11 - Imagine that you intend to eat (not eat) high-calorie snacks in the next two weeks. What factors do you think might lead you to actually (eat) not eat high-calorie snacks in the next two weeks?					
Health concerns	7	32	Stress	7	30
Weight gain	5	23	Temptation	6	26
			Influence from friends/family	6	26

	Snacks are available	5	22

Behavioural beliefs were elicited using the four standard belief-elicitation questions (Q1a, Q2a, Q3, Q4) and two additional questions designed to capture experiential beliefs (Q1b, Q2b). Normative beliefs were assessed using four standard questions which sought to identify both injunctive (Q5, Q6) and descriptive (Q7, Q8) normative referents. Two standard control belief questions were included in the questionnaire (Q9, Q10). An additional question required respondents to imagine they intended to eat (or not eat) high-calorie snacks and list factors that would make them go on to perform the alternative behaviour (Q11). Six text boxes were provided below each question and respondents were instructed to leave any boxes not required blank. The questionnaire also collected demographic and background information including age, nationality, height, weight, and dietary regime which were recorded using an open response format. Respondents were also asked to report their gender, education level, weight related aim for the next two weeks, and how many days in the last two weeks have they eaten high-calorie snacks which were all recorded using a multiple choice format.

6.2.1.3 Analysis procedure

Content analyses were conducted to compile separate sets of modal salient behavioural, normative, and control beliefs for eating and not eating high-calorie snacks. The content analysis procedure adhered to the recommendations of Ajzen and Fishbein (1980) which involved first collating a list of the main recurring themes based on responses to each type of beliefs. For each question the beliefs elicited from each respondent were categorised according to the main themes and the frequency of each response was recorded. Beliefs that were semantically similar and fit into the same theme were counted as a single incidence of that belief. Similar beliefs were treated separately when numerous respondents listed both beliefs in regard to the same question. Idiosyncratic beliefs mentioned by only one respondent and were not semantically similar to other beliefs were discounted. A 20% decision rule was used to determine which beliefs were included in the modal salient belief sets. This means that all beliefs that were elicited in response to a given question by at least

5 respondents were included in the modal belief sets (see section 3.3.6.1 for a discussion on the content analysis procedure)

6.2.2 Belief-elicitation results

6.2.2.1 Conceptual overlap between the salient behavioural beliefs of eating and not eating high-calorie snacks

There is a moderate degree of conceptual overlap between the behavioural beliefs for eating and not eating high-calorie snacks. Table 6.3 presents the modal salient beliefs for each belief type. Out of the 12 modal salient behavioural beliefs across action and inaction sets, 7 are conceptually related. These conceptually related beliefs form 5 mirrored belief pairs (unhealthy/healthier food; gain weight/weight loss; satisfy cravings and hunger/ feel hungry, cravings; long-term health problems/better health; low energy/more energy). There are 2 distinct beliefs about eating high-calorie snacks (taste; enjoyable) and 3 unique beliefs in regard to not eating high-calorie snacks (miss them; feel better about myself; save money).

Table 6.3 - Modal salient belief sets for eating and not eating high-calorie snacks

Eating high-calorie snacks	**Not eating high-calorie snacks**
Behavioural beliefs	
Taste (20) +	Weight loss (18) +
Unhealthy (12) -	Feel better about myself (12) +
Gain weight (12) -	Miss them (11) -
More energy (9) +	Better health (10) +
Satisfy craving and hunger (8) +	More energy (8) +
Convenience (7) +	Save money (8) +
Enjoyable (7) +	Healthier food (7) +
Long-term health problems (6)	Feel hungry (5) -
Low energy (5) -	Craving (5) -
	Not as convenient (5) -
Normative Beliefs	
Active people (12) -	People trying to lose weight (11) +
My family (10) -	Snack companies (9) -
Overweight people (9) +	My family (8) + -
My doctor (8) -	Health conscious people (8) +
Kids (8) +	Overweight people (8) -
Snack retailers (8) +	My doctor (7) +
Health conscious people (8) -	Health professionals (6) +
Friends (7) +	Friends (6) + -
People with a low income (5) +	Parents (6) +
My fitness trainer/instructor (5) -	People with diet related health problems (5) +
Control Beliefs	
Easily available (10) +	Lower calorie snacks (9) +
Low cost (7) +	Social occasions (8) -
Special/social occasion (7) +	Stress (7)
Health concerns (7) -	Temptation (6)
Not having them around (5) -	Influence from friends/family (6)
Watching my weight (5) -	Snacks are available (5) -
No money (5) -	Don't buy any (5) +
	Busy (5) -

Note: Beliefs of each type presented in order of most to least frequently reported. + indicates beliefs of positive valence, - indicates beliefs of negative valence.

Having more energy is a salient advantage of both eating and not eating high-calorie snacks. This may reflect the way in which eating high-calorie snacks can provide an immediate energy boost but lower energy overall, whereas not eating high-calorie snacks may not involve an immediate energy boost but may result in the individual having more energy over the longer term. The presence of a common salient belief between action and inaction suggests that the same belief can have a different meaning for action and inaction that is not always readily apparent from the elicitation of beliefs alone (in this instance they may differ in regard to the time span within which the outcome will be encountered). No other salient advantages or things which would be liked or enjoyed are related between eating and not eating high-calorie snacks. No beliefs about the disadvantages and things which would be disliked or hated about eating and not eating high-calorie snacks are conceptually related.

Several advantages and things which would be liked or enjoyed about eating high-calorie snacks mirror the disadvantages and things which would be disliked or hated about not eating high-calorie snacks. These beliefs include convenient (not as convenient), as well as satisfying cravings and hunger (feeling hungry, and cravings). Three of the 6 separate modal salient beliefs about the advantages and things that would be liked or enjoyed about eating high-calorie snacks conceptually mirror the disadvantages and things that would be disliked or hated about not eating high-calorie snacks. Missing them is a salient disadvantage and thing which would be disliked or hated about not eating high-calorie snacks. Whilst the nature of what would be missed is not explicitly clear, it may capture any or all of the advantages and things which would be liked or enjoyed about eating high-calorie snacks (e.g. the taste, convenience, the enjoyment of eating them). It should be noted, however, that this belief item may refer to other factors not otherwise identified in the study.

Numerous advantages and things which would be liked or enjoyed about not eating high-calorie snacks conceptually mirror disadvantages and things which would be disliked or hated about eating high-calorie snacks. These include weight loss (weight gain), better health (unhealthy), and more energy (low energy). Three out of the 6 separate beliefs which are salient advantages and things which would be liked or enjoyed about not eating high-calorie snacks mirror disadvantages and things which would be disliked or hated about eating high-calorie snacks. Better health also mirrors the salient possible outcome (long-term health problems) of eating high-calorie snacks.

Both distinct modal salient behavioural beliefs about eating high-calorie snacks relate to the advantages or things that would be liked or enjoyed about the behaviour (taste and enjoyable). Two distinct modal behavioural beliefs about not eating high-calorie snacks also relate to the advantages or things that would be liked or enjoyed about not performing the behaviour (feel better about myself; save money). A further modal salient behavioural belief about not eating high-calorie snacks relates to the disadvantages or things that would be disliked or hated about not performing the behaviour (miss them).

6.2.2.2 Conceptual overlap between the salient normative beliefs of eating and not eating high-calorie snacks

There is a moderate degree of overlap between salient normative referents for eating and not eating high-calorie snacks. Of the 14 separate modal salient beliefs identified, 6 are common between behavioural alternatives (my family; overweight people; my doctor; snack retailers; health conscious people; friends). A further 4 beliefs are unique in regard to eating (active people; kids; people with a low income; my fitness trainer/instructor) and 4 are unique in regard to not eating high-calorie snacks (people trying to lose weight; health professionals; parents; people with diet related health problems).

Friends are a salient individual or group who would approve of both eating and not eating high-calorie snacks, as well as a referent that would disapprove of not eating high-calorie snacks. Similarly, my family are a salient referent that would approve of not eating high-calorie snacks as well as disapprove of both eating and not eating high-calorie snacks. There are three reasons why people may hold such seemingly conflicting beliefs about the approval or disapproval of important normative referents. Firstly, important referents may be perceived to accept and respect the individual's autonomy over their own behaviour. Secondly, this may tap into the way important referents may approve and disapprove of eating and not eating high-calorie snacks in different contexts. Alternatively, it may capture individual differences in the attitudes of friends and family toward high-calorie snack consumption more generally, with some people finding it acceptable and others not. Nevertheless, these shared beliefs identify that the meaning of elicited beliefs are not always explicitly clear to the researcher. In addition to friends, snack retailers are a salient referent that would approve of eating high-calorie snacks and disapprove of not eating them. My

doctor is a salient referent that would approve of not eating high-calorie snacks and disapprove of eating them, whilst my fitness trainer is a unique referent that would disapprove of eating high-calorie snacks but is not believed to approve of not eating high-calorie snacks.

Overweight people are a salient group that would be most likely to eat, and least likely to not eat, high-calorie snacks. Health conscious people are a group that are both most likely to not eat, and least likely to eat, high-calorie snacks. Distinct modal salient normative beliefs about eating high-calorie snacks concern referents that are believed to be most likely to eat high-calorie snacks (kids and people with a low income), are believed to disapprove of the individual eating high-calorie snacks (my fitness trainer/instructor) and individuals or groups that are least likely to eat high-calorie snacks in the next two weeks (active people). Distinct modal salient normative beliefs about not eating high-calorie snacks relate to the individuals or groups who would approve of the individual not eating high-calorie snacks (parents) and those most likely to not eat high-calorie snacks (people trying to lose weight, health professionals, and people with diet related health problems).

6.2.2.3 Conceptual overlap between the salient control beliefs of eating and not eating high-calorie snacks

Modal salient control belief sets for eating and not eating high-calorie snacks are comprised of highly distinct beliefs. Three out of 12 modal salient beliefs about eating and not eating high-calorie snacks are conceptually related (easily available/snacks are available, special or social occasion/ social occasions, not having any/don't buy any). There are 4 distinct modal salient control beliefs for eating high-calorie snacks (low cost, health concerns, watching my weight, and no money) and 5 for not eating high-calorie snacks (lower calorie snacks, stress, temptation, influence from friends/family, busy).

High-calorie snacks being easily available is a salient factor that would make it easy or enable people to eat high-calorie snacks, whereas not buying high-calorie snacks would make it difficult to eat them. Similarly, not having them around is believed to make it difficult or would prevent people from eating high-calorie snacks, whilst having high-calorie snacks available close by is a salient factor that would make it difficult or prevent people from not eating high-calorie snacks. As such, salient facilitating and impeding factors related to the

availability of high-calorie snacks appear to be conceptually mirrored. Special or social occasions are another salient factor that would make it easy to eat high-calorie snacks and difficult to not eat them. Distinct modal salient control beliefs were identified in regard to factors or circumstances that would make it easy or enable the individual to eat high-calorie snacks (low cost) and that would make it difficult or prevent the individual from eating high-calorie snacks (health concerns, watching my weight, and no money). Distinct modal salient control beliefs were identified in regard to factors that would make it easy or enable the individual to not eat high-calorie snacks (lower calorie snacks) and factors that would make it difficult or prevent the individual from not eating high-calorie snacks (busy). Further distinct beliefs about not eating high-calorie snacks were identified regarding factors that might lead the individual to not eat high-calorie snacks when they had intended to eat high-calorie snacks (stress, temptation, influence from friends/family).

6.2.2.4 Study 3.1 discussion

The belief-elicitation study was conducted to evaluate the extent to which modal salient belief sets for eating and not eating high-calorie snacks are composed of conceptually mirrored beliefs (research question 1.1). Modal salient behavioural and normative belief sets for eating and not eating high-calorie snacks are mirrored to a moderate degree. On the other hand, the modal salient control belief sets are highly distinct between behavioural alternatives. The highly distinct nature of the modal salient control belief sets may reflect the differential control characteristics of eating and not eating high-calorie snacks. Eating high-calorie snacks often requires little effort, abilities or resources, whereas not eating high-calorie snacks is a much more cognitively demanding task which requires a degree of understanding about caloric values. Overall, modal salient belief sets about eating and not eating high-calorie snacks are not largely composed of conceptually mirrored beliefs.

Unique modal salient beliefs are identified in regard to eating and not eating high-calorie snacks across all 3 belief types. Both alternatives are therefore perceived to have unique qualities in their own right. According to the complementarity assumption, beliefs about two mutually exclusive and exhaustive alternatives will usually be largely conceptually mirrored, and modal salient belief sets for action and inaction should not provide unique information relevant to only one of the two alternatives (Ajzen, 2017; Ajzen & Fishbein, 1980; Fishbein & Middlestadt, 1987; Sutton, 2004). The results of this study are at odds with this position. They do, however, lend support to those of Dodge and Jaccard (2008) whom identified that

a largely different set of behavioural beliefs inform attitude toward using and abstaining from using performance enhancing substances. The conceptual distinctness of modal salient belief sets for eating and not eating high-calorie snacks is also consistent with previous studies that identify that people perform and do not perform target behaviours for different reasons (Chatzidakis et al., 2016; Richetin et al., 2011 study 2), and that these reasons can exhibit discriminant validity (Chatzidakis et al., 2016).

An unexpected finding is that the belief more energy is a salient advantage of both eating and not eating high-calorie snacks. Similarly, friends are a salient group that would approve of both eating and not eating high-calorie snacks in addition to a group that would disapprove of not eating high-calorie snacks. French et al. (2007) conducted a think aloud study wherein respondents were required to verbally express whatever thoughts came to mind as they completed TPB questionnaire items. Respondents indicated that their responses to belief-based items would differ depending on what set of circumstances they referred to when answering a given question. Belief-elicitation questions are purposefully open in nature (Fishbein & Ajzen, 2010) and respondents may consider a number of mentally generated scenarios when responding to them. It is plausible that the seemingly conflicting findings noted above arose because different sets of circumstances were referred to when answering belief-elicitation questions across the eating and not eating high-calorie snack questionnaires, as well as between items within the same questionnaire. For example, the finding that more energy is a salient advantage of eating and not eating high-calorie snacks may capture the different temporal energy pattern of action and inaction in this context. Consuming high-calorie snacks can provide an immediate energy boost but lower energy levels over time. On the other hand, not eating high-calorie snacks are associated with higher energy levels in the longer-term but does not provide short-term energy enhancement. These findings further demonstrate that the beliefs people hold about eating and not eating are not strictly conceptually mirrored.

Overall, the belief-elicitation study identifies that modal salient beliefs about eating and not eating high-calorie snacks are not strictly conceptual opposites. People hold distinct beliefs about both eating and not eating high-calorie snacks. Examining beliefs about both action and inaction in this context provides a more accurate and in-depth understanding of high-calorie snack consumption than identifying the beliefs people hold about either behavioural alternative alone.

6.3 Applying the theory of planned behaviour to eating and not eating high-calorie snacks

A study was conducted to examine whether the belief-based and extended direct measure TPB models operate differently when applied to eating and not eating high-calorie snacks. The findings of this study are presented as two sub-studies. The first study examines the application of the belief-based TPB model to eating and not eating high-calorie snacks (study 3.2) whereas the second study examines the application of an extended direct measure TPB model to eating and not eating high-calorie snacks (study 3.3).

6.3.1 Method

6.3.1.1 Sample

A self-selected sample of 607 MTurk workers residing in the U.S. opted to complete one of two HITs posted on the MTurk platform, one week apart. Of this sample 343 respondents completed the follow-up questionnaire (115 eating high-calorie snacks, 107 not eating high-calorie snacks, 121 both eating and not eating high-calorie snacks). Those who took part in the first HIT completed the questionnaire about either eating or not eating high-calorie snacks, whereas those who took part in the second HIT completed the questionnaire about both eating and not eating high-calorie snacks[2]. Respondents were permitted to complete a HIT only once and those who completed the first HIT were prevented from viewing (and therefore completing) the second HIT. Details of the demographic and background features of the sample are presented in Table 6.4. Respondents were paid for completing the questionnaire to a satisfactory standard.

[2] Similar results are produced across the belief-based and direct measure analyses when only the independent samples are included, however, these models have lower statistical power.

Table 6.4 - Demographic and background characteristics for the full, eating and not eating high-calorie snack sample sub-groups for studies 3.2 and 3.3

	Full Sample n = 607	Eating high calorie snacks n = 208	Not eating high calorie snacks n = 202	Both n = 197
Mean age (SD)	36.31 (11.52)	37.13 (11.80)	36.54 (12.06)	35.22 (10.57)
Gender (% male)	311 (51.2)	104 (50)	108 (53.5)	99 (50.3)
Education Level	Frequency (%)			
Less or equal to high school	46 (7.6)	15 (7.2)	15 (7.4)	16 (8.1)
Some college	123 (20.3)	48 (23.1)	36 (17.8)	39 (19.8)
College graduate	261 (43)	86 (41.3)	87 (43.1)	88 (44.7)
Graduate school	117 (29.2)	59 (28.4)	64 (31.7)	54 (27.4)
Mean BMI (SD)	24.74 (5.18)	24.66 (5.19)	24.99 (4.87)	24.57 (5.48)
Weight related aim	Frequency (%)			
Lose weight	244 (40.2)	73 (35.1)	90 (44.6)	81 (41.1)
Maintain weight	313 (51.6)	118 (56.7)	98 (48.5)	97 (49.2)
Gain weight	50 (8.2)	17 (8.2)	14 (6.9)	19 (9.6)

6.3.1.2 Materials and procedure

Respondents were required to complete a questionnaire about eating (v1), not eating (v2), or both eating and not eating high-calorie snacks (v3) (see appendix 0 for questionnaires). All instructions and questions in versions 1 and 2 of the questionnaire corresponded to either eating or not eating high-calorie snacks. Version 3 of the questionnaire presented instructions and questions related to one of the two behavioural contexts first followed by those of the other behavioural alternative. Questions in version 3 of the questionnaire were presented in a counter balanced order to minimise the possibility that carry over effects would influence responses to questions about the second behavioural alternative. Half of respondents who completed version 3 of the questionnaire completed questions about eating high-calorie snacks first, whereas the other half of the respondents completed questions about not eating high-calorie snacks first. Other than the behavioural context referred to, all instructions, direct measures, and demographic and background questions were the same across questionnaires. Belief-based measures were assessed using the same question branch in all questionnaires. Individual belief items differed for eating and not

eating high-calorie snacks because the modal salient belief sets include different beliefs for each alternative.

Belief-based measures were constructed from the modal salient behavioural, normative, and control belief sets identified in the elicitation study (study 3.1). All questions are consistent with the guidelines provided by Fishbein and Ajzen (2010). The strength of each belief was assessed in addition to its outcome evaluation (behavioural beliefs), motivation to comply (normative beliefs), or power of the control factor (control beliefs). Where composite scores are used (i.e. in the path analyses) they were calculated in accordance with the guidelines provided by Ajzen (2006). The behavioural belief (A_B: attitude toward the behaviour) construct was formulated by multiplying the belief strength (b_i) by the outcome evaluation (e_i), and summing the resulting products over all accessible behavioural outcomes as shown in the equation below.

$$A_B \propto \sum b_i e_i$$

To obtain the composite normative belief (SN: subjective norm) construct belief strength (n_i) was multiplied by the motivation to comply (m_i), and the resulting products were summed over all accessible normative outcomes as shown in the following equation.

$$SN \propto \sum n_i m_i$$

The composite control belief (PBC: perceived behavioural control) construct was created by multiplying the control belief strength (c_i) by the power of the control factor (p_i), and summing the resulting product over all accessible control belief outcomes as below.

$$PBC \propto \sum c_i p_i$$

Direct measures were formulated in accordance with the guidelines provided by Fishbein and Ajzen (Fishbein & Ajzen, 2010). Scale items were adapted from published TPB studies that report high reliability and internal consistency amongst items of the construct and all items were assessed using 7-point scales.

6.3.2 Study 3.2 Belief-based TPB model

SEM in Amos version 22 was used to compare eating and not eating high-calorie snack belief-based models. A comparison is made in regard to the modal salient beliefs that significantly contribute to each of the belief-based constructs (research question 1.2), whether different determinants impact intention and behaviour for eating and not eating high-calorie snacks (research question 1.5), whether the belief-based model exhibits similar validity when applied to eating and not eating high-calorie snacks (research question 2.1), and the relative explanatory power of the belief-based model when applied to action and inaction (research question 2.2). Path analysis in Amos 22 was undertaken to examine the structural equivalence of relationships between constructs when the belief-based TPB model is applied to eating and not eating high-calorie snacks (research question 1.6). Finally, regression analyses were performed using SPSS version 24 to establish the contribution of mirrored and distinct beliefs in the prediction of intention (research question 1.3).

The belief-based high-calorie snack models are comprised of 3 latent formative constructs (behavioural beliefs, normative beliefs, and control beliefs) each of which is identified by two reflectively measured indicators of that construct. Reflective indicators were selected on the basis that they load significantly and substantially on their respective construct and have a high degree of explanatory power in both action and inaction models.

6.3.2.1 Eating high-calorie snack model validity assessment

The behavioural, normative, and control belief constructs are comprised of 9, 10, and 7 beliefs, respectively. Indicator validity was examined by assessing VIF values of all indicators in the model. All VIF values are below 10 (range 1.64 to 5.31) which shows that multicollinearity is not of concern and that all of the indicators provide information about the

construct they relate to that is not already accounted for by other indicators of the same construct (Urbach & Ahlemann, 2010). Construct validity was examined by comparing the correlations between the composite behavioural, normative, and control belief constructs with their respective reflectively measured constructs. The correlations between belief-based and directly measured constructs are all significant (p < .001). The correlation between behavioural beliefs and attitude (r = .64) and between normative beliefs and subjective norm (r = .64) is moderately high. There is a moderate degree of correlation between control beliefs and PBC (r = .44). These results suggest the belief-based measures capture important beliefs relevant to their respective construct (Diamantopoulos & Winklhofer, 2001). Construct validity is further evidenced by way of the variance explained in each of the belief-based constructs. A considerable amount of variance in the behavioural belief (R^2 = .584), normative belief (R^2 = .581), and control belief (R^2 = .529) constructs is explained by their associated belief items. Nomological validity was established by identifying that the structural relationships of the model are generally consistent with those of the reflective eating high-calorie snack model (see study 3.3). Overall, the results provide evidence for the indicator and construct validity of the belief-based eating high-calorie snack model.

6.3.2.2 Eating high-calorie snack formative model assessment

Of the 9 behavioural beliefs included in the model 4 significantly contribute to the behavioural belief construct. These beliefs include 'more energy' (β = .341, p < .001), 'satisfy cravings and hunger' (β = .237, p = .005), 'gaining weight' (β = .178, p = .022), and 'lead to low energy' (β = .215, p = .033). There is a moderate correlation between 'more energy' and 'low energy' (r = .303) which suggests that that the two beliefs differ in their conceptualisation. All 4 beliefs that significantly influence the behavioural belief construct constitute conceptually mirrored beliefs. 'Family' (β = .499, p < .001) is the only normative belief out of 10 that significantly informs the normative belief construct. Family is also a conceptually modal salient mirrored belief across eating and not eating high-calorie snack models. Three out of the 7 modal salient control beliefs are significant which cover 'easily available' (β = .571, p < .001), 'health concerns' (β = -.157, p = .016), and 'watching your weight' (β = -.162, p = .013). Only 'easily available' is a conceptually mirrored belief people hold about both eating and not eating high-calorie snacks. Table 6.5 presents a summary of the results for the eating high-calorie snack belief-based model.

Table 6.5 - Means, standard deviations and β's for eating high-calorie snack behavioural, normative and control beliefs

Belief-based item	Mean (SD)	β
Behavioural beliefs		
a. More energy	13.41 (10.67)	0.341***
b. Satisfying my cravings and hunger	17.97 (10.92)	0.237**
c. Food that tastes good	22.92 (10.56)	-0.071
d. Convenience	21.01 (10.90)	0.065
e. Enjoyment	21.76 (10.82)	0.154
f. Unhealthy	6.37 (9.60)	0.016
g. Gaining weight	7.72 (10.12)	0.178*
h. Low energy	5.26 (8.53)	0.215*
i. Long-term health problems	5.21 (8.91)	-0.051
Normative beliefs		
a. Friends	10.13 (9.93)	0.105
b. Family	9.81 (10.50)	0.499***
c. Doctor	6.60 (9.26)	0.004
d. Kids	8.94 (10.47)	-0.030
e. Fitness instructor	5.98 (9.01)	0.028
f. Snack retailers	8.45 (10.27)	0.034
g. Overweight people you know	7.11 (9.04)	0.026
h. Active people you know	7.31 (9.44)	-0.066
i. Health conscious people you know	5.79 (8.33)	0.218
j. People you know with a low income	7.49 (9.08)	0.107
Control beliefs		
a. Easily available	22.42 (11.65)	0.571***
b. Low cost	19.87 (12.58)	0.142
c. A special or social occasion	20.54 (12.10)	0.007
d. Health concerns	17.18 (12.25)	-0.157*
e. Not having them around	20.61 (12.77)	-0.005
f. Watching your weight	17.68 (12.26)	-0.162*
g. Having no money	18.02 (13.24)	0.075

Note: *** $p < .001$, ** $p < .01$, * $p < .05$

The structural relationships of the eating high-calorie snack belief-based model are depicted in Figure 6.2. The model explains 65.1% of the extracted variance in intention to eat high-calorie snacks. The behavioural belief (β = .429, p < .001) and control belief (β = 682, p < .001) constructs significantly contribute to the prediction of intention, but the normative belief construct does not (p > .10). The model explains 24% of the variance in eating high-calorie snack behaviour. Intention (β = 410, p < .001) significantly influences behaviour but the control belief construct does not (p > .10).

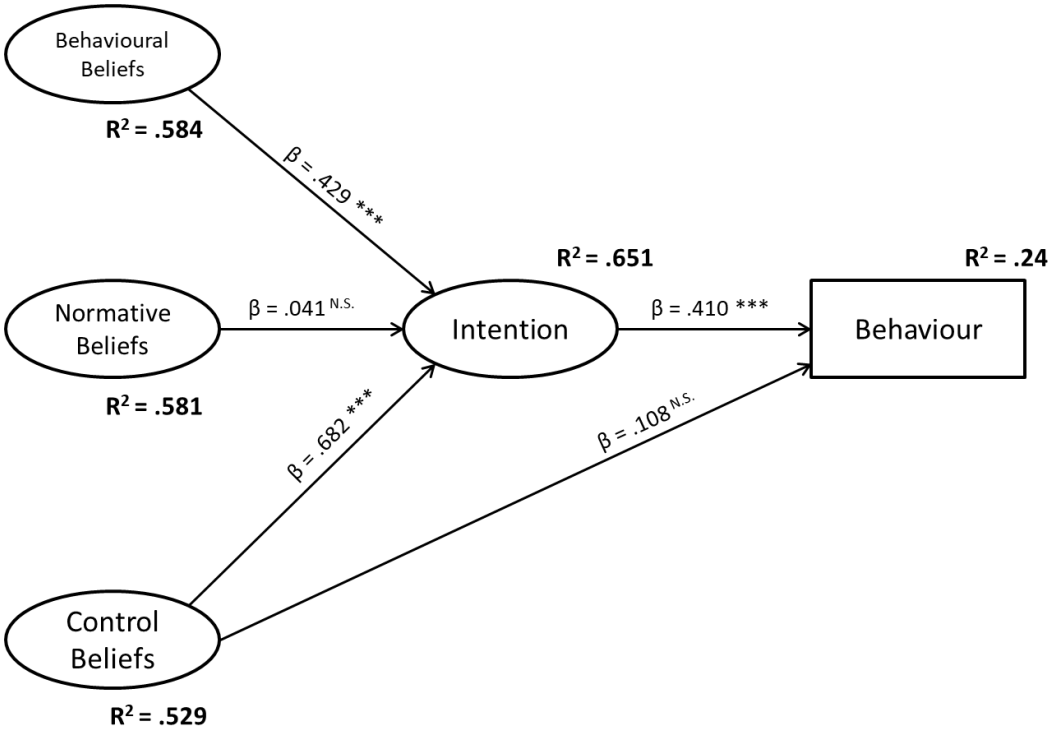

Figure 6.2 - Structural relationships of the eating high-calorie snack belief-based model

Notes: *** p < .001, ** p < .01, * p < .05, N.S. = not significant

6.3.2.3 Not eating high-calorie snack belief-based model validity assessment

The behavioural, normative, and control belief constructs are formed from 11, 10, and 8 beliefs, respectively. The validity of the formative model was assessed at the indicator and construct level. VIF values are all below 10 (range 1.4 to 5.65), showing that multicollinearity is not an issue in the model and all indicators provide unique information about their respective belief-based construct not fully accounted for by other indicators of the construct

(Urbach & Ahlemann, 2010). The correlations between belief-based and direct measure behavioural ($p < .001$), normative ($p < .001$), and control beliefs ($p < .05$) constructs are all significant. A moderate correlation between the behavioural belief and attitude constructs ($r = .51$), moderately strong correlation between normative beliefs and subjective norm constructs ($r = .64$), and weak correlation between the control belief and PBC constructs ($r = .12$) is observed. This shows that the behavioural and normative belief-based items capture the meaning of the construct well, whereas important control beliefs may not have been adequately captured in the model (Diamantopoulos & Winklhofer, 2001). A moderate amount of variance in the behavioural belief construct ($R^2 = .266$) and control belief construct ($R^2 = .304$) is explained by their respective indicators. A very high amount of variance in the normative belief construct is explained by the normative indicators ($R^2 = .822$). Structural relationships within the belief-based model are somewhat consistent with those observed in the extended direct measure TPB model (study 3.3). A notable difference is that the normative belief construct exerts a strong, significant influence on intention in the belief-based model whereas neither injunctive norm nor descriptive norm constructs significantly influence intention to not eat high-calorie snacks in the direct measure model. Overall, the validity of the belief-based not eating high-calorie snack model is lower than that exhibited by the belief-based eating high-calorie snack model (research question 2.1).

6.3.2.4 Not eating high-calorie snack formative model assessment

Two of the 9 behavioural beliefs included in the model significantly contribute to the behavioural belief construct. These beliefs are ‘make me have cravings’ ($\beta = .344$, $p = .001$), and ‘make me feel better about myself’ ($\beta = .424$, $p < .001$). ‘Make me have cravings’ is a modal salient conceptually mirrored belief for eating and not eating high-calorie snacks. Three of the 10 normative beliefs are significant covering ‘snack retailers’ ($\beta = .355$, $p < .001$), ‘your family’ ($\beta = .331$, $p = .016$), and ‘your parents’ ($\beta = .306$, $p = .017$). Normative referents ‘snack retailers’ and ‘your family’ are conceptually mirrored beliefs in regard to action and inaction whereas ‘your parents’ is a distinct belief. Two out of 7 control beliefs significantly contribute to the control belief construct which include ‘not buying any’ ($\beta = .238$, $p = .035$), and ‘a special or social occasion’ ($\beta = .392$, $p = .019$). Neither control belief is conceptually mirrored for eating and not eating high-calorie snacks. A summary of these findings is presented in Table 6.6. Of note is that ‘make me have cravings’ and ‘your family’ are the only modal salient beliefs that significantly inform their respective belief-based construct across eating and not eating high-calorie snack models.

Table 6.6 - Means, standard deviations, and β's for not eating high-calorie snack behavioural, normative and control beliefs

Belief-based item	Mean (SD)	β
Behavioural beliefs		
a. Lose weight	19.77 (12.11)	-.020
b. Better health	25.02 (10.59)	.103
c. More energy	23.37 (10.88)	-.005
d. Eat healthier food	25.03 (10.52)	-.203
e. Feel better about myself	23.45 (11.37)	.424***
f. Save money	21.60 (10.98)	.066
g. Feel more healthy	24.82 (10.46)	-.002
h. Miss them	10.68 (9.97)	.063
i. Not as convenient	11.05 (9.58)	-.066
j. Make me feel hungry	8.94 (9.74)	-.039
k. Make me have cravings	9.49 (9.46	.344**
Normative beliefs		
a. Friends	13.90 (11.03)	.126
b. Family	16.83 (12.12)	.331***
c. Doctor	19.44 (11.78)	.032
d. Parents	16.52 (12.37)	.306*
e. Snack retailers	5.43 (9.27)	.355***
f. People you know who are trying to lose weight	15.26 (11.74)	.117
g. Health conscious people you know	17.80 (11.61)	.059
h. Health professionals	19.56 (11.65)	-.137
i. People you know with diet related health problems	15.77 (11.39)	-.229
j. Overweight people you know	12.97 (11.61)	.148
Control beliefs		
a. Having low calorie snacks available	20.82 (11.62)	.131
b. Not buying any	21.82 (12.18)	.238*
c. A special or social occasion	10.02 (10.47)	.392*
d. Social occasions	16.95 (11.72)	.144
e. Available close by	17.43 (12.12)	-.247
f. Being busy	14.75 (11.91)	-.199

g. Stress	15.00 (11.98)	.083
h. Temptation	16.66 (11.88)	-.190

Note: *** $p < .001$, ** $p < .01$, * $p < .05$

Figure 6.3 shows the structural relationships of the belief-based not eating high-calorie snack model. The model explains 75.5% of the extracted variance in intention to not eat high-calorie snacks, with behavioural beliefs (β = .609, $p < .001$), normative beliefs (β = .209, $p < .001$) and control beliefs (β = 583, $p = .015$) significantly predicting intention. The model explains 17.8% of the extracted variance in not eating high-calorie snack behaviour. Both intention (β = 519, $p < .001$) and the control belief construct (β = -.317, $p = .037$) significantly influence behaviour.

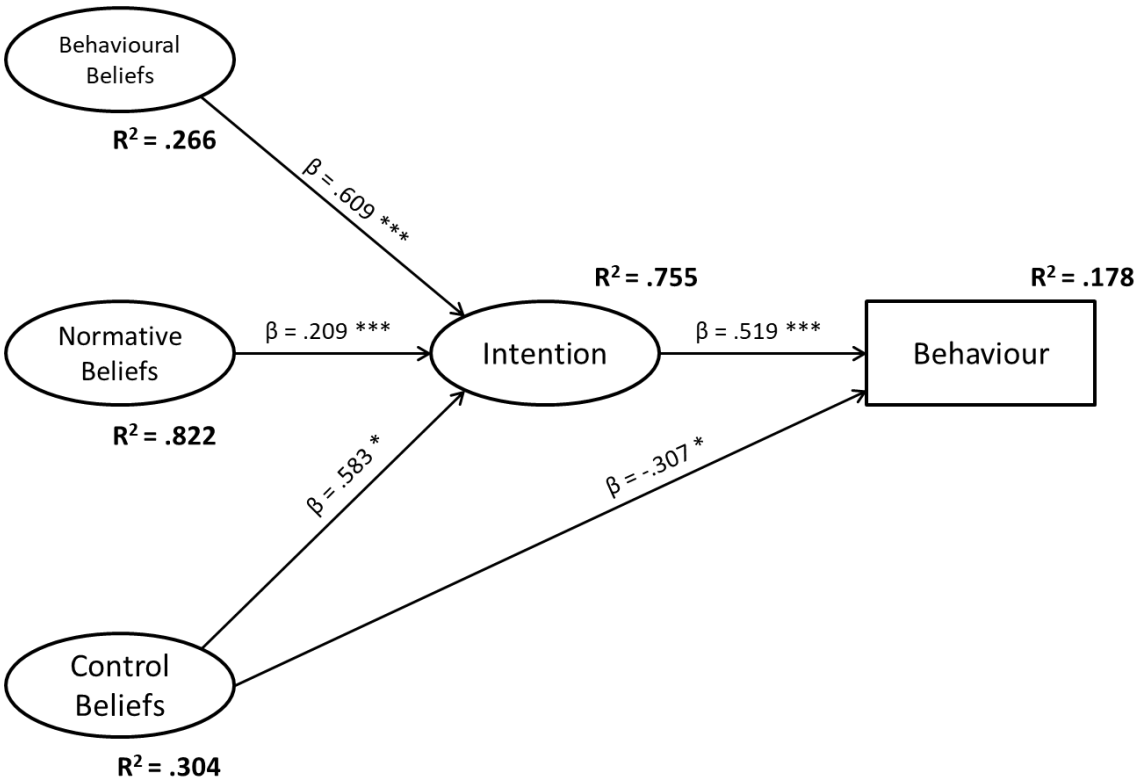

Figure 6.3 - Structural relationships for the belief-based not eating high-calorie snack model

Note: *** $p < .001$, ** $p < .01$, * $p < .05$

These findings identify that there are differences in the determinants of intention and behaviour across eating and not eating high-calorie snack models (research question 1.5). The explanatory power of the model also differs across models, with greater variance in intention explained when the model is applied to not eating high calorie snacks, but more variance explained in behaviour when applied to eating high calorie snacks (research question 2.2).

6.3.2.5 Comparing the structural relationships of the eating and not eating high-calorie snack belief-based models

Path analyses were conducted to examine whether structural relationships of the belief-based eating and not eating high-calorie snack models significantly differ. Path analysis was used rather than SEM because the action and inaction models include a different number of belief items and some of these beliefs differ between models. For the eating and not eating high-calorie snack models separately, a composite score for each belief-based construct was formed from all modal salient beliefs of that construct. Indicators that do not significantly inform their respective belief-based construct were not omitted to ensure that the meaning of the underlying construct was not changed (Kenneth Bollen & Lennox, 1991). A composite score for intention was also formed from its reflective measures.

The eating high-calorie snack path model explains 30.5% of the variance in intention. Intention is significantly influenced by behavioural (β = .623, $p < .001$) and control belief constructs (β = -.099, $p = .032$), but not the normative belief construct ($p > .10$). In turn, intention (β = .508, $p < .001$) but not the control belief construct ($p > .10$) significantly impact behaviour, of which 26% is explained. The not eating high-calorie snack path model explains 22.5% of the variance in intention. The behavioural belief (β = .132, $p = .032$), normative belief (β = .441, $p < .001$), and control belief (β = -.106, $p = .033$) constructs are all significant predictors of intention. The model explains only 14.2% of the variance in behaviour which is significantly influenced by intention (β = .371, $p < .001$), but not the control belief construct ($p > .10$).

Chi-square difference tests show that overall the structural relations of the eating and not eating high-calorie snack models are variant ($\Delta\chi^2$ (5) = 48.196, $p < .001$). An overview of the

structural differences between models is presented in Figure 6.4. The structural relationships between the behavioural belief construct and intention ($\Delta\chi^2$ (1) = 31.402, p < .001), and normative belief construct and intention ($\Delta\chi^2$ (1) = 34.360, p < .001) are non-equivalent. The relationships between the control belief construct and intention, intention and behaviour, and control belief construct and behaviour (p > .10) do not significantly differ. These results identify that there are significant differences in the way belief-based constructs influence intention and behaviour across eating and not eating high calorie snack models (research question 1.6)

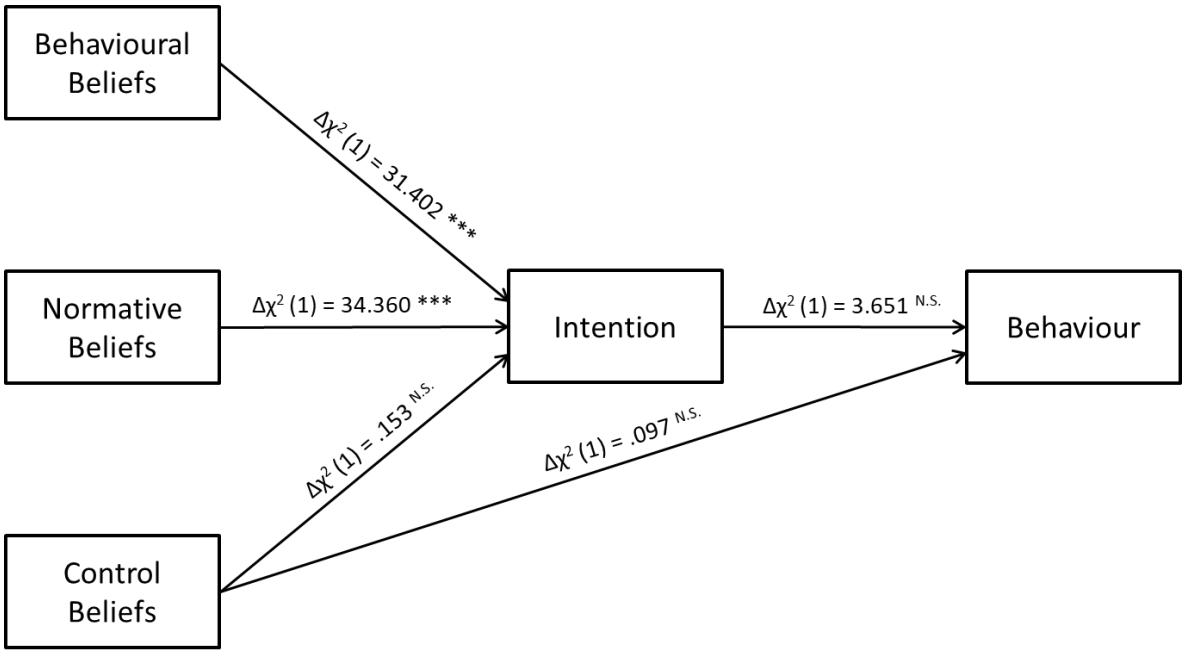

Figure 6.4 - Results of the chi-square difference test of structural relationships for the eating and not eating high-calorie snack belief-based models

Note: * p < .05, ** p < .01, *** p < .001

6.3.2.6 Exploring the influence of mirrored and distinct beliefs on eating and not eating high-calorie snack intentions and behaviour

A three-step approach was taken to determine whether distinct beliefs about eating and not eating high calorie snacks explain additional variance in intention and behaviour, over and above that explained by mirrored beliefs across eating and not eating high-calorie snacks alone. In the first step, separate analyses were conducted for eating and not eating high-calorie snack models that included only beliefs that are conceptually mirrored between action and inaction. In the second step, separate analyses were performed for eating and not eating high-calorie snack models that included distinct beliefs relevant to action and inaction, in addition to the mirrored beliefs relevant to each behavioural alternative (i.e. the eating high-calorie snack model contained distinct beliefs relevant to eating high-calorie snacks as well as the set of beliefs that are conceptually mirrored with not eating high-calorie snacks, and vice versa for the not eating high-calorie snack model). In the third step, hierarchical regression analyses were conducted to determine whether distinct beliefs relevant to action and inaction significantly add to the prediction of intention to eat and not eat high-calorie snacks, after controlling for the mirrored beliefs between action and inaction (research question 1.3).

6.3.2.7 Comparison of the eating and not eating high-calorie snack mirrored belief models

The validity of the belief-based models is evidenced when a substantial portion of variance in the belief-based construct is explained by the beliefs relevant to that construct. In the mirrored belief eating high-calorie snack model a considerable amount of variance in the behavioural (R^2 = .497), normative (R^2 = .560), and control belief (R^2 = .436) constructs is explained by their respective belief items. In the mirrored belief not eating high-calorie snack model only a small amount of variance is explained in the behavioural belief construct (R^2 = .114), whilst a higher portion of variance is explained in the normative (R^2 = .661) and control belief (R^2 = .314) constructs. These results show that modal salient normative referents that are mirrored across eating and not eating high-calorie snacks play an important role in forming the normative belief construct in both models. Mirrored beliefs are also important determinants of the behavioural and control belief constructs in the eating high-calorie snack model. On the other hand, the lower explained variance in the not eating high-calorie snack

behavioural and control belief constructs suggests that these constructs may be influenced by important beliefs that are not conceptually mirrored to those of action.

6.3.2.8 Comparing the belief-based determinants of eating and not eating high-calorie snacks

Separate belief-based models were analysed for eating and not eating high-calorie snacks including only the beliefs that are conceptually mirrored across behavioural alternatives. This facilitates the exploration of the extent to which belief-based constructs of the eating and not eating high-calorie snack models are informed by modal salient beliefs that are conceptually mirrored in regard to action and inaction. Satisfying hunger and cravings (E: β = .455, p < .001; NE: β = .341, p < .001) is a significant behavioural belief across action and inaction. Convenience (β = .143, p = .042), weight (β = .201, p = .009) and energy (β = .179, p = .009) are significant only for eating high-calorie snacks, whereas better health (β = .201, p = .031) significantly informs the behavioural belief construct in regard to not eating high-calorie snacks only. Family (E: β = .476, p < .001; NE: β = .434, p < .001) is a significant normative referent for both behavioural alternatives. Health conscious people (β = .195, p = .038) and snack retailers (β = .345, p < .001) are significant for eating and not eating high-calorie snacks, respectively. The availability of high-calorie snacks is a significant belief in both eating and not eating high-calorie snack models (E: β = .687, p < .001; NE: β = .564, p < .001). Overall, these results identify that few modal salient beliefs that are conceptually mirrored in regard to eating and not eating high-calorie snacks significantly inform the belief-based constructs of both models (research question 1.2).

Table 6.7- Comparison of the means, standard deviations, and β's for the eating and not eating high-calorie snack behavioural, normative and control beliefs

Belief-based item	Mean *(SD)*	β
Behavioural beliefs		
a. Weight loss/gain	13.41 (10.66) [19.77 (12.11)]	.201** [-.002]
b. Health	4.51 (5.89) [25.02 (10.59)]	-.008 [.179*]
c. More/less energy	5.23 (8.53) [23.37 (10.88)]	.179* [.023]
d. Convenience	21.01 (10.90) [11.05 (9.58)]	.143* [-.029]
e. Hunger and cravings	1.67 (11.56) [9.22 (9.17)]	.455*** [.341***]
Normative beliefs		
a. Family	9.81 (10.50) [13.90 (11.02)]	.476*** [.434***]
b. Doctor	6.60 (9.26) [16.83 (12.12)]	-.015 [-.030]
c. Overweight people	7.11 (9.03) [19.44 (11.78)	.048 [.125]
d. Snack retailers	8.45 (10.26) [25.03 (10.52)]	.038 [.345***]
e. Health conscious people	5.79 (8.33) [5.43 (9.43)]	.195* [-.005]
f. Friends	10.13 (9.93) [21.60 (10.98)]	.095 [.164]
Control beliefs		
a. Availability	22.42 (11.65) [20.82 (11.62)]	.687*** [.564***]
b. Special occasion	20.54 (12.77) [10.02 (10.47)]	-.055 [-.049]

Note: *** $p < .001$, ** $p < .01$, * $p < .05$

In the eating high-calorie snack model behavioural (β = .468, p < .001) and control beliefs (β = .629, p < .001) are significant predictors of intention, but normative beliefs (β = .088, p = .052) are not. A total of 62.2% of the extracted variance in intention to eat high-calorie snacks is explained. Intention significantly predicts behaviour (β = .440, p < .001) whereas control beliefs do not (p > .10). In total 23.1% of the variance in behaviour is explained by the model. The not eating high-calorie snack model explains 60.3% of the extracted variance in intention to not eat high-calorie snacks. Behavioural (β = .668, p < .001), normative (β = .376, p < .001), and control beliefs (β = .119, p = .038) are all significant predictors of intention to not eat high-calorie snacks. A total of 20.4% of the variance in behaviour is explained by the model and is significantly predicted by both intention (β = .410, p < .001) and the control belief construct (β = -.244, p = .003). A comparison of the eating and not eating high-calorie snack mirrored belief models is shown in Figure 6.5.

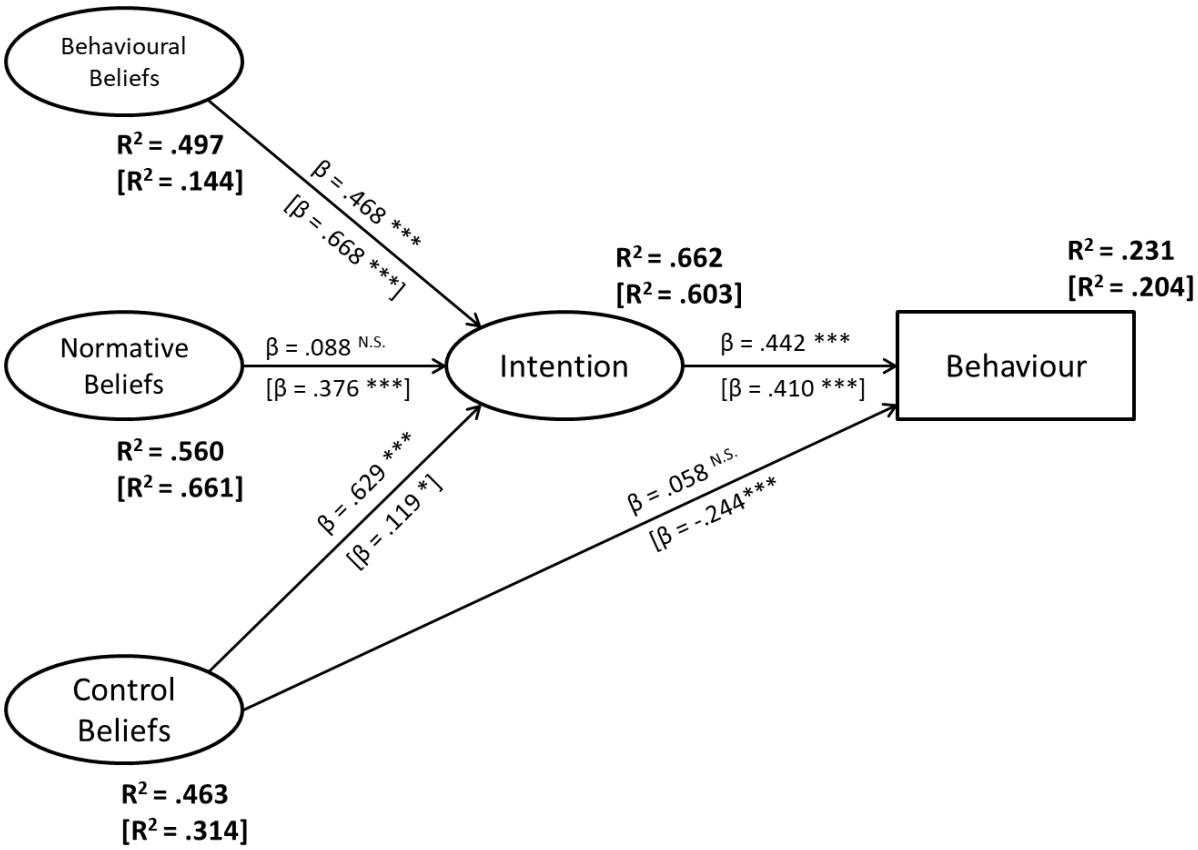

Figure 6.5 - Comparison of the structural relationships of the mirrored eating and not eating high-calorie snack models

Notes: *** *p* < .001, ** *p* < .01, * *p* < .05, N.S. = not significant; values in square brackets are for the not eating high-calorie snack model

6.3.2.9 Assessing the contribution of distinct beliefs over and above that of the mirrored beliefs in the prediction of intention

Section 6.3.2.2 reports that a belief-based model consisting of all modal salient beliefs relevant to eating high-calorie snacks explains 65.1% of the variance in intention to eat high-calorie snacks and 24% of the variation in behaviour. The explanatory power of this model is slightly better than that provided by a belief-based eating high-calorie snack model which includes only beliefs that are mirrored between action and inaction. In this mirrored belief model 62.2% of the variance in intention and 23.1% of the variance in behaviour is explained. A belief-based model consisting of all modal salient beliefs relevant to not eating high-calorie snacks explains 75.5% of the variance in intention and 17.8% of the variance in behaviour (see section 6.3.2.4). The model containing only mirrored beliefs for not eating high-calorie snacks explained considerably less variance in intention (R^2 = .603) but a higher portion of variance in behaviour (R^2 = .204).

Hierarchical regression analyses were undertaken in SPSS version 24 to establish whether distinct modal salient beliefs about action and inaction contribute to the prediction of intention, over and above that explained by the mirrored beliefs between action and inaction alone. In the first regression model mirrored beliefs relevant to eating high-calorie snacks were entered in step 1 and explained 37.1% of the variance in intention. Distinct beliefs about eating high-calorie snacks were entered in step 2 and explained an additional 10.4% (p < .001). In the second regression model mirrored beliefs relating to not eating high-calorie snacks were entered in step 1 and explained 29.1% of the variance in intention. When entered in step 2 distinct beliefs about not eating high-calorie snacks significantly increased the variance explained by 9.4% (p < .001). This finding shows that distinct modal salient beliefs about eating and not eating high-calorie snacks are important factors underpinning intention to act and not act (research question 1.3).

6.3.2.10 Study 3.2 discussion

Belief-based constructs of the eating and not eating high-calorie snack models are mostly influenced by different rather than conceptually mirrored beliefs (research question 1.2). Some of the beliefs that significantly inform their respective belief-based constructs are conceptually mirrored for eating and not eating high-calorie snacks. However, distinct beliefs about both alternatives play an important role in the formation of all of the belief-based

constructs in both eating and not eating high-calorie snack models. This finding suggests that even when people hold conceptually mirrored beliefs about action and inaction, the beliefs that influence each behavioural alternative may largely differ. In both eating and not eating high-calorie snack regression models distinct beliefs significantly and substantially raise the explained variance in intention, over and above that explained by the conceptually mirrored beliefs alone (research question 1.3). As such, distinct beliefs are important underlying determinants of both eating and not eating high-calorie snacks. A full and accurate picture of the motivating factors that influence eating and not eating high-calorie snacks cannot be gleaned by considering the beliefs people hold about either behavioural alternative alone. This finding is at odds with the complementarity assumption which holds that when action and inaction are mutually exclusive and exhaustive alternatives, investigating both action and inaction will not provide unique information about the target behaviour not already accounted for by assessing only one of the two behavioural alternatives (Ajzen, 2017; Fishbein & Middlestadt, 1987; Sutton, 2004). The results are, however, consistent with previous research showing different behavioural beliefs inform attitude toward using and not using performance enhancing substances (Dodge & Jaccard, 2008).

Examination of the belief-based structural models identifies that a combination of common and different determinants influence intention and behaviour across eating and not eating high-calorie snack models (research question 1.5). Several studies have applied the direct measure TPB model to action and inaction. These studies find that different determinants can influence action and inaction intention (Ajzen & Sheikh, 2013; Middlestadt et al., 2014; Richetin et al., 2012, 2011) and behaviour (Richetin et al. 2011: study 1). Building upon these findings, the present study identifies that structural relationships of the belief-based model are not all equivalent when the model is applied to eating and not eating high-calorie snacks (research question 1.6). The finding suggest inferences made about the determinants of inaction based on research into the determinants of action, and vice versa, may not result in an accurate understanding of the determinants of that behaviour.

Overall, the belief-based model exhibits superior validity when applied to eating high-calorie snacks than to not eating high-calorie snacks (research question 2.1). The correlation between the normative belief construct and its respective, reflectively measured construct is equivalent across eating and not eating high-calorie snack models. However, correlations

between the behavioural and control belief constructs and their respective reflective constructs were lower in the not eating high-calorie snack model. von Haeften et al. (2001) show that such weak correlations between belief-based and direct measure constructs can indicate that the measures are tapping into different psychological concepts. This may occur because direct measures capture 'top of the mind' responses to questions of a general nature, whereas indirect measures capture more reasoned and thought out responses to specific questions (Ajzen, 1991). Whilst both direct and indirect measures elicit responses that come readily to mind in response to a given question, indirect measures have the potential to also elicit responses based on less-accessible beliefs that are retrieved from memory in a more effortful way (Fishbein & Ajzen, 2010). As such, belief-based measures may tap into facets of the focal construct not captured by the direct measures to a greater extent when applied to not eating than eating high calorie snacks.

An alternative interpretation of these findings is that the belief-based model operates more effectively when applied to eating than to not eating high-calorie snacks (Diamantopoulos et al. 2008; MacKenzie et al. 2005). Differences in the variance explained in the belief-based constructs by their respective indicators lend support for this view. A considerable portion of variance in the behavioural, normative, and control belief constructs are explained by their respective indicators in the eating high-calorie snack model. Normative belief indicators of the not eating high-calorie snack model account for a very high portion of variance in the normative belief construct, and this is considerably higher than that explained in the eating high-calorie snack model. However, variance explained in the behavioural and control belief constructs of the not eating high-calorie snack model is low, and considerably lower than in the eating high-calorie snack model. Together, these findings show that the belief-based model operates well when applied to eating high-calorie snacks. The operation of the belief-based model when applied to not eating high-calorie snacks is more varied. When applied to not eating high-calorie snacks, the belief-based model is highly effective in identifying beliefs that inform the normative belief construct. However, the model is also much less effective in capturing important beliefs that inform the behavioural and control belief constructs. Differences in the validity of the belief-based eating and not eating high-calorie snack models shows that the belief-based model does not always operate equivalently when applied to action and inaction.

The belief-based model explains greater variance in intention to not eat high-calorie snacks whereas the eating high-calorie snack model affords superior prediction of behaviour (research question 2.2). People are expected to hold a greater number of readily accessible beliefs about not eating high-calorie snacks than about eating high-calorie snacks. This is because beliefs about not eating high-calorie snacks may relate to the more certain, enduring and negative outcomes (e.g. cravings, hunger, having to resist temptation) whereas beliefs about eating high-calorie snacks may be associated with less-certain (e.g. weight gain) and momentary outcomes (e.g. enjoyment of taste, convenience). The feature positive effect shows that information processing is typically more challenging and less efficient when it concerns non-occurrences than occurrences (e.g. Hearst, 1991; Rassin, 2014). However, when information about inaction is highly salient the feature positive effect many be reduced or eliminated (e.g. Astley et al., 2015; Beckmann & Young, 2007; Johnston et al., 1990; Rassin, 2014). The TPB stipulates that it is the readily accessible beliefs an individual holds about a behaviour that inform their attitude, subjective norm, and PBC about that behaviour (Fishbein & Ajzen, 2010). The TPB model may, therefore, explain greater variance in intention to not eat high-calorie snacks because people hold a more readily accessible belief set about not eating high-calorie snacks than eating them.

An unanticipated finding is that the belief-based model affords superior prediction of behaviour when applied to eating than to not eating high-calorie snacks. The belief-based model is therefore more effective in capturing the factors that lead people to eat rather than not eat high-calorie snacks. For most people, and in most situations, eating high-calorie snacks will be easier and less effortful than not eating high-calorie snacks. This is because eating high-calorie snacks involves no prerequisite knowledge of caloric values of various snack options and no mental effort is required to ensure any snacks consumed are not high in calories. Conversely, not eating high-calorie snacks may entail expending considerable mental effort in order to resist temptation in addition to the effort required in checking the caloric values of all snacks consumed. Greater variance in behaviour may, therefore, be explained when the belief-based model is applied to eating than not eating high-calorie snacks because fewer impeding factors may be encountered when an attempt is made to eat high-calorie snacks.

6.3.3 Study 3.3 Comparing the application of an extended direct measure TPB model to eating and not eating high-calorie snacks

Two approaches were utilised to compare the application of the TPB to eating and not eating high-calorie snacks. Firstly the eating and not eating high-calorie snack models are analysed separately to produce a 'best case' model for each behavioural alternative. These 'best case' models provide insight into the performance of the TPB when used to predict action and inaction as they would typically be analysed in the literature (i.e. when only one alternative is investigated). Eating and not eating high-calorie snack models are compared in regard to their model fit (research question 3.1), psychometric properties (research question 3.2) determinants of intention and behaviour (research question 1.7), and predictive power (research question 3.4). The moderating role of actual capacity and actual autonomy on the intention-behaviour relationships is also examined (research question 3.3) in addition to whether AAR (research question 4.2) and AIR (research question 4.3) exert a differential influence on intention and behaviour across eating and not eating high calorie snack models. The second step involves analysing eating and not eating high-calorie snack models on a like-for-like basis so that they can be directly compared. This approach facilitates the comparison of the structural relationships of the direct measure TPB model when applied to eating and not eating high-calorie snacks (research questions 3.4 and 4.3). The eating and not eating high-calorie snack models are compared to examine whether the factor structure and meaning of the constructs varies between models, and whether the structural relationships are different for action and inaction.

The high-calorie snack models are comprised of 9 reflective latent constructs including experimental attitude, instrumental attitude, injunctive norm, descriptive norm, perceived capacity, perceived autonomy, AAR, AIR, actual behavioural control, and intention. The structural models also have a measure of past behaviour, and behaviour. Modelling the sub-components of attitude, subjective norm, and PBC separately served to provide a more in-depth view of whether, and how, the extended direct measure TPB model operates differently when applied to action and inaction. Actual behavioural control was captured in the follow-up questionnaire which was not completed by all respondents. Amos does not provide modification indices when there are missing data in the model and so an initial CFA was conducted without actual capacity and actual autonomy. After modifications were made

to the initial model a second CFA was conducted with actual capacity and actual autonomy included. Table 6.8 presents the measures used to assess the direct measure constructs.

Table 6.8 - Direct measure eating and not eating high-calorie snack questionnaire items and scales

Construct	**Scale**
Intention (Adapted from Shaw et al. 2006)	
INT1a. How likely are you to (NOT) eat high-calorie snacks in the next two weeks?	0 Very unlikely to 6 Very likely
INT1b. How strong is your intention to (NOT) eat high-calorie snacks in the next two weeks?	0 No intention at all to 6 Very strong
INT1c. How much do you agree with this statement about you "I will (NOT) eat high-calorie snacks in the next two weeks"?	0 Strongly disagree to 6 Strongly agree
Experiential Attitude (Adapted from Armitage and Conner, 1999)	
Please indicate how you feel about (NOT) eating high-calorie snacks in the next two weeks. EXP3a. Pleasant (+3) to Unpleasant (-3) EXP3b. Enjoyable (+3) to Unenjoyable (-3) EXP3c. Relaxing (+3) to Stressful (-3) EXP3d. Satisfying (+3) to Unsatisfying (-3)	
Instrumental Attitude (Adapted from Armitage and Conner, 1999)	
Please indicate how you feel about (NOT) eating high-calorie snacks in the next two weeks. INST4a. Beneficial (+3) to Harmful (-3) INST4b. Healthy (+3) to Unhealthy (-3) INST4c. Good (+3) to Bad (-3) INST4d. Positive (+3) to Negative (-3) INST4e. Satisfactory (+3) to Un**s**atisfactory (-3)	
Injunctive Norm (Adapted from Kothe et al. 2012)	
INJ5a. People who are important to me would think I 'should'/'should not' (NOT) eat high-calorie snacks in the next two weeks	+3 Should to -3 Should not
INJ5b. People who are important to me would 'approve'/disapprove' of me (NOT) eating high-calorie snacks in the next two weeks	+3 Approve to -3 Disapprove
INJ5c. People who are important to me would want me to (NOT) eat high-calorie snacks in the next two weeks	+3 Strongly agree to -3 Strongly disagree
INJ5d. I feel under social pressure to (NOT) eat high-calorie snacks in the next two weeks	+3 Strongly agree to -3 Strongly disagree
Descriptive Norm (Adapted from Kothe et al. 2012)	
DESC6a. 'How often do you think the people who are important to you will themselves (NOT) eat high-calorie snacks in the next two weeks	+3 Everyday to -3 Never
DESC6b. Of the people you know, how many do you think will (NOT) eat	+3 All of them to -3 None of

high-calorie snacks in the next two weeks	them
DESC6c. Most people important to me will (NOT) eat high-calorie snacks in the next two weeks	+3 Strongly agree to -3 Strongly disagree
Perceived Capacity (Adapted from Godin et al. 2010)	
CAP7a. For me, (NOT) eating high-calorie snacks in the next two weeks would be…	+3 Easy to -3 Difficult
CAP7b. I believe I have the ability to (NOT) eat high-calorie snacks in the next two weeks'	+3 Definitely do to -3 Definitely do not
CAP7c. I am confident that I am able to overcome any obstacles that would prevent me from (NOT) eating high-calorie snacks in the next two weeks?	+3 Strongly agree to -3 Strongly disagree
CAP7d. How confident are you that you will be able to (NOT) eat high-calorie snacks in the next weeks?	+3 Very confident to -3 Very unconfident
Perceived Autonomy (Adapted from Godin et al. 2010)	
AUT8a. Whether or not I do (NOT) eat high-calorie snacks in the next two weeks is entirely up to me	+ Strongly agree to -3 Strongly disagree
AUT8b. How much control do you feel you have over (NOT) eating high-calorie snacks in the next 2 weeks?	+3 Complete control to -3 Very little control
AUT8c. How much do you feel that (NOT) eating high-calorie snacks in the next 2 weeks is beyond your control?	+3 Very much to -3 Not at all
Anticipated action regret (Taken from Godin et al. 2005)	
If I choose TO EAT high-calorie snacks in the next two weeks…	
AAR9a. I would regret it	0 Not at all to 6 Very much
AAR9b. It would bother me	
AAR9c. I would be disappointed	
Anticipated inaction regret (Taken from Godin et al. 2005)	
If I choose to NOT EAT high-calorie snacks in the next two weeks…	
AIR10a. I would regret it	0 Not at all to 6 Very much
AIR10b. It would bother me	
AIR10c. I would be disappointed	
Past Behaviour	
PB13. In the last two weeks, how often have you eaten high-calorie snacks?	0 Never to 6 Several times a day
Actual Behavioural Control (Adapted from Godin et al. 2010 (PBC measures))	
ABC14a. For me, (NOT) eating high-calorie snacks in the last two weeks was…	0 Difficult to 6 Easy
ABC14b. (NOT) eating high-calorie snacks was completely up to me	0 Strongly disagree to 6 Strongly agree
ABC14c. I was able to overcome any obstacles that would prevent me from (NOT) eating high-calorie snacks in the last two weeks	0 Strongly disagree to 6 Strongly agree

Behaviour	
BEH15. On how many days did you (NOT) eat high-calorie snacks in the last two weeks?	0-14 days

6.3.3.1 Comparison of the baseline eating and not eating high-calorie snack measurement models

6.3.3.1.1 Baseline eating high-calorie snack measurement model

The initial eating high-calorie snack model yields acceptable fit statistics (χ^2 (428) = 1279.366, p < .001, CFI = .924, TLI = .912, NFI = .891, RMSEA = .07, AIC = 1479.366). All indicators load significantly on their respective constructs (p < .001) with factor loadings above .7 except for one injunctive norm item (INJ5d: .58) and one perceived autonomy item (AUT8c: .318). The squared multiple correlations for these items also fall below the .4 threshold (INJ5d: .37, AUT8c: .101). On this basis these items were removed from subsequent analysis. Additionally, the error terms of two experiential attitude items (e6: EXP3c, e7: EXP3d) exhibit high covariance and are therefore covaried in the model.

6.3.3.1.2 Baseline not eating high-calorie snack measurement model

The initial not eating high-calorie snack model is a poor fit to the data (χ^2 (428) = 1571.401, p < .001, CFI = .887, TLI = .868, NFI = .851, RMSEA = .082, AIC = .1771.401) according to the usual conventions (Hair, Black, Babin, & Anderson, 1998; Hu & Bentler, 1999). Factor loadings are all significant and most are above .7 except for three injunctive norm items (Inj5a: .359, INJ5b: .61, INJ5d: .55) and two perceived autonomy items (AUT8a: .61, AUT8c: .43). The squared multiple correlations of the same three injunctive norm items (Inj5a: .13, INJ5b: .372, and INJ5d: .302) and two perceived autonomy items (AUT8a: .37, AUT8c: .184) are below .4. On this basis INJ5a, INJ5d and AUT8c were removed from subsequent analysis whereas INJ5b and AUT8a were retained in the model so that each construct had a minimum of 2 indicators. High covariance between the error terms of two experiential attitude items (e6: EXP3c, e7: EXP4d) and two capacity items (e21: CAP7b, e22: CAP7c) is evidenced and so these error term pairings were covaried in further analysis. These findings

show initial model fit is superior in the eating high calorie snack model whereas the not eating high calorie snack model required greater model refinement (research question 3.1).

6.3.3.1.3 Assessing common method variance for eating and not eating high-calorie snack models

Common method variance was examined using Harman's single factor method and the correlational marker technique (Lindell & Whitney, 2001) as suggested by Schaller et al (2015b). An exploratory factor analysis was conducted including all substantive constructs of the model which include intention, experiential attitude, instrumental attitude, injunctive norms, descriptive norms, perceived capacity, perceived autonomy, AAR, and AIR. In the eating high-calorie snack model the unrotated solution identified 8 factors with an eigenvalue of greater than 1 which explain 79.47% of the variance. The first factor alone explains 36.05% of the variance which falls below the 50% threshold. In the not eating high-calorie snack model the unrotated solution identified 7 factors with an eigenvalue of greater than 1 which explain 74.16% of the variance and the first factor explains 30.58%. Common method variance was further examined using the correlational marker technique (Lindell & Whitney, 2001) with age as the marker variable. Lindell and Whitney (2001) stipulate that artificial negative correlations (i.e. where a construct is negatively correlated to many or all of the other constructs within the model) should be eliminated using reverse coding prior to conducting the correlational marker technique. AAR was reverse coded accordingly in the eating high-calorie snack model and AIR was reverse coded in the not eating high-calorie snack model. After common method variance was partialled out of the model all construct pairings which were significant prior to correction ($p < .001$) remained significant and all construct pairings which were non-significant before correction were also non-significant post CMV-correction. Together, the results of the Harman's single factor method and correlational marker technique show that common method variance is not of concern in the present model.

6.3.3.2 Comparison of the independently refined eating and not eating high-calorie snack models

6.3.3.2.1 Independently refined eating high-calorie snack measurement model

The refined eating high-calorie snack model yields a good fit to the data (χ^2 (368) = 856.719, p < .001, CFI = .954, TLI = .946, RMSEA = .057, AIC = .1050.719) according to the usual conventions (Hair, Black, Babin, & Anderson, 1998; Hu & Bentler, 1999). All indicators load significantly (p < .001) and substantially on their respective constructs with standardised factor loadings of .67 or above. Correlations between most constructs are low (|r| > .7) with the exception of the attitude and perceived capacity pairing (r = .75). Table 6.9 reports the descriptive statistics and correlations between constructs. All alpha, AVE and construct reliability values exceed the minimum recommended thresholds (Bagozzi & Yi, 1988; Fornell & Larcker, 1981) with the lowest alpha, construct reliability, and AVE .78, .80, and .63, respectively. Discriminant validity is evidenced according to the Fornell and Larcker (1981) criterion and the Heterotrait-monotrait ratio of correlations (Henseler et al., 2015) between all constructs is less than .85 (range: -.07 to .50).

Table 6.9 - Descriptive statistics and correlations between constructs of the eating high-calorie snack model

Construct	Mean (SD)	α	AVE	CR	1	2	3	4	5	6	7	8
1. Intention	3.83 (1.72)	.89	.90	.96	-							
2. Experiential attitude	0.80 (1.7)	.90	.68	.89	.68	-						
3. Instrumental attitude	-.52 (1.83)	.95	.79	.95	.52	.45	-					
4. Injunctive norm	-.30 (1.75)	.93	.82	.93	.47	.42	.68	-				
5. Descriptive norm	1.08 (1.31)	.87	.69	.87	.51	.43	.32	.42	-			
6. Perceived capacity	1.33 (1.48)	.87	.63	.87	.75	.67	.40	.42	.62	-		
7. Perceived autonomy	1.82 (1.35)	.78	.67	.80	.22	.23	.42	.42	.44	.49	-	
8. AAR	2.81 (2.03)	.96	.92	.97	-.32	-.24	-.33	-.26	-.02	-.17	.10	-
9. AIR	1.89 (1.83)	.92	.85	.94	.35	.34	.53	.54	.26	.24	-.08	-.13

Notes: SD = standard deviation, α = alpha, AVE = average variance extracted, CR = construct reliability.

6.3.3.2.2 Independently refined eating high-calorie snack model with ABC

The inclusion of the actual behavioural control construct into the model also produces good fit statistics (χ^2 (449) = 1050.379, p < .001, CFI = .945, TLI = .93, RMSEA = .058, AIC = .1340.379). The ABC indicators load significantly onto the ABC construct (p < .001). Two of the standardised factor loadings and squared multiple correlations are very low (ABCa .38, .146; ABCc .33, .106). As the lowest performing indicator for ABC, item ABCc was omitted from the model. An examination of the alpha value of the ABC construct shows that the two items, one assessing actual capacity and the other actual autonomy, do not have a satisfactory degree of internal consistency (.39). Actual capacity and actual autonomy were therefore included in the structural model as separate observed items.

6.3.3.2.3 Eating high-calorie snack independently refined structural model

The independently refined eating high-calorie snack structural model yields acceptable fit statistics (χ^2 (611) = 1364.445, p < .001, CFI = .935, TLI = .913, NFI = .890, RMSEA = .055). This model explains 69.8% of the extracted variance in intention to eat high-calorie snacks. Experiential attitude (ß = .265, p < .001), instrumental attitude (ß = .109, p = .037), descriptive norm (ß = .094, p = .037), perceived capacity (ß = .398, p < .001), perceived autonomy (ß = -.088, p = .025), AAR (ß = -.186, p < .001), and past behaviour (ß = .284, p < .001) significantly predict intention. Injunctive norm and AIR, however, do not significantly impact intention to eat high-calorie snacks (p > .10). Age, sex, BMI, weight related goal, and education level (p > .10) also do not influence intention. A total of 46.4% of the variance in perceived capacity is explained by actual capacity (ß = .590, p < .001) and actual autonomy (ß = .200 p < .001). On the other hand 50.4% of the extracted variance in perceived autonomy is explained, with actual autonomy (ß = .678, p < .001), but not actual capacity (p > .10) making a significant impact.

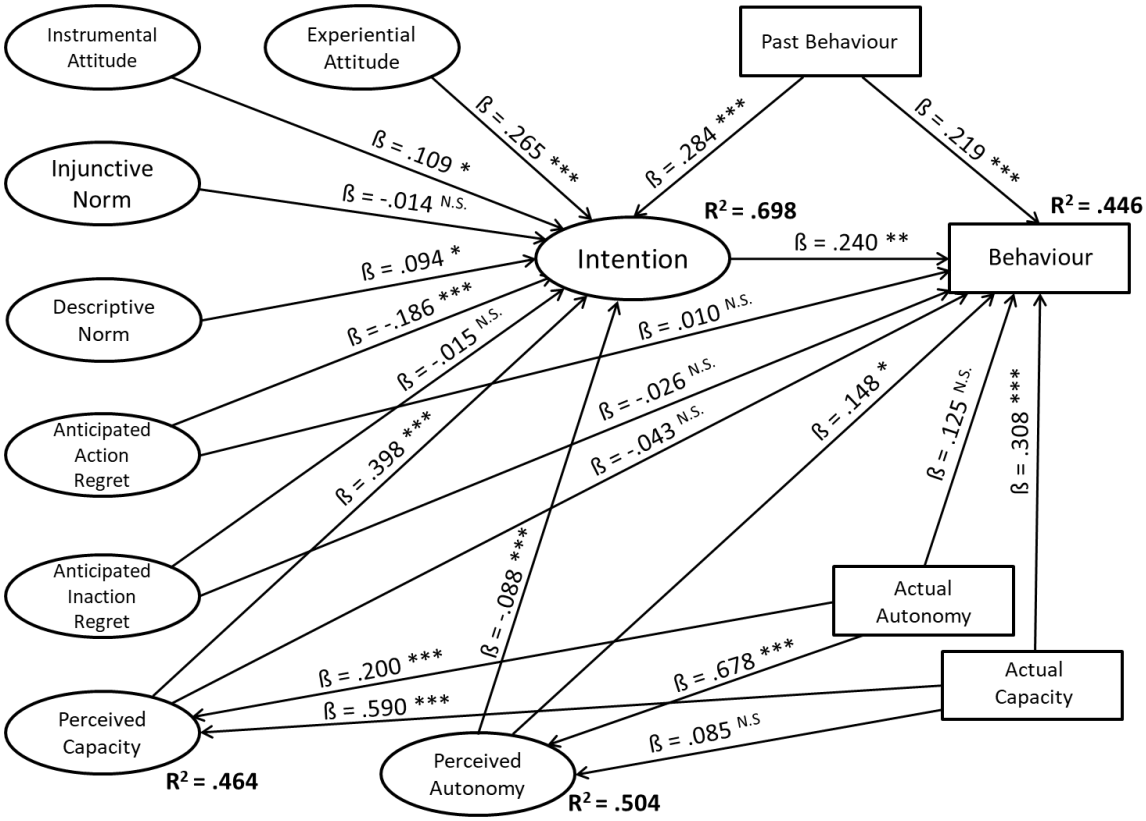

Figure 6.6 - Independently refined eating high-calorie snack structural model

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$, N.S. = not significant

The model explains 44.6% of the variance in eating high-calorie snack behaviour and is significantly influenced by intention (ß = .240, $p = .008$), actual capacity (ß = .308, $p < .001$), and past behaviour (ß = .219, $p = .001$). Women eat high-calorie snacks on more occasions than males (ß = -.122, $p = .019$), and respondents with a higher BMI intend to eat high-calorie snacks more than those with a lower BMI (ß = .117, $p = .049$). Perceived capacity, AAR, AIR, actual autonomy ($p > .10$), and perceived autonomy ($p = .079$) were not significant predictors of eating high-calorie snack behaviour. Furthermore, weight related goal (to lose weight $p > .10$, to gain weight $p > .09$), education level, and age ($p > .10$) do not influence eating high-calorie snacks.

6.3.3.2.4 Independently refined not eating high-calorie snack measurement model

The refined not eating high-calorie snack model yields an acceptable fit ($\chi 2$ (339) = 948.411, $p < .001$, CFI = .936, TLI = .923, NFI = .904, RMSEA = .067, AIC = .1140.411). All indicators load significantly ($p < .01$) with factor loadings of .7 and above (range .7 to .96) other than that of one injunctive norm item (INJ5b: .60) one perceived autonomy item (AUT8a: .62). Slightly high correlations are observed between intention and experiential attitude (.72), and intention and perceived capacity (.73) however correlations between all other constructs are below .7. Table 6.10 shows the descriptive statistics and correlations between construct pairings. As shown, alpha values, construct reliability, and AVE values range from .65, .66, and .50 respectively. Psychometric properties are broadly comparable across eating and not eating high calorie snack models (research question 3.2). Discriminant validity is confirmed as the squared correlation between each pair of constructs is less than the AVE values for both of the constructs and the HTMT ratio of correlations falls below .85 for each construct pairing (range: -.14 to .49).

Table 6.10 - Descriptive statistics and correlations between constructs of the not eating high-calorie snack model

Construct	Mean (SD)	α	AVE	CR	1	2	3	4	5	6	7	8
1. Intention	3.15 (1.89)	.89	.79	.92	-							
2. Experiential attitude	0.25 (1.76)	.93	.70	.90	.73	-						
3. Instrumental attitude	1.61 (1.64)	.91	.75	.94	.28	.20	-					
4. Injunctive norm	1.04 (1.51)	.71	.60	.74	.44	.45	.36	-				
5. Descriptive norm	0.16 (1.55)	.89	.74	.89	.57	.46	.14	.37	-			
6. Perceived capacity	0.66 (1.62)	.89	.65	.88	.73	.65	.23	.27	.55	-		
7. Perceived autonomy	-.37 (2.10)	.65	.50	.66	.24	.19	.30	.34	.37	.45	-	
8. AAR	3.09 (2.02)	.97	.93	.98	.55	.36	.37	.53	.32	.25	.20	-
9. AIR	1.90 (1.76)	.91	.82	.93	-.04	-.05	-.23	-.11	.18	-.13	-.18	-.07

Notes: SD = standard deviation, α = alpha, AVE = average variance extracted, CR = construct reliability.

6.3.3.2.5 Independently refined not eating high-calorie snack model with ABC

The inclusion of ABC into the model produces good fit statistics (χ^2 (417) = 1166.805, p < .001, CFI = .923, TLI = .903, RMSEA = .067, AIC = .1452.805). As previously noted however, item ABCc may not tap into actual autonomy effectively as it may not be applicable to not eating high-calorie snacks. As such, this item was omitted from the model. An examination of the alpha values shows that the two remaining ABC items, one assessing actual capacity and the other assessing actual autonomy, do not have a satisfactory degree of internal consistency (.35) and were therefore included in the model as separate variables.

6.3.3.2.6 Independently refined not eating high-calorie snacks structural model

The independently refined not eating high-calorie snack structural model yielded acceptable fit statistics (χ^2 (572) = 1448.254, p < .001, CFI = .914, TLI = .882, NFI = .868, RMSEA = .062). This model explains 74.8% of the extracted variance in intention to not eat high-calorie snacks. Experiential attitude (ß = .328, p < .001), perceived capacity (ß = .463, p < .001), AAR (ß = .274, p < .001), and perceived autonomy (ß = -.086, p = .037) significantly predict intention. Respondents with a higher education level do not eat high-calorie snacks on more occasions than those with a lower education level (ß = .123, p < .001). Instrumental attitude, injunctive norm, descriptive norm, AIR, and past behaviour however did not significantly impact intention (p > .10). No significant differences were observed for intention to not eat high-calorie snacks based on weight loss goal to gain weight, BMI, age, gender (p > .10), or weight loss goal to lose weight (p = .054). An overview of the structural model results are presented in Figure 6.7.

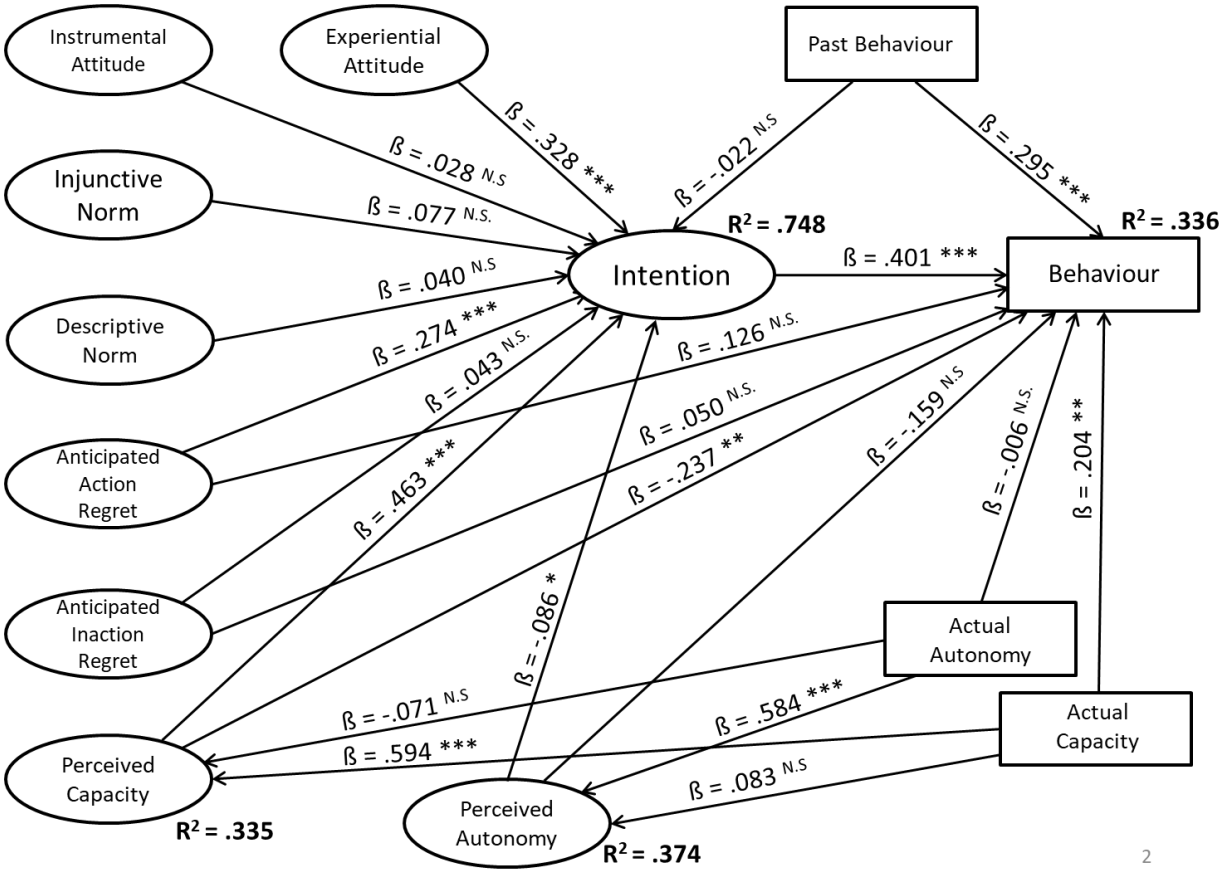

Figure 6.7 – Independently refined not eating high-calorie snack structural model results

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$, N.S. = not significant

A total of 37.4% of the extracted variance in perceived autonomy is explained by the model, with actual autonomy (ß = .584, $p < .001$) but not actual capacity (p > .10) emerging as a significant predictor. A total of 33.5% of the variance in perceived capacity is explained by the model whereby actual capacity (ß = .594, $p < .001$), but not actual autonomy ($p > .10$), is a significant predictor. This model explains 33.6% of the variance in not eating high-calorie snack behaviour. Behaviour is significantly influenced by intention to not eat high-calorie snacks (ß = .401, $p < .001$), perceived capacity (ß = -.237, $p = .004$), actual capacity (ß = .204, $p = .007$), and past behaviour (ß = .295, $p < .001$). Perceived autonomy ($p = .065$), AAR ($p = .074$), age ($p = .062$), AIR, actual autonomy, gender, weight related goal, education level, and BMI do not significantly impact not eating high-calorie snack behaviour $p > .01$). Together, these findings show that not all determinants of intention and behaviour are common across eating and not eating high-calorie snack models (research question 1.7). Greater variance in intention is explained in the eating high calorie snack model, but the not eating high calorie snack model affords superior prediction of behaviour (research question 3.4).

6.3.3.3 Assessing the moderating role of actual capacity and actual autonomy

The moderating role of actual capacity and actual autonomy on the intention-behaviour relationship is compared to establish whether actual behavioural control factors influence the way intention translates into behaviour differently for eating and not eating high calorie snacks. The interaction effects of actual autonomy and actual capacity on the intention-behaviour relationship are analysed separately using PROCESS, Model 1 (Hayes 2013). Figure 6.8 depicts the conceptual moderation model.

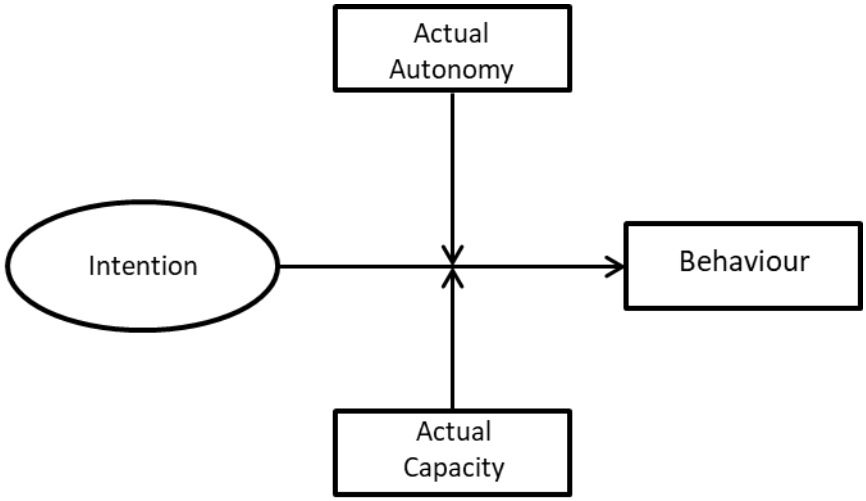

Figure 6.8 - Conceptual moderation model

6.3.3.3.1 Moderating role of actual capacity for eating high-calorie snacks

Overall, the model which includes actual capacity explains 36% of the variance in eating high-calorie snack behaviour (F (3, 232) = 46.73, $p < .001$). Intention (b = .77, t(232) = 6.39, $p < .001$), actual capacity (b = .83, t(232) = 6.69, $p < .001$), and the interaction term (b = .179, t(232) = 3.27, $p = .001$) all significantly contribute to the prediction of behaviour. The significance of the interaction term shows that actual capacity moderates the intention-behaviour relation. Figure 6.9 depicts the simple slopes of the relation between intention and behaviour at low, medium, and high (-1 SD, mean, +1 SD) levels of actual capacity. The intention-behaviour relation is stronger when actual capacity is high (b = 1.07, t(232) = 5.95, $p < .001$) than when actual capacity is at the average (b = .767. t(232) = 6.39, $p < .001$) and low level (b = .46, t(232) = 3.95, $p < .001$).

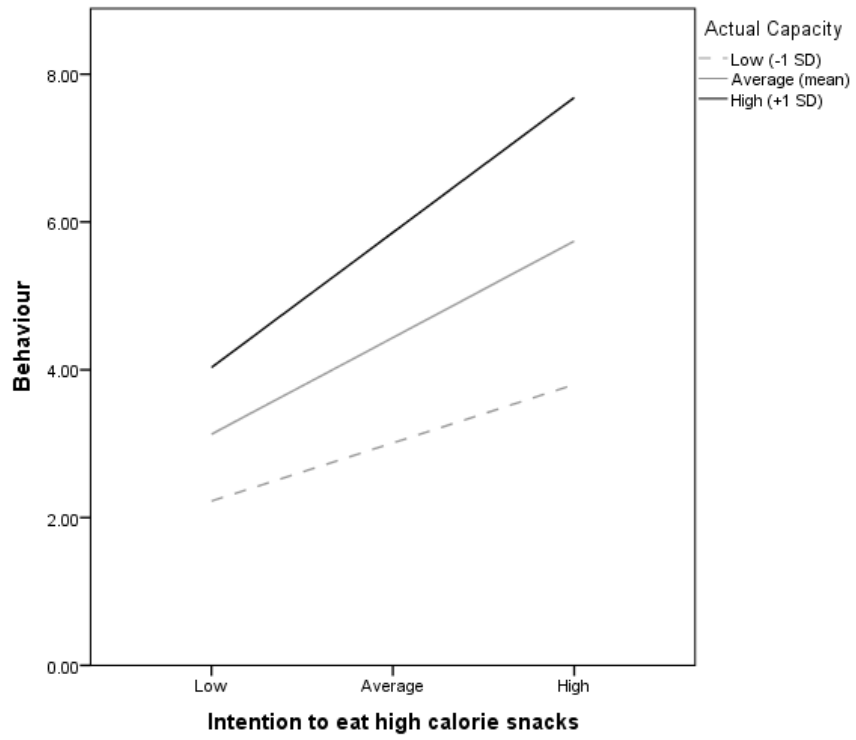

Figure 6.9 - Moderating role of actual capacity on the intention-behaviour relationship in the eating high-calorie snack model

6.3.3.3.2 Moderating role of actual autonomy for eating high-calorie snacks

Overall, the model that includes actual autonomy explains 26% of the variance in eating high-calorie snack behaviour (F (3, 232) = 32.52, $p < .001$). While intention (b = 1.11, t(232) = 8.88, $p < .001$) is a significant predictor of behaviour, actual capacity is not (b = .187, t(232) = 1.00 , $p > .10$). Furthermore, the non-significant interaction term shows that actual autonomy does not moderate the intention-behaviour relation for eating high-calorie snacks (b = .037, t(232)= .338, $p > .10$).

6.3.3.3.3 Moderating role of actual capacity for not eating high-calorie snacks

The model including actual capacity explains 13% of the variance in eating high-calorie snack behaviour (F (3, 224) = 9.58, $p < .001$). Intention (b = .641, t(224) = 4.37, $p < .001$) is a significant predictor of behaviour but actual capacity is not ($p > .001$). The interaction term is also non-significant ($p > .10$) which shows that actual capacity does not moderate the intention-behaviour relationship.

6.3.3.3.4 Moderating role of actual autonomy for not eating high-calorie snacks

The model that includes actual autonomy explains 13% of the variance in not eating high-calorie snack behaviour (F (3, 224) = 9.50, $p < .001$). Intention (b = .666, t(224) = 4.91, $p < .001$) is a significant predictor of behaviour but actual capacity is not (p > .10). The interaction term is, however, significant (b = .166, t(224) = 2.11, $p = .036$) which indicates that actual autonomy plays a moderating role in the relationship between intention to not eat high-calorie snacks and behaviour. An examination of the simple slopes (depicted in Figure 6.10) presents the relation between intention and behaviour at low, medium, and high (-1 SD, mean, +1 SD) levels of actual autonomy. The intention-behaviour relation is stronger when actual autonomy is high (b = .836, t(232) = 5.07, $p < .001$) than when actual autonomy is at the average level (b = .666. t(232) = 4.91, $p < .001$) and low level (b = .424, t(232) = 2.52, $p = .012$).

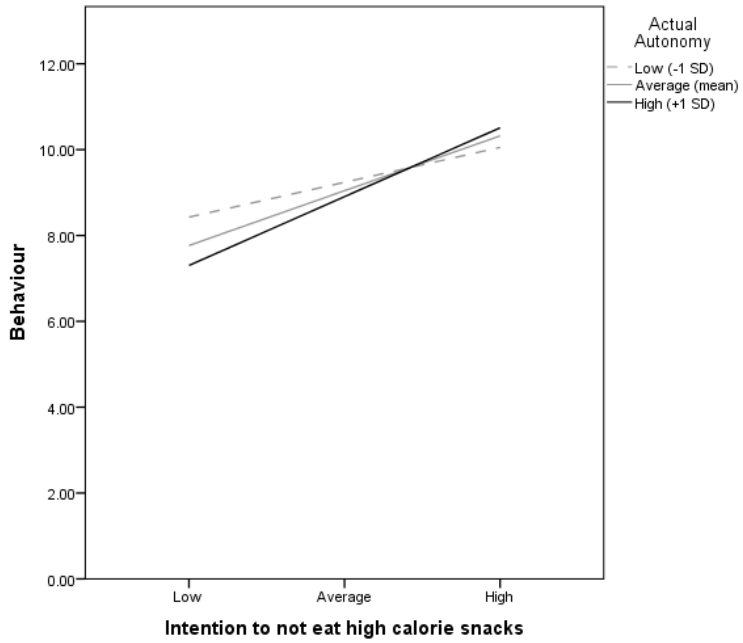

Figure 6.10 - Moderating role of actual autonomy on the intention-behaviour relationship in the not eating high-calorie snack model

Overall, moderation analyses identify that the moderating role of actual capacity and actual autonomy differ across eating and not eating high-calorie snack models (research question 3.3).

6.3.3.4 Direct comparison of eating and not eating high-calorie snack models

6.3.3.4.1 Comparison of the baseline eating and not eating high-calorie snack model CFAs

Using the baseline models reported in sections 6.3.3.1.1 and 6.3.3.1.2 the eating and not eating high-calorie snack models were refined on a like-for-like basis so that the predictive power and structural relations between models can be directly compared. The initial eating high-calorie snack model yields slightly better fit statistics (χ^2 (428) = 1279.366, $p < .001$, CFI = .924, TLI = .912, NFI = .891, RMSEA = .07, AIC = 1479.366) than the initial not eating high-calorie snack model (χ^2 (428) = 1571.401, $p < .001$, CFI = .887, TLI = .868, NFI = .851, RMSEA = .082, AIC = 1771.401). The factor loading of one attitude item (AUT8c: eating

.318, not eating .429) and one injunctive norm item (INJ5d: eating .58, not eating .55) is low across groups. The squared multiple correlations of these indicators also fall below .4 in both models (AUT8c: .101 and .184, INJ5d: .336 and .302 for eating and not eating high-calorie groups respectively). These items were removed from subsequent analysis because they explain a small amount of variance in their respective constructs across both models. Whilst there were a number of indicators that exhibited low factor loadings and squared multiple correlations in both models, they were not common across models and were therefore retained. Due to a high covariance between the error terms of two experiential attitude items (e6: EXP3c, e7: EXP3d) in both models these error terms were correlated in the eating and not eating high-calorie snack models.

6.3.3.4.2 Refined measurement models for the eating and not eating high-calorie snack models

The extended eating high-calorie snack model yields a good fit to the data (χ^2 (368) = 856.719, $p < .001$, CFI = .954, TLI = .946, RMSEA = .057, AIC = .1050.719) whilst the not eating high-calorie snack model yields an acceptable fit (χ^2 (368) = 1165.388, $p < .001$, CFI = .917, TLI = .902, NFI = .884, RMSEA = .074, AIC = .1359.388). Across both models all indicators load significantly on their respective constructs ($p < .001$). All factor loadings approach or exceed .7 across models (eating: .67 -.96, not eating: .72 -.96) with the exception of two indicators of injunctive norm (INJ5a: .30, INJ5b: .66) and one indicator of autonomy (AUT8a: .62) in the not eating high-calorie snack model. Correlations between constructs within each model are generally low ($|r| > .7$) with the exception of the attitude and actual capacity pairing (r = .75) in the eating high-calorie snack model and the experiential attitude and intention pairing (.73) in the not eating high-calorie snack model. Construct reliability is evidenced across both models by way of Cronbach's Alpha values exceeding .6 (Bagozzi & Yi, 1988) and AVE values above .5 (Fornell & Larcker, 1981) (see Table 6.11). In each model the squared multiple correlations of each pair of constructs is less than the AVE values for both of the constructs, whilst the HTMT ratio of correlations is below .85 for each construct pairing (range: eating -.06 to .49, not eating -.14 to .49), thus, discriminant validity is evidenced.

Table 6.11 - Descriptive statistics and correlations between constructs for eating and not eating high-calorie snack models

Construct	Mean (SD)	α	AVE	CR	1	2	3	4	5	6	7	8	9
1. Intention	3.83 (1.72) [3.15 (1.89)]	.89 [.89]	.90 [79]	.96 [.92]	-	.73	.28	.47	.57	.70	.25	.55	-.04
2. Experiential attitude	0.80 (1.70) [0.25 (1.76)]	.90 [.91]	.68 [70]	.89 [.90]	.68	-	.20	.40	.50	.61	.19	.36	-.05
3. Instrumental attitude	-0.52 (1.83) [1.61 (1.64)]	.95 [.93]	.79 [75]	.95 [94]	.52	.45	-	.38	.14	.24	.30	.37	-.23
4. Injunctive norm	-.030 (1.75) [0.71 (1.36)]	.93 [.62]	.82 [.41]	.93 [.64]	.47	.42	.68	-	.40	.32	.34	.55	-.08
5. Descriptive norm	1.08 (1.31) [0.16 (1.55)]	.87 [.89]	.69 [.74]	.87 [.89]	.51	.43	.32	.42	-	.53	.19	.32	.18
6. Perceived capacity	1.33 (1.48) [0.66 (1.62)]	.87 [.89]	.63 [.68]	.87 [.89]	.75	.67	.40	.42	.62	-	.51	.24	-.14
7. Perceived autonomy	1.82 (1.35) [1.78 (1.21)]	.78 [.65]	.67 [.50]	.80 [.66]	.22	.23	.06	.02	.23	.49	-	.19	-.18
8. Anticipated action regret	2.81 (2.03) [3.09 (2.02)]	.96 [.97]	.92 [93]	.97 [.98]	-.32	-.24	-.33	-.26	-.02	-.17	.10	-	-.07
9. Anticipated inaction regret	1.89 (1.83) [1.90 (1.76)]	.92 [.91]	.85 [.82]	.94 [.93]	.35	.34	.53	.54	.26	.24	-.08	-.13	-

Notes: SD = standard deviation, α = alpha, AVE = average variance extracted, CR = construct reliability; values in square brackets are for the not eating high calorie snack model; values in the upper diagonal are for eating high calorie snack model, values in lower diagonal are for not eating high calorie

6.3.3.4.3 Assessing measurement invariance for the extended TPB model

Configural and metric invariance were assessed using multi-group confirmatory factor analyses (MCFAs) across eating and not eating high-calorie snack groups. The configural invariance model yields acceptable fit statistics (χ^2 (736) = 2022.113, $p < .001$, CFI = .937, TLI = .925, NFI = .905, RMSEA = .047) which suggests that the factor structure is similar across groups and all factor loadings are significant for both groups. These results indicate that a common conceptual frame of reference is used when respondents complete the TPB questionnaire in regard to eating and not eating high-calorie snack and that the factor structure is equivalent across action and inaction models.

Metric invariance was determined via a chi-square difference test between the configural invariance (fully unconstrained) and metric invariance (factor loadings fully constrained) models. Full metric invariance was not observed ($\Delta\chi^2$ (21) = 84.769, $p < .001$) between groups. The factor loadings relative to each subscale (construct) was then tested for invariance separately. Partial invariance ($\Delta\chi^2$ (11) = 16.370, $p > .10$) was achieved when the constraints of one indicator of intention, two indicators of experiential attitude, three indicators of instrumental attitude, two indicators of injunctive norm, one indicator of capacity and one indicator of autonomy were unconstrained.

Scalar invariance was assessed by comparing both the factor loadings and intercepts of items to identify whether the meaning and level of the constructs are equivalent across eating and not eating high-calorie snack models. Full scalar invariance ($\Delta\chi^2$ (51) = 1032.442, $p < .001$) and partial scalar invariance ($\Delta\chi^2$ (22) = 73.955, $p < .001$) are not observed between models. Failure to evidence partial scalar invariance is attributed to several constructs being variant across groups when all but one intercept is unconstrained (instrumental attitude, injunctive norm, and descriptive norm). On the individual construct level perceived autonomy and AIR are partially invariant across models. Experiential attitude and perceived capacity are

invariant when one intercept is unconstrained whereas intention, instrumental attitude, and AAR are partially invariant when two intercepts are unconstrained between models. The results indicate that differences in item means between eating and not eating high-calorie snacks cannot be attributed to differences in the means of the respective construct for the model as a whole (Steenkamp & Baumgartner, 1998). Together, these findings show that there are differences in the way respondents conceptualise and respond to some TPB questionnaire items when they relate to eating and not eating high calorie snacks (research question 1.4).

6.3.3.4.4 Comparing structural relationships between eating and not eating high-calorie snack structural models

The eating high-calorie snack structural model yields an acceptable fit to the data (χ^2 (611) = 1364.445, p < .001, CFI = .935, TLI = .913, NFI = .890, RMSEA = .055) whereas the not eating high-calorie snack model yields poorer fit statistics (χ^2 (611) = 1702.383, p < .001, CFI = .894, TLI = .858, NFI = .847, RMSEA = .067). The eating high-calorie snack model explains 69.8% of the variance in intention which is lower than the 73.8% explained by the not eating high-calorie snack model. Several common determinants of intention are observed between models which cover experiential attitude (E: ß = .265, p < .001; NE: ß = .351, p < .001), perceived capacity (E: ß = .398, p < .001; NE: ß = .424, p < .001), perceived autonomy (E: ß = -.088, p = .025; NE: ß = -.099, p = .020), and AAR (E: ß = -.186, p < .001; NE: ß = .288, p < .001). Instrumental attitude (ß = .109, p = .037), descriptive norm (ß = .094, p = .037), and past behaviour (ß = .284, p < .001) are unique determinants of intention to eat high-calorie snacks as they do not significantly impact intention to not eat high-calorie snacks (p < .10). Injunctive norm and AIR do not determine intention in either model (p > .10). Respondents with a higher education level do not eat high-calorie snacks on more occasions (ß = .123, p < .001) than those with a lower education level, however this difference is not observed for eating high-calorie snack (p < .10). Gender, age, BMI, weight related goal to gain weight (p > .10) and weight related goal to lose weight (E: p > .10; NE: p = .08) do not significantly influence intention for either eating or not eating high-calorie snacks.

The eating high-calorie snack model accounts for 44.6% of the variance in perceived capacity and 50.4% of the variance in perceived autonomy. This is considerably higher than that observed in the not eating high-calorie snack model wherein 30.9% of the variance in perceived capacity and 38.7% of the variance in perceived autonomy is explained. Perceived capacity over eating high-calorie snacks is significantly influenced by both actual capacity (ß = .590, $p < .001$) and actual autonomy (ß = .200 $p < .001$) whereas perceived capacity over not eating high-calorie snacks is impacted by actual capacity (ß = .560, $p < .001$) but not actual autonomy ($p > .10$). Perceived autonomy over eating high-calorie snacks is predicted by actual autonomy (ß = .678, $p < .001$) but not actual capacity ($p > .10$). Similarly, perceived autonomy over not eating high-calorie snacks is influenced by actual autonomy (ß = .594, $p < .001$) but not actual capacity ($p > .10$).

The eating and not eating high-calorie snack models explain 46.4% and 34.4% of the variance in behaviour respectively. Several common determinants underpin the decision to eat and not eat high-calorie snacks, including intention (E: ß = .240, $p = .008$; NE: ß = .417, $p < .001$), actual capacity (E: ß = .308, $p < .001$; NE: ß = .203, $p = .007$), and past behaviour (E: ß = .219, $p = .001$; NE: ß = .297, $p < .001$). In the eating high-calorie snack model women also eat high-calorie snacks on more occasions than males (ß = -.122, $p = .019$), and respondents with a higher BMI intend to eat high-calorie snacks more than those with a lower BMI (ß = .117, $p = .049$). Perceived capacity is a unique determinant of not eating high-calorie snack behaviour (ß = -.261, $p < .001$). Across both groups AAR (E: $p > .10$; NE: $p = .088$), perceived autonomy (E: $p > .10$; NE: $p = .079$) AIR ($p > .10$) are not significant predictors of behaviour. Furthermore, intention is not significantly impacted by respondent weight related goal ($p < .10$), education level ($p < .10$), age (E: $p > .10$; NE: $p = .064$), or BMI (not eating only $p > .10$). A comparison of the structural relationships of the eating and not eating high-calorie snacks are presented in Figure 6.11. Together, these findings show that the extended direct measure model explains greater variance in intention when applied to eating high calorie snacks, but greater variance in behaviour when applied to not eating high calorie snacks (research question 3.4). Furthermore, AAR and AIR exhibit the same pattern of prediction across eating and not eating high calorie snack models (research aims 4.1 and 4.2).

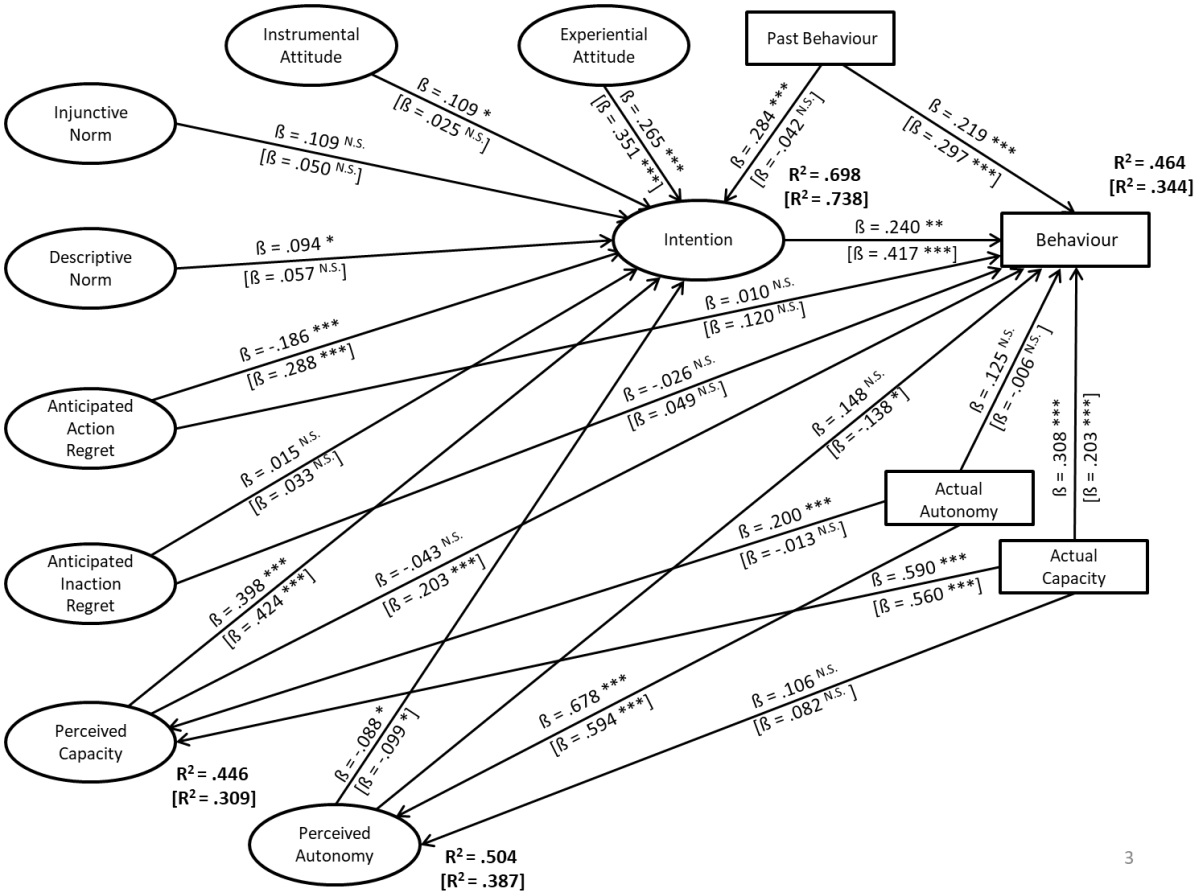

Figure 6.11 - Direct comparison of the eating and not eating high-calorie snack structural models

Notes: * p < .05, ** p < .01, *** p < .001, N.S. = not significant; eating [not eating] high-calorie snack model results

6.3.3.5 Assessing differences in the structural relationships of the eating and not eating high-calorie snack structural models

Model fit for the multi-group comparison of eating and not eating high-calorie snacks yields an acceptable fit to the data (χ^2 (954) = 2766.624, p < .001, CFI = .914, TLI = .893, RMSEA = .049. This shows that the parameters of the multi-group model operate fairly equivalently across groups. Chi-square difference tests were performed to determine whether the regression weights of the eating and not eating high-calorie snack models are significantly different. Overall the structural relations between eating and not eating high-calorie snack models are nonequivalent ($\Delta\chi^2$ (36) = 837.934, p < .001). The structural relationships between intention and AAR ($\Delta\chi^2$ (1) = 71.241, p < .001), and intention and past behaviour ($\Delta\chi^2$ (1) = 45.058, p < .001), actual autonomy and perceived autonomy ($\Delta\chi^2$ (1) = 8.986, p = .003), actual autonomy and perceived capacity ($\Delta\chi^2$ (1) = 6.675, p = .010) and perceived autonomy and behaviour ($\Delta\chi^2$ (1) = 5.298, p = .021) are variant across eating and not eating

high-calorie snack models. Conversely, the relationships between intention and experiential attitude (p = .086), instrumental attitude, injunctive norm, descriptive norm, perceived capacity, perceived autonomy, and AIR do not significantly differ (p > .10). The relations between actual capacity and perceived autonomy also do not differ (p > .10). Furthermore the relationships between behaviour and AAR (p = .069), past behaviour, intention, AIR, and perceived capacity (p > .10) are non-variant. Figure 6.12 presents an overview of these results. The findings identify that there are significant differences in the structural relationships of the extended direct measure TPB model, including that between AAR and intention (research questions 1.8 and 4.3).

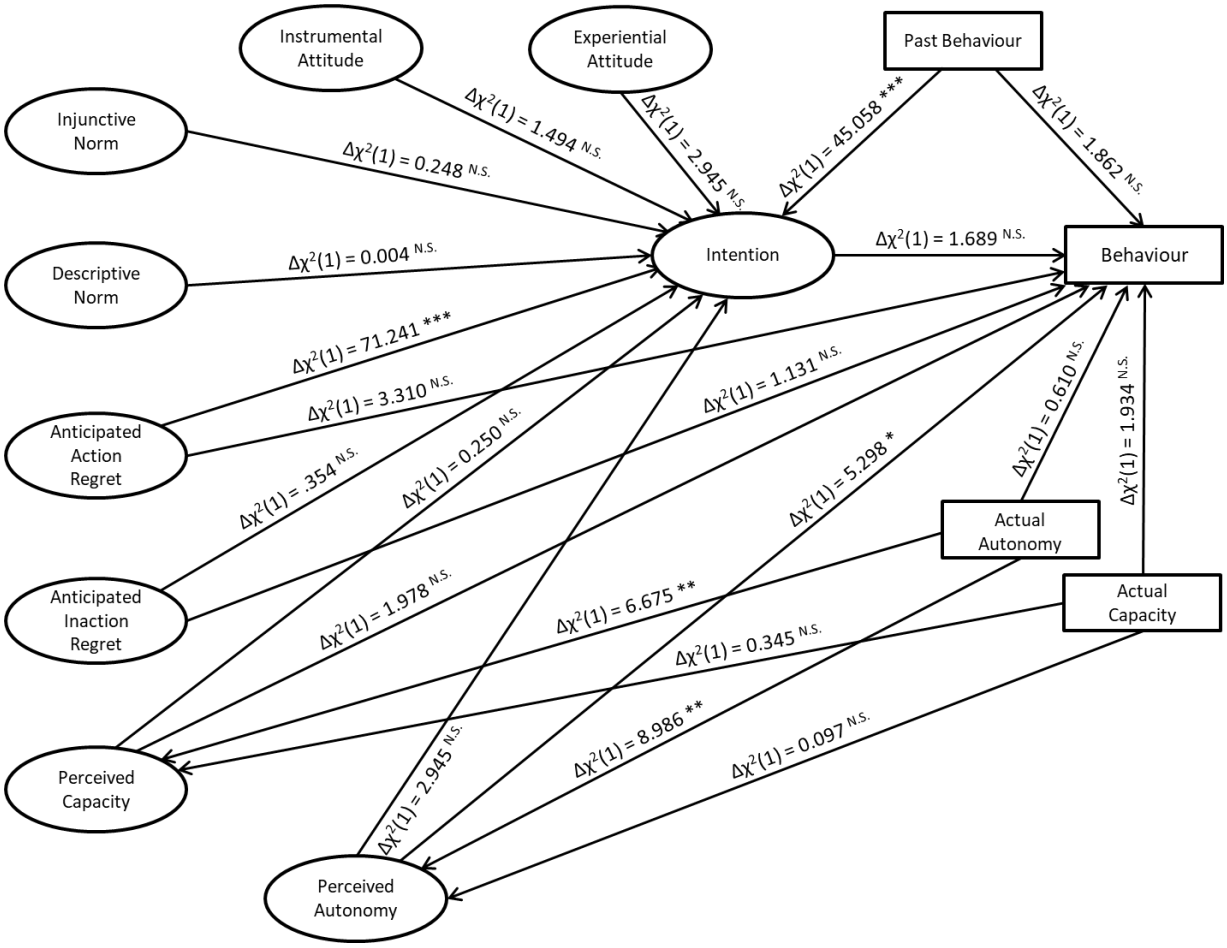

Figure 6.12 - Comparison of the structural relations between eating and not eating high-calorie snack models.

Notes: * p < .05, ** p < .01, *** p < .001, N.S. = not significant

6.3.3.6 Study 3.3 discussion

Measurement invariance was evaluated to establish the extent to which respondents' conceptualised items and constructs relating to eating and not eating high-calorie snacks in the same way (research question 1.4). Configural invariance was established across action and inaction models, showing that respondents conceptualised constructs relating to eating and not eating high-calorie snacks in the same way. Partial metric invariance was evidenced, indicating that responses to some questionnaire items differed across action and inaction models. Respondents therefore conceptualised some questionnaire items differently depending on whether they completed the questionnaire items about eating or not eating high-calorie snacks. Neither full nor partial scalar invariance was evidenced which shows that differences in latent and observed means were inconsistent across eating and not eating high-calorie snack models. Comparison of mean scores across eating and not eating high-calorie snack models cannot be meaningfully made (Byrne et al., 1989). These findings show that there are differences in the way respondents conceptualise and respond to questions about eating and not eating high-calorie snacks. This lends support to the argument that action and inaction are not strictly conceptually mirrored concepts within the TPB framework.

Intention and behaviour in regard to eating and not eating high-calorie snacks are influenced by both common and different determinants (research question 1.7). Of note is that the influence of perceived autonomy and perceived capacity on behaviour differs across action and inaction models. This shows that perceptions of control play a differential role in the prediction of eating and not eating high-calorie snack behaviour. These differences reflect the way in which eating and not eating high-calorie snacks differ considerably in terms of the prerequisite knowledge and effort required for action and inaction. Common determinants across action and inaction models tend to differ in their relative impact on intention and behaviour. These findings are consistent with those reported in study 3.2 and also with a number of previous studies that have applied the direct measure TPB model to action and inaction (Ajzen & Sheikh, 2013; Middlestadt et al., 2014; Richetin et al., 2012, 2011). Building upon these past studies, the present research sought to establish whether there are significant differences in the structural relationships of the extended direct measure model when applied to eating and not eating high-calorie snacks (research question 1.8). Overall, structural relationships of the action and inaction models are variant. This finding is consistent with that of study 3.2 as well as study 1.2, 2.2 and 2.3. The relationships between intention and AAR, intention and past behaviour, actual autonomy and perceived capacity,

actual autonomy and perceived autonomy, and perceived autonomy and behaviour are variant across eating and not eating high-calorie snack models. These findings identify that there are significant differences in a number of structural relationships of the extended direct measure model when applied to eating and not eating high-calorie snacks. Significant differences in these structural relationships show that intention and behaviour in regard to eating and not eating high-calorie snacks are not guided by the same underpinnings. Eating and not eating high-calorie snacks are, therefore, not psychologically mirrored concepts.

This study also sought to establish whether an extended direct measure TPB model operates differently when applied to eating and not eating high-calorie snacks (research question 3). Baseline model fit was considerably better for the eating than not eating high-calorie snack model. The not eating high-calorie snack model required more extensive model refinement which resulted in an acceptable fit to the data, whereas the eating high-calorie snack model required less refinement and resulted in a good fit to the data (research question 3.1). The psychometric properties of the eating and not eating high-calorie snack models were broadly equivalent with the exception of alpha, CR and AVE values of the injunctive norm and perceived autonomy constructs which were considerably lower in the not eating high-calorie model (research question 3.2). Similar psychometric properties across models for most constructs reflects the way in which these properties were assessed following model refinement. They therefore show that acceptable psychometric properties can be obtained for all constructs when the direct measure TPB model is applied to action and inaction. Poorer psychometric properties for the injunctive norm and perceived autonomy constructs identifies that the survey instrument did not operate as well when applied to not eating high-calorie snacks than eating high-calorie snacks. This may have occurred because respondents found questionnaire items harder to understand, it was more difficult to use mentally simulated scenarios as the basis for answering, or information retrieval occurred less readily (French et al., 2007) when questions related to inaction than to action.

The extended direct measure TPB model is also shown to operate differently due to the way in which actual capacity and actual autonomy moderate the intention-behaviour relationship across eating and not eating high-calorie snack models (research question 3.3). Actual capacity moderates the intention-behaviour relationship in the eating high-calorie snack model, whereas actual autonomy moderates the intention-behaviour relationship in the not

eating high-calorie snack model. The translation of intention into behaviour therefore differs for eating and not eating high-calorie snacks. Fishbein and Ajzen (2010) discuss the way in which the TPB can be applied to predict and understand both the performance and non-performance of a target behaviour. However, it is assumed that the TPB model will function in the same way regardless of whether it is applied to action or inaction. The present finding indicates that this may not always be the case. In many contexts action and inaction differ considerably in regard to the prerequisite resources, abilities and effort required to carry though an intention.

The extended direct measure TPB model explains a very high portion of variance in intention when applied to both eating and not eating high-calorie snacks (research question 3.4). Seven applications of the direct measure TPB model applied to action and inaction within the same study are identified in the literature (Ajzen & Sheikh, 2013: study 1 drinking and avoiding alcohol, study 2 eating and avoiding fast food; Middlestadt et al., 2014: to continue smoking and taking measures to not smoke; Richetin et al., 2012: study 1 and 2 reducing and not reducing resource consumption, 2011: study 1 eating meat and not eating plenty of meat; study 2 doing and not doing vigorous physical exercise). Across all of these applications, the direct measure TPB model is consistently found to explain greater variance in intention to perform the target behaviour than to not perform it. The finding that greater variance in intention is explained when an extended direct measure model is applied to inaction is, therefore, at odds with past literature and indeed the findings of study 1.2 and 2.3 of this thesis. It is important to note that the significance of the difference in R^2 values across models cannot be ascertained using SEM. Differences in regard to the variance explained in intention and behaviour across models is therefore tentatively discussed. However, the findings do indicate that the extended direct measure TPB model explains a different amount of variance in intention when applied to eating and not eating high-calorie snacks. This finding can be explained in regard to the feature positive effect. The feature positive effect posits that information processing tends to be more effective when it concerns action rather than inaction (e.g. Hearst, 1991; Rassin, 2014). However, when information relating to inaction is of high salience it may be processed as or more effectively than information relating to action (e.g. Astley et al., 2015; Beckmann & Young, 2007). People are assumed to hold highly accessible beliefs about both eating and not eating high-calorie snacks, although beliefs about not eating high-calorie snacks may be relatively more accessible in memory. As such, this may be reflected in the finding that the extended direct measure TPB

model explains a high portion of variance in both eating and not eating high-calorie snacks, but explains slightly more variance in intention to not eat high-calorie snacks.

A substantial portion of variance in behaviour is explained in the eating and not eating high-calorie snack models. The extended direct measure TPB model explains 44.6% of the variance in eating high-calorie snack behaviour and 33.6% of the variance in not eating high-calorie snack behaviour. The eating high-calorie snack model therefore better captures the factors that lead people to eat high-calorie snacks than to not eat them. Similarly, Richetin et al. (2011: study 1) found that an extended direct measure TPB model explained greater variance in behaviour when applied to predict eating than to not eating plenty of meat. Studies 2.2, 2.3, 3.2 of this thesis also identify a greater intention-behaviour gap when the model is applied to action than to inaction. One potential explanation for this finding is that intentions to act may be encoded and retrieved from memory more effectively than intentions to not act. Prospective memory is the process of remembering to do something at a particular time in the future (Kvavilashvili & Ellis, 1996), whereas negative prospective memory is the process of remembering to not do something at a particular time in the future (El Haj, Coello, Kapogiannis, Gallouj, & Antoine, 2017). Prospective memory posits that intentions lead to behaviour following a four stage process that covers encoding, retention, retrieval, and performance (e.g. Förster, Liberman, & Higgins, 2005; Goschke & Kuhl, 1993; Kvavilashvili & Ellis, 1996a). Research into the feature positive effect (e.g. Astley et al., 2015; Beckmann & Young, 2007) and the affirmation-negation asymmetry (e.g. Christensen, 2009; Glenberg et al., 1999) suggest that intentions to act may be encoded and retrieved from memory more effectively than intentions to not act, thus leading to greater intention-behaviour consistency when the extended direct measure TPB model is applied to eating rather than not eating high calorie snacks.

An alternative explanation for the differing intention-behaviour gap across eating and not eating high-calorie snack models is that the control factors that impact behaviour differ for action and inaction. An individual may only carry out their intention when they have sufficient actual control over performing or not performing the target behaviour (Fishbein & Ajzen, 2010). Actual behavioural control moderates the intention-behaviour relation in such a way that a stronger intention-behaviour relationship will be observed when actual behavioural control is high, and a weaker intention-behaviour relationship will be observed when actual behavioural control is low (Fishbein & Ajzen, 2010). People are likely to have a high degree

of control over eating high-calorie snacks because they are readily available, are often cheap to buy, and does not involve having to resist temptation or know about caloric values of snacks available. On the other hand, an individual may have a lower degree of actual control over not eating high-calorie snacks because this requires the individual to exert mental energy in resisting temptation, finding alternative options to satisfy cravings or hunger, and it can be more difficult to identify non-high-calorie snack options. This difference in actual control may lead to the larger intention-behaviour gap in the not eating high-calorie snack model relative to the eating high-calorie snack model.

Together, differences in model fit and refinement, psychometric properties, moderating role of actual capacity and actual autonomy on the intention-behaviour relation, and explanatory power across action and inaction models show that the extended direct measure TPB model does not operate in the same way when applied to eating and not eating high-calorie snacks.

This study also sought to investigate whether constructs of AR exert a differential influence on intention and behaviour in regard to eating and not eating high-calorie snacks (research question 4). AAR significantly influences intention to eat and not eat high-calorie snacks, but is not a significant predictor of behaviour in either model (research question 4.1). AIR does not significantly influence intention or behaviour in either model (research question 4.2). A similar pattern of AR is, therefore, observed across action and inaction models. However, the structural relationship between AAR and intention is significantly different across eating and not eating high-calorie snack models (research question 4.3). This shows that AAR exerts a differential influence on intention to eat and not eat high-calorie snacks which can be attributed to AAR exerting a stronger influence on intention to not eat high-calorie snacks than on intention to eat high-calorie snacks. According to Sandberg et al. (2016) AAR should exert a strong influence on intention to perform immediate hedonic behaviours whereas AIR may also be a significant but weaker predictor of intention. The finding that AAR significantly influences intention to eat high-calorie snacks is consistent with this position. Sandberg et al. (2016) further argue that for distal benefit behaviours, AIR should exert a stronger influence on intention than AAR. The finding that intention to not eat high-calorie snacks is influenced by AAR but not AIR is not consistent with this argument. The distal benefit and immediate hedonic behaviour categories outlined by Sandberg and Conner (2008) were identified in a meta-analysis of TPB studies that measure AR. Because most TPB studies examine the performance rather than non-performance of a target behaviour, these categories may not

adequately account for the way in which some behaviours are not performed in pursuit of positive future outcomes. Sandberg et al. (2016) posit that AIR will significantly impact intention to perform distal benefit behaviours because not acting will mean the individual may miss out on future positive outcomes associated with the behaviour. AAR is not expected to exert a strong influence on intention because acting does not forgo these positive future outcomes. This pattern of regret is less plausible when the target behaviour is not performed in pursuit of positive future outcomes because not performing the target behaviour is expected to lead to positive future outcomes. On the other hand, AAR would be expected to influence intention to not perform distal benefit behaviours because performing the behaviour would forgo the future positive outcome associated with inaction. As such, the distal benefit behaviour category may benefit from refinement such that a distinction is made between distal benefit action behaviours (mainly performed in pursuit of positive future outcomes) and distal benefit inaction behaviours (not performed primarily in pursuit of positive future outcomes). For the former behavioural category, AIR is expected to exert a stronger influence on intention than AAR. For the latter behavioural category, AAR would be expected to impact intention to a greater extent than AIR.

This study explored the application of the belief-based and extended direct measure TPB models to eating and not eating high-calorie snacks, a behavioural context for which people are assumed to hold more readily accessible beliefs about inaction than action. A limitation of this study is that people are likely to have highly accessible beliefs about both eating and not eating high calorie snacks. As such, comparing the application of the belief-based and extended direct measure model in this context may not fully identify aspects of the models that may operate differently in behavioural contexts with greater relative difference in belief accessibility. Future research should cross-validate the findings of this study by comparing the application of the belief-based and extended direct measure models to additional behavioural contexts for which people hold more readily accessible beliefs about inaction. In particular, this research should examine behavioural contexts with greater differential belief accessibility between action and inaction. A further limitation of this study is that it infers that beliefs people hold about not eating high-calorie snacks are relatively more accessible in memory than those they have bout eating high-calorie snacks. However, the relative accessibility of beliefs about eating and not eating high-calorie snacks was not empirically tested. The differential belief accessibility explanation for the way belief-based and extended direct measure TPB models operate differently when applied to action and inaction is therefore tentatively made. A deeper understanding of the differential operation of the TPB

models when applied to action and inaction would be gained by establishing the extent to which beliefs about action and inaction differ in accessibility for action and inaction in the contexts investigated.

6.4 Conclusion

This chapter has explored the application of the TPB framework to eating and not eating high-calorie snacks. This exploration was conducted across a belief-elicitation study and main TPB study which reported the findings of the belief-based and direct measure model analyses separately. Study 3 finds that the complementarity assumption does not hold in the context of high-calorie snack consumption. Differences are observed in the operation of both the belief-based and extended direct measure TPB models when applied to eating and not eating high-calorie snacks. Finally, anticipated action regret is shown to exert a differential influence on intention to eat and not eat high-calorie snacks within the extended direct measure TPB model.

Chapter 7 General Discussion

This chapter presents a discussion of the overarching findings of the 3 empirical studies presented in the thesis. The chapter begins by reiterating the aims of the research and how these aims were addressed (section 7.1). Section 7.2 outlines the main findings of the research, discusses these findings in the context of past literature, and offers possible explanations for the results obtained. The next section (7.3) clarifies the main contributions of the thesis and discusses the implications of its findings. Finally, section 7.4 highlights the most pertinent limitations of the research and suggests several avenues for future research.

7.1 Overview of the thesis aims and research undertaken

This thesis was undertaken to address four main aims. Specifically, these aims were (i) to test the complementarity assumption by establishing the degree to which action and inaction are distinct concepts within the TPB framework; to assess whether the belief-based (ii) and extended direct measure (iii) TPB models operate differently when applied to action and inaction; and (iv) to determine whether AR exerts a differential influence on intention and behaviour in regard to action and inaction within the extended direct measure TPB models. These aims are met across 3 empirical studies into blood donation (study 1, chapter 4), sunscreen use (study 2, chapter 5), and high-calorie snack consumption (study 3, chapter 6).

In belief-elicitation studies 1.1, 2.1, and 3.1 modal salient belief sets for action and inaction were compared to establish how far the belief-based foundations of action and inaction are conceptually mirrored or distinct (objective 1.1). Studies 2.2 and 3.2 explore the application of the belief-based TPB model to action and inaction in order to establish the extent to which performing and not performing target behaviours are guided by conceptually mirrored beliefs (objective 1.2); if distinct beliefs explain unique variance in intention not explained by mirrored beliefs alone (objective 1.3); whether respondents conceptualise and respond to

TPB constructs and questionnaire items in the same way when they relate to action and inaction (objective 1.4); whether the same determinants influence intention and behaviour when the belief-based TPB model is applied to action and inaction (objective 1.5); and if structural relationships are equivalent across action and inaction belief-based models (objective 1.6). These studies also evaluate whether the belief-based model operates in the same way when applied to action and inaction in regard to construct validity, indicator validity (objective 2.1) and predictive efficacy (objective 2.2). Studies 1.2, 2.3 and 3.3 explore the application of an extended direct measure TPB model to action and inaction. These studies explore whether the same determinants influence intention and behaviour across action and inaction models (objective 1.7), and if the structural relationships across action and inaction models are equivalent (objectives 1.8 and 4.5). Direct measure measurement models are compared to determine whether relative model fit (objective 3.1) and psychometric properties (objective 3.2) differ when the extended direct measure model is applied to action and inaction. The predictive efficacy of the extended direct measure model is also compared when applied to action and inaction (objective 3.4). Furthermore, these studies identify whether the moderating role of actual capacity and actual autonomy differ across action and inaction models (objective 3.3). Finally, studies 1.2, 2.3 and 3.3 also explored whether AR exerts a differential influence on intentions to act and not act when one behavioural alternative is a distal benefit behaviour and the other alternative is an immediate hedonic behaviour (objectives 4.1-4.4). In studies 1.2 and 2.3, performing the target behaviour constitutes a distal benefit behaviour and not performing the target behaviour is an immediate hedonic behaviour. In study 3.3, action is an immediate hedonic behaviour whereas inaction represents a distal benefit behaviour.

7.2 Discussion of the main findings across studies 1, 2 and 3

7.2.1 The psychological distinctness of action and inaction

There is a lack of consensus in the literature regarding the conceptual distinctness of action and inaction within the TPB framework. On the one hand it is acknowledged that action and inaction differ in regard to their TACT elements and therefore represent two different

behaviours. Indeed, Ajzen (2015) recently states that performing and not performing a target behaviour constitute two different behaviours because there may be considerable differences in the accessible beliefs that guide action and inaction. On the other hand, the reasoned action approach stipulates that when a choice is between two mutually exclusive and exhaustive alternatives it may be possible to understand the determinants of both action and inaction by investigating the determinants of only one of the two behaviours (Ajzen, 2017; Fishbein & Middlestadt, 1987). For such behavioural alternatives, it is assumed that assessing cognitions in regard to both action and inaction will not identify important additional information than when cognitions about only one of the two alternatives are assessed (Sutton, 2004). This complementarity assumption has led some researchers to draw inferences about the determinants of inaction based on information about the determinants of action, and to a lesser extent, vice versa (e.g. Forward, 2010). Contrary to the complementarity assumption studies 1.1, 2.1 and 3.1 show that modal salient beliefs about action and inaction are not conceptual opposites. Rather, modal salient belief sets for action and inaction are composed of distinct beliefs to at least a moderate degree (objective 1.1). Importantly, all modal salient behavioural, normative, and control belief sets contained distinct beliefs for both action and inaction in all 3 studies. Thus, neither action nor inaction is simply the conceptual opposite of the other behavioural alternative, and both action and inaction are associated with unique attributes. These results lend support to the view that action and inaction are not psychologically inverse concepts and people hold beliefs about action and inaction that are not conceptually mirrored. Control beliefs were found to be highly differentiated across all 3 behavioural contexts. This may reflect the way in which action and inaction often differ in regard to the degree to which they are active or passive. The more active alternative typically entails greater prerequisite resources, abilities and autonomy, whereas the more inactive alternative may depend on few or none of these factors.

7.2.1.1 Belief-based foundations of action and inaction

Study 2.2 finds that none of the modal salient beliefs that significantly inform their respective belief-based constructs are conceptually mirrored for action and inaction. In study 3.2 one mirrored belief of each belief type inform their respective constructs for both action and inaction, all other significant beliefs are distinct (objective 1.2). These findings are consistent with the work of Dodge and Jaccard (2008) whom identified that mostly different behavioural beliefs inform attitude toward using and abstaining from using performance enhancing substances. This thesis goes beyond the findings of Dodge and Jaccard (2008) by

comparing beliefs that significantly inform the behavioural, normative, and control belief constructs for action and inaction, rather than only behavioural beliefs. Studies 2.2 and 3.2 further identify that distinct beliefs in regard to action and inaction significantly raise the extracted variance in intention, over and above that explained by mirrored beliefs about action and inaction alone (objective 1.3). This finding emphasises that distinct beliefs exert an important influence on both action and inaction within the TPB. Mirrored beliefs between performing and not performing the behaviour do not capture all important information relating to both alternatives. Together, these findings show that the beliefs which underpin action and inaction are not largely conceptually mirrored. Distinct beliefs relating to action and inaction are important for gaining a comprehensive understanding of why people perform or do not perform a target behaviour. The distinction between action and inaction within the TPB framework is consistent with research showing people perform and do not perform a given behaviour for different reasons (Chatzidakis et al., 2016; Richetin et al., 2011: study 2) and these different reasons exhibit discriminant validity (Chatzidakis et al., 2016).

7.2.1.2 Differences in the conceptualisation of action and inaction

This thesis extends the extant literature by exploring measurement invariance across direct measure action and inaction models. Studies 1.2, 2.3 and 3.3 examine measurement model invariance when the extended direct measure model is applied to action and inaction. Configural invariance was established across all 3 studies, showing that respondents conceptualised the constructs relating to action and inaction in the same way within a given context. Partial metric invariance was also evident in these studies. This indicates that responses to some questionnaire items differed between action and inaction models (Steenkamp & Baumgartner, 1998). As such, respondents did not conceptualise all items in the same way when they referred to performing and not performing the target behaviour. Finally, partial scalar invariance was not evidenced in any of the studies which shows that differences in latent and observed means were inconsistent across action and inaction models (Steenkamp & Baumgartner, 1998). Comparison of mean scores across action and inaction models cannot therefore be meaningfully made (Byrne, Shavelson, & Muthén, 1989). Together, findings of measurement model invariance testing highlights that there are significant differences in the way respondents conceptualise and respond to questions relating to action and inaction. This lends support to the argument that performing and not performing a behaviour are related yet distinct concepts within the TPB framework.

7.2.1.3 Differences in the determinants of intention and behaviour across action and inaction models

This thesis further explores the psychological distinction of action and inaction within the TPB by identifying whether the determinants of intention and behaviour are significantly different across action and inaction models. No previous studies have compared the belief-based determinants of action and inaction within the TPB framework. Several previous studies have reported that different determinants influence intention when the direct measure TPB model is applied to action and inaction (Ajzen & Sheikh, 2013; Middlestadt et al., 2014; Richetin et al., 2011). However, these studies have not directly compared action and inaction models to establish whether these differences are significant. It is therefore not possible to draw conclusions about differences in the determinants of intention for action and inaction in these studies. To address this gap in knowledge, multi-group comparisons of the structural belief-based and extended direct measure TPB models were conducted to identify whether the determinants of intention and behaviour are significantly different for action and inaction.

Studies 2.2 and 3.2 explore the application of the belief-based TPB model to action and inaction. The studies find that the determinants of intention and behaviour can differ across action and inaction models (objective 1.4). Study 2.2 identifies that the significance of the structural paths between the behavioural belief construct and intention, the normative belief construct and intention, and the control belief construct and behaviour differ across using and not using sunscreen models. In study 3.2 there are differences in the significance of the relationships between the normative belief construct and intention as well as the control belief construct and behaviour. Similar to the results of the belief-based models, studies 1.2, 2.3 and 3.3 find that different determinants can significantly impact intention (study 1.2, 2.3 and 3.3) and behaviour (studies 2.3 and 3.3 only) when extended direct measure TPB models are applied to action and inaction (objective 1.6). In study 1.2 the significance of the relationship between subjective norm and intention, and AIR and intention differ across donating and not donating blood models. In study 2.3 structural paths between attitude and intention, intention and behaviour, PBC and behaviour, and actual autonomy and PBC differ in the using and not using sunscreen models. Study 3.3 also identified differences in the significance of determinants of intention and behaviour across eating and not eating high-calorie snack models. The significance of the relationship between intention and instrumental attitude, descriptive norm, and past behaviour differ, as well as structural relations between perceived capacity and behaviour, and perceived autonomy and

behaviour. Furthermore, the relationships between actual autonomy and perceived capacity differ in their significance across action and inaction models.

The finding that the significance of relationships can differ when the TPB is applied to action and inaction is consistent with the results of several previous TPB studies (Ajzen & Sheikh, 2013; Middlestadt et al 2014; Richetin et al. 2011; Richetin et al. 2020). In one such study, Ajzen and Sheikh (2013: study 1) find that the significance of the subjective norm-intention and PBC-intention relationships differ for drinking and avoiding drinking alcohol. In their second study, the significance of the attitude-intention and PBC-intention relation is different across eating and avoiding fast food models (Ajzen & Sheikh, 2013: study 2). Richetin et al. (2011: study 2) identified that the significance of the attitude-intention and subjective norm-intention relationships differ across doing and not doing vigorous physical activity models. It should be noted, however, that not all studies evidence differences in the significance of structural relationships when applying extended TPB models to action and inaction (e.g. Richetin et al. 2011: study 1).

Studies 3.2 and 3.3 also show that the relative influence of common determinants of intention and behaviour can differ between action and inaction models. For example, in study 3.2 the behavioural and control belief constructs are both significant predictors of intention to eat and not eat high-calorie snacks. However, the control belief construct is the stronger predictor of intention to eat high-calorie snacks whereas the behavioural belief construct is a stronger predictor of intention to not eat high-calorie snacks. In study 3.3 the strongest predictor of eating high-calorie snack behaviour is actual capacity followed by intention, past behaviour and perceived autonomy, whereas the strongest predictor of not eating high-calorie snack behaviour is intention followed by past behaviour, perceived capacity then actual capacity. A difference in the relative weight of significant structural paths across action and inaction models was also evidenced by Middlestadt et al. (2014) whom identified that PBC was the strongest predictor of intention to continue smoking cigarettes followed by attitude whereas PBC is a weaker predictor of intention to take measures not to smoke cigarettes than attitude.

Differences in the weight and significance of relationships when the TPB is applied to action and inaction is consistent with the results of the belief-elicitation studies (1.1, 2.1 and 3.1)

which show that the beliefs people hold about action and inaction are not strictly conceptually mirrored. Fishbein and Ajzen (2010) stipulate that it is the readily accessible beliefs people hold about performing or not performing a behaviour that go on to inform their attitude, subjective norm, and PBC in regard to that behaviour. Such differences in the underlying factors that motivate action and inaction are therefore apparent in the differential significance of the relationships within the TPB when it is applied to performing and not performing a target behaviour, and the relative weight of paths that are significant across both action and inaction models.

Comparing the determinants of intention and behaviour across action and inaction models is insightful. However, the identification that a structural relationship is significant for one behavioural alternative and not the other does not evidence that there is a significant difference in the structural path across action and inaction models. Multi-group comparisons were used to examine whether the structural equivalence of paths within the belief-based (study 2.2 and 3.2) and extended direct measure (studies 1.2, 2.3 and 3.3) action and inaction models significantly differ. Table 7.1 provides a summary of the chi-square difference tests across action and inaction models for studies 1.2, 2.2, 2.3, 3.2 and 3.3. None of the belief-based or extended direct measure structural models are equivalent when applied to action and inaction. The structural path between the behavioural belief construct and intention was found to significantly differ across eating and not eating high-calorie snack models (study 3.2). Whilst the relationship between the behavioural belief construct and intention is significant in both models, the relationship is stronger in the inaction model. The normative belief-intention relation is non-equivalent in study 2.2 which is because the normative belief construct significantly impacts intention in the using sunscreen model, but not in the not using sunscreen model. The normative belief-intention path is also significantly different in study 3.2 because the relation is not significant in the eating high-calorie snack model, but is significant in the not eating high-calorie snack model. The PBC-intention structural path is significant in both donating and not donating blood direct measure models (study 1.2), however, this path is non-equivalent because PBC exerts a stronger influence on intention to donate blood than to not donate blood. The PBC-intention relation is also significant in both using and not using sunscreen direct measure models (study 2.3). This relationship is stronger in the not using sunscreen model than in the using sunscreen model.

There is a significant difference in the structural path between PBC and intention in studies 1.2 and 2.3. In the blood donation study (1.2) this is because PBC exerts a stronger influence on intention to donate blood than to not donate blood. In study 2.3 this is due to the way in which PBC is a stronger predictor of intention to not use sunscreen than to use sunscreen. The AIR-intention relationship is non-equivalent in study 1.2 and 2.3. In study 1.2 the relationship between AIR and intention is significant in the donating blood model, but not in the not donating blood model. In study 2.3 this is because the AIR-intention relationship is stronger in the using sunscreen than not using sunscreen model. There is also a significant difference in the structural path between AAR and intention in study 3.3 due to the way in which AAR exerts a stronger impact on intention to not eat high-calorie snacks than to eat them. Finally, there is a significant difference in the structural path between PBC and behaviour in study 2.3, as well as between perceived autonomy and behaviour in study 3.3. In the sunscreen model (study 2.3) PBC is a significant determinant of intention to use sunscreen, but not of intention to not use sunscreen. In the high-calorie snack consumption study (study 3.3) perceived autonomy significantly impacts intention to not eat high-calorie snacks whereas the relationship between perceived autonomy and eating high-calorie snack behaviour is non-significant.

Overall, the results show that the determinants of intention and behaviour are not the same for action and inaction. The complementarity assumption does not hold in the behavioural contexts studied and lends further support to the conceptual distinctness of action and inaction within the TPB. Of particular note is that some structural relationships were non-equivalent across behavioural contexts. These findings suggest that significant differences in the equivalence of structural paths across action and inaction models may not all be behaviour specific. Rather, they may reflect more systematic differences in the way people conceptualise and respond to items in regard to action and inaction.

Table 7.1 - Summary of the main relationships and chi-square difference tests across studies 1.2, 2.2, 2.3, 3.2 and 3.3

	Model	**Action (Do)**	**Inaction (Not-do)**	**Chi-sq diff**
Attitude → Intention				
Blood donation (Study 1)	Belief-based model	(not examined)	(not examined)	(not examined)
	Direct model	NS (independently refined model) Sig (direct comparison model)	NS	NS
Sunscreen use (Study 2)	Belief-based model	NS [Sig]	Sig [Sig]	NS [not examined]
	Direct model	NS	Sig	NS
High-calorie snacks (Study 3)	Belief-based model	Sig [Sig]	Sig [Sig]	Sig [not examined]
	Direct model (experiential attitude)	Sig	Sig	NS
	Direct model (instrumental attitude)	Sig	NS	NS
SN → Intention				
Blood donation (Study 1)	Belief-based model	(not examined)	(not examined)	(not examined)
	Direct model	NS	Sig	NS
Sunscreen use (Study 2)	Belief-based model	Sig [Sig]	NS [Sig]	Sig [not examined]
	Direct model	NS	NS	NS
High-calorie snacks (Study 3)	Belief-based model	NS [NS]	Sig [Sig]	NS [not examined]
	Direct model (descriptive norm)	Sig	NS	NS
	Direct model (injunctive norm)	NS	NS	NS
PBC → Intention				
Blood donation (Study 1)	Belief-based model	(not examined)	(not examined)	(not examined)
	Direct model	Sig	Sig	Sig
Sunscreen use (Study 2)	Belief-based model	Sig [Sig]	Sig [Sig]	NS [not examined]
	Direct model	Sig	Sig	Sig
High-calorie	Belief-based model	Sig	Sig	NS

snacks (Study 3)	Direct model (perceived capacity)	Sig	Sig	NS
	Direct model (perceived autonomy)	Sig	Sig	NS
AR → Intention				
Blood donation (Study 1)	Belief-based model	(not examined)	(not examined)	(not examined)
	Direct model	Sig (AIR)	NS (AIR)	Sig (AIR)
Sunscreen use (Study 2)	Belief-based model	(not examined)	(not examined)	(not examined)
	Direct model	Sig (AIR)	Sig (AIR)	Sig (AIR)
High-calorie snacks (Study 3)	Belief-based model	(not examined)	(not examined)	(not examined)
	Direct model (AAR)	Sig	Sig	Sig
	Direct model (AIR)	NS	NS	NS
PBC → Behaviour				
Blood donation (Study 1)	Belief-based model	(not examined)	(not examined)	(not examined)
	Direct model	(not examined)	(not examined)	(not examined)
Sunscreen use (Study 2)	Belief-based model	NS	Sig	NS
	Direct model	Sig	NS	Sig
High-calorie snacks (Study 3)	Belief-based model	NS	Sig	NS
	Direct model (perceived capacity)	NS	Sig	NS
	Direct model (perceived autonomy)	NS	NS (Sig in direct comparison model)	Sig
AR → Behaviour				
Blood donation (Study 1)	Belief-based model	(not examined)	(not examined)	(not examined)
	Direct model	(not examined)	(not examined)	(not examined)
Sunscreen use (Study 2)	Belief-based model	(not examined)	(not examined)	(not examined)
	Direct model	NS	NS	NS
High-calorie snacks (Study 3)	Belief-based model	(not examined)	(not examined)	(not examined)
	Direct model (AAR)	NS	NS	NS
	Direct model (AIR)	NS	NS	NS

Note: [mirrored model]

An interesting finding is that the behavioural belief construct (belief-based model) and attitude (direct measure model) were not consistently identified as significant predictors of intention across all applications of the belief-based and direct measure models. Table 7.1 presents the attitude-intention relationships across all studies reported in this thesis. The behavioural belief construct is a significant predictor of intention in three of the four applications of the belief-based model reported in this thesis. Study 2.2 finds that the behavioural belief construct is a significant predictor of intention to not use sunscreen, but not of intention to use sunscreen. Study 3.2 shows that the behavioural belief construct significantly influences intention to both eat and not eat high-calorie snacks. In the direct measure models, attitude was not a significant predictor of intention to donate or not donate blood (study 1.2). Attitude also did not exert a significant influence on intention to use sunscreen, but did significantly impact intention to not use sunscreen (study 2.3). In study 3.3 experiential attitude significantly influenced intention to both eat and not eat high-calorie snacks. Instrumental attitude was a significant predictor of intention to eat high-calorie snacks, but not intention to not eat high-calorie snacks. Collectively, these findings are inconsistent with the results of several meta-analyses that have found attitude to be the strongest predictor of intention across studies (e.g. McEachan et al. 2011; Rise et al. 2010; Rivis & Sheeran 2003). It is plausible, however, that the non-significant relations between the behavioural belief construct and intention (study 2.2), and attitude and intention (study 2.3 and 3.3) reported in this thesis are attributed to contextual factors.

Constructs relating to control, including PBC and self-efficacy, are most often reported as the strongest predictor of intention to donate blood in the TPB literature (Armitage & Conner, 2001; Faqah, Moiz, Shahid, Ibrahim, & Raheem, 2015; Giles & Cairns, 1995; Godin et al., 2005; Masser, White, Hyde, Terry, & Robinson, 2009; Veldhuizen, Ferguson, de Kort, Donders, & Atsma, 2011). For example, Godin et al. (2005) found that attitude was a weak significant predictor of intention to donate blood, with both PBC, factors facilitating action, AR, and moral norm exerting a stronger influence than attitude. In another study, Veldhuizen et al. (2011) found that self-efficacy was the strongest predictor of intention, whereas cognitive attitude and moral norm only marginally contributed to the prediction of intention.

The relationships between the behavioural belief construct and intention to use sunscreen (study 2.2) and between attitude and intention to use sunscreen (study 2.3) are non-significant. These findings contrast with various past studies that show attitude is a

significant predictor of intention to use sunscreen (e.g. Martin, Jacobsen, Lucas, Branch, & Ferron, 1999; Myers & Horswill, 2006), although not all studies report that attitude exerts a strong impact on intention. For example, Hillhouse (1997) found that PBC was the strongest predictor of intention to use sunscreen, whereas attitude and subjective norm were shown to exert a weak but significant influence on intention. It is important to note that many of the studies examining sunscreen use within the TPB framework collect data from Australian respondents (e.g. White et al. 2014), whereas study 2 collected data from respondents residing in the US. There are also differences in the constructs assessed across the sunscreen use TPB studies. For example, White et al. (2014) examined the standard TPB constructs in addition to group norm, personal norm, and personal choice/responsibility. Differences in the role of attitude across TPB sunscreen studies may, therefore, reflect differences in the factors that motivate different groups to use sunscreen and when accounting for different constructs within the TPB model. In contrast, it is interesting that the current research finds significant relationships across both belief-based and direct measure models in predicting intention to 'not use sunscreen'.

In the behavioural context of high-calorie snacks (study 3.2 and study 3.3), more consistent (significant) influences of attitude on intention are found, where only instrumental attitude fails to significantly influence intention to not snack. In particular, experiential attitude exerts a strong significant influence on intention to both eat and not eat high-calorie snacks. These findings suggest factors associated with the experience (e.g., enjoyable/unenjoyable; pleasant/unpleasant) of high calorie-snack consumption play a key role in people's intention to eat and not eat high-calorie snacks whereas evaluations of the consequences (e.g., beneficial/harmful; healthy/unhealthy) may play a lesser role regarding not eating high-calorie snacks. Indeed, a review of the behavioural beliefs that exert a significant influence on intention to eat high-calorie snacks reported in study 3.2 of this thesis cover experiential beliefs 'more energy', 'satisfying my cravings and hunger' and 'less energy'. Instrumental belief 'gaining weight' was the only instrumental belief that significantly impacted intention to eat high-calorie snacks. In turn, behavioural beliefs that significantly influenced intention to not eat high-calorie snacks covered 'feeling better about myself' and 'make me have cravings and hunger'. As such, the beliefs that underlie not eating high-calorie snacks are experiential in nature, rather than instrumental.

Strong evidence for the psychological distinctness of action and inaction within the TPB is evident across the 3 behavioural contexts investigated. This is an important finding because it highlights that inferences made about the determinants of inaction based on those about action may be invalid and lead to an inaccurate understanding of the motivating factors that influence inaction. Behaviour change interventions based on this information may, in turn, be largely ineffective because they may not tackle the most pertinent beliefs that guide inaction. Understanding why people do not perform a given behaviour can be as important as understanding why they do perform it (Michaelidou & Hassan, 2014). The present research therefore draws attention to a considerable dearth of knowledge about the factors that motivate inaction because most TPB research has focused on understanding the performance of target behaviours.

7.2.2 Evaluation of whether the belief-based and extended direct measure models operate differently when applied to action and inaction

This thesis sought to identify whether the belief-based and extended direct measure TPB models operate differently when applied to action and inaction (aims 2 and 3, respectively). A substantial body of literature has identified an asymmetry in information processing whereby information relating to action and inaction (e.g. Eerland et al., 2012; Hearst, 1991; Newman et al., 1980; Rassin, 2014), and affirmation and negation (e.g. Bianchi et al., 2011; Carpenter et al., 1999; Christensen, 2009; Mayo et al., 2004) is not processed equivalently. Such research suggests that there may be differences in the availability (the existence of a trace in memory for a given concept) and accessibility (the ease with which the concept comes to mind when relevant) of cognitions people hold about action and inaction (Rajagopal et al., 2006). No previous research has explored whether such an asymmetry occurs within the TPB framework. The belief-based TPB model is largely underutilised in the literature and no previous studies have applied the model to both action and inaction within the same context. Several studies have applied the direct measure TPB model to action and inaction, however (Ajzen & Sheikh, 2013; Middlestadt et al., 2014; Richetin et al., 2012, 2011). These studies are conducted with the assumption that the TPB functions in the same way when used to predict and understand the decision to perform and not perform a given behaviour. Furthermore, few studies have empirically examined the moderating role of actual behavioural control on the intention-behaviour relationship within the TPB (Carrington, Neville, & Whitwell, 2010; Hassan, Shiu, & Shaw, 2016). While some studies evidence a

moderating role of ABC on the intention-behaviour relation (e.g. Sheeran et al., 2003) others do not (e.g. Hassan et al., 2016). There is, therefore, a dearth in knowledge regarding the nature of the moderating role of ABC across different contexts. This thesis builds upon past literature by conducting the first in-depth evaluation of whether the belief-based and extended direct measure TPB models operate differently when applied to action and inaction. It is also the first to investigate whether ABC moderates the intention-behaviour relationship differently for action and inaction within the same behavioural context. Furthermore, this thesis investigates the moderating role of actual capacity and actual autonomy separately to gain further insight into the way in which actual control factors influence the intention-behaviour relation for action and inaction.

7.2.2.1 Comparing the belief-based and extended direct measure measurement models when applied to action and inaction

Overall, studies 2.2 and 3.2 find that indicator and construct validities were superior in the action than inaction belief-based models (objective 2.1). This indicates that the action questionnaires were more effective in capturing the important beliefs that inform the belief-based constructs than the inaction questionnaires (Bollen, 1989). The modal salient belief sets for action also captured the essence of their respective constructs to a greater extent than in the inaction models (Diamantopoulos & Winklhofer, 2001). In study 2.2 all indicator and construct validities were higher in the action than inaction model, except that the indicator validity of the control belief construct was greater in the inaction model. In study 3.2 differences in construct and indicator validities for the belief-based constructs were less consistent. Indicator and construct validities were high for all belief-based constructs in the action model. Lower indicator validity was evidenced for the behavioural and control belief items in the inaction model, whereas the normative belief items exhibited similar indicator validity across action and inaction models. Construct validity of the behavioural and control belief constructs were much lower in the inaction model, whereas the inaction model accounted for a greater portion of variance in the normative belief construct. These findings suggest that the belief-based TPB model is more effective in capturing important beliefs that influence belief-based constructs in regard to action than in regard to inaction. It is also shown that the modal belief sets relating to action tend to capture the essence of their respective constructs to a greater extent than those relating to inaction. However, this is not always the case and indicator and construct validities in the inaction model can be similar or exceed those in the action model.

Studies 1.2, 2.3 and 3.3 compare the application of extended direct measure TPB models to action and inaction. These studies identify that when refined independently, measurement model fit was superior in the action than inaction models. In turn, the inaction models required more extensive refinement to achieve a good fit to the data (objective 3.1). The action questionnaires therefore generated data that reflected the meaning of the underlying construct better than the inaction questionnaires. The finding that psychometric properties of the action and inaction models are broadly equivalent was unanticipated, but not surprising, considering these properties were assessed following model refinement (objective 3.2). As such, the psychometric properties reported in the thesis reflect the way in which, after removing the most problematic indicators of the action and inaction models, constructs tend to exhibit an acceptable level of reliability and construct validity for both behavioural alternatives.

Insight into why the belief-based and extended direct measure TPB models operate more effectively when applied to action than inaction may be gleaned from two think aloud studies by French et al. (2007). French et al. (2007) required participants to vocalise their thoughts while completing a TPB questionnaire on either increasing physical activity or binge drinking. The questionnaires contained both belief-based and direct measures of all standard TPB constructs in regard to performing the target behaviour. The research identified that whilst most people were able to answer most questions without issue, participants each encountered problems completing at least some questions. These problems are likely to be exasperated when respondents answer questions relating to inaction. One problem identified by French et al. (2007) is that participants found it difficult to comprehend some questions due to their complexity. For example, a group of participants found it difficult to express disapproval with questions that were negatively phrased. As such, when questionnaire items are more complex they appear to be more difficult to respond to. Carpenter et al. (1999) argue that greater cognitive resources are required to process negations than affirmations because they are more linguistically complex. Several other factors contribute to the complexity of negations. Most behaviours investigated using the TPB are unipolar in nature and are therefore assumed to be processed according to the schema plus-tag model (Mayo et al., 2004). The schema plus-tag model posits that affirmations are processed in a single step involving only the core supposition of the message. Therefore, the meaning of affirmations are usually processed effectively. In contrast, negations are processed over two steps within a schema that refers to the core supposition of the message. This core supposition is processed in the first step and is then labelled with a negation operator that

signals that the message is false in the second step (Mayo et al., 2004). Negations are more likely to activate incongruent concepts than affirmations because, when the second step is not completed effectively, the meaning of the negation can be erroneously interpreted in line with the core supposition of the message (Gawronski et al., 2008; Mayo et al., 2004). Responding to questions relating to a negation may also be more complex than responding to questions in regard to an affirmation because negations are more difficult to understand. Most behavioural contexts investigated within the TPB framework, and indeed the studies reported in this thesis, are unipolar in nature because they do not have a clearly defined opposite schema that may be drawn upon to interpret the negation (e.g. the way in which 'hot' brings to mind 'cold'). Without this opposite schema, it is more difficult to understand the meaning of the negation (Mayo et al., 2004). Furthermore, people sometimes use mentally simulated scenarios to answer TPB questionnaire items (French et al., 2007). It is more difficult to mentally represent negated information than it is affirmative information (Howard, 1975). It is reasonable to assume that people will find questionnaire items easier to respond to when they are simpler to read, clearer to understand, evoke a set of beliefs that are consistent with the target behaviour referred to, and can easily be considered in metal simulations. As such, the relative difference in the complexity of affirmation and negation may explain why the belief and direct measure measurement models operate more effectively when applied to the affirmed rather than negated behavioural alternative.

French et al. (2007) further identified that participants experienced challenges with information retrieval for some belief-based and direct measure items. Participants expressed that their answer depended on information not provided in the question or that they did not have sufficient knowledge or beliefs to adequately answer the question. This suggests that some questionnaire items do not evoke sufficient beliefs for participants to confidently provide an answer. Respondents may encounter greater problems with information retrieval when answering questions relating to inaction than action because inactions are more ambiguous concepts (Bianchi et al., 2011). Affirmations clearly identify the target to which the individual must consider and will therefore evoke beliefs associated with that particular target. Conversely, negations are comparatively unclear because they inform the individual as to what they should think about not doing, without providing a specific target as to what they should think about doing (Bianchi et al., 2011). As such, beliefs that are readily accessible in regard to performing a behaviour are likely to be clear and focused on a specific target, whereas beliefs that are readily accessible in regard to not performing a target behaviour may be more ambiguous and less focused. It is also more difficult to make

logical inferences about negations than affirmations (e.g. Evans & Lynch, 1973; Wason, 1961) and to form associations between a present and an absent stimuli than between two present stimuli (Hearst, 1991; Rassin, 2014). This could mean that the belief-based foundations of inactions are formed less readily and with less accuracy than for actions (e.g. Newman et al., 1980). French et al. (2007) further identified that challenges with information retrieval stemmed from participants utilising more than one mentally generated scenario when answering a given question. Participants indicated that their answer would depend on which of these mentally simulated scenarios they referred to. On one hand, the greater ambiguity associated with negations may mean that people consider a greater number of mentally generated alternative situations when completing a questionnaire about inaction. On the other hand, people have greater difficulty in mentally representing negated information (Howard, 1975) which may mean it is more challenging to use these mentally generated scenarios to respond to questions about inaction. Respondents could reasonably be expected to find it easier to answer TPB questionnaire items that are clear, guide thought toward a specific target and therefore elicit a set of relevant and focused beliefs, where logical inferences about the target behaviour are readily drawn, and when mentally simulated situations can be used effectively to aid in answering the question. It is therefore likely that people will typically encounter greater difficulty with information retrieval when answering TPB questionnaire items in regard to inaction than action.

Research on the action-inaction asymmetry provides a plausible explanation for why the belief-based and extended direct measure measurement models tend to perform more effectively when applied to action than to inaction. However, several other findings need to be addressed. Specifically, why the indicator validity for the PBC construct is greater in the not using sunscreen model than in the using sunscreen model (study 2.2); why indicator validity of the normative belief construct was equivalent across action and inaction measurement models; and why greater construct validity was exhibited for the normative belief construct in the not eating high-calorie snack model (study 3.2). These findings suggest that TPB questionnaire items are not always more challenging to complete when they assess inaction rather than action. Literature on the feature-positive effect identifies that it is more challenging to use non-occurrences as the basis for efficient and appropriate information processing than using occurrences. Associations are learned more readily when they occur between two occurrences than between an occurrence and a non-occurrence (Rassin, 2014). Furthermore, information relating to inaction is noticed and used less-readily in decision-making than that relating to action (Eerland & Rassin, 2012). The most widely

accepted explanation for the feature-positive effect is that occurrences are more salient than non-occurrences (Hearst, 1991; Hearst & Wolff, 1989; Newman et al., 1980). Several studies have identified that when inactions are more salient than actions, the feature-positive effect can be reduced or eliminated (Astley et al., 2015; Beckmann & Young, 2007; Rassin, 2014). Following this literature, it is plausible that difficulties associated with completing the TPB questionnaires in regard to inaction are minimised, but not eliminated, when cognitions relating to inaction are highly accessible in memory.

Donating blood is a behavioural context for which most people are likely to have highly accessible beliefs. This is because the act of donating blood provides many opportunities for memory imprinting to occur. In order to donate blood an individual must register as a blood donor, book an appointment, and then attend the appointment. Sensory memory traces are likely to be formed when the individual experiences the act of donating blood. Donating blood often evokes strong emotions, most notably pride, which are likely to leave strong memory traces. The accessibility of beliefs about donating blood may increase with repeated exposure to communications from blood services, such as text messages informing them that their donation has been issued. Individuals who have not donated blood are also likely to hold accessible beliefs about donating blood based on their awareness of what the blood donation process involves. For example, non-donors are shown to believe that donating blood will be painful and make the individual feel nervous and tense (Lemmens et al., 2005). Accessibility of beliefs held by non-donors about blood donation is likely to be increased with repeated exposure to marketing communication from the blood service, such as adverts promoting blood donation or specific blood drives in their local area. In contrast, beliefs people have about not donating blood are likely to be less accessible than those they hold about donating blood. Whilst people may not donate blood often, it is unlikely these events will activate an object-evaluation and therefore reinforce beliefs about not donating blood. Not donating blood requires nothing of the individual and does not involve a sensory experience. Because the specific outcomes of not donating blood are unknown and involve other people they are less likely to provoke thought and strong affective reactions. Beliefs about donating blood are, therefore, more likely to be highly accessible than beliefs about not donating blood. As such, respondents are likely to encounter more challenges when answering the TPB questionnaire in regard to inaction. This is consistent with the finding that the direct measure measurement model was superior when applied to donating blood than not donating blood in study 1.2.

The beliefs people hold about using sunscreen may usually be more accessible in memory than those they hold about not using sunscreen. Using sunscreen often involves a series of steps that include acquiring the product, ensuring it is available when it is needed, and actually applying it when required. Applying sunscreen is also a sensory experience that many people find unpleasant due to factors such as its unpleasant scent and making the skin appear oily. Individuals who do not use sunscreen also appear to share knowledge of these factors. Fewer opportunities for memory imprinting occur in regard to not using sunscreen because it requires no prerequisite resources or abilities and no effort on the individual's part. However, strong memory traces are likely to be formed if an individual sustains sunburn, pain, or skin damage as a result of not using sunscreen. In such circumstances not using sunscreen may result in highly accessible beliefs. Accordingly, respondents are likely to encounter more difficulty, overall, in completing TPB questionnaire items in regard to not using sunscreen than for using sunscreen. However, some cognitions relating to not using sunscreen may be highly accessible in memory. Questions relating to such highly accessible cognitions may not be as challenging to respond to. This argument is consistent with the findings of study 2.2 and 2.3 wherein belief-based and extended direct measure measurement models were generally superior for using than not using sunscreen.

The differential belief accessibility for actions and inactions is likely to be less distinct for high-calorie snack consumption than for blood donation and sunscreen use. Eating high-calorie snacks involves a positive sensory experience for the individual. Positive memory traces may occur due to the pleasure and satisfaction experienced having eaten high-calorie snacks, but people may encounter negative emotions such as guilt or shame. Many people also eat high-calorie snacks frequently which may increase the accessibility of beliefs people hold about eating high-calorie snacks. Not eating high-calorie snacks often requires the individual to exert considerable self-control and effort to ensure any snacks consumed are not high-calorie. Furthermore, not eating high-calorie snacks can involve stronger sensory experiences of hunger and cravings in addition to both positive and negative emotive memory content in the forms of feeling pride at not engaging in unhealthy behaviour but negative in terms of frustration or sadness. Due to this, repeatedly not eating high-calorie snacks may involve the repeated activation of the association in memory, thus making beliefs about not eating high-calorie snacks highly accessible. In study 3.2 the belief-based measurement model was generally superior for the action model, but not consistently so. These results are consistent with research showing that when cognitions about inaction are highly salient, the feature positive effect may be reduced (Astley et al., 2015; Beckmann &

Young, 2007; Rassin, 2014). As such, respondents may encounter fewer challenges when answering TPB questionnaire items when they relate to beliefs that are highly accessible in memory about not eating high-calorie snacks.

Overall, evaluation of the belief-based and extended direct measure measurement models suggests that TPB questionnaire items are more challenging to respond to when they relate to action than inaction because it is more difficult to process information about inaction than action. However, this difficulty may be reduced when beliefs about inactions are highly accessible in memory, perhaps because such highly accessible beliefs provide the respondent with a stronger basis to interpret and answer questions in regard to inaction.

7.2.2.1.1 Comparison of the belief-based structural model when applied to predict intention to act and not act

Studies 2.2 and 3.2 find that the belief-based TPB model explains a high portion of variance in intention when applied to both action and inaction. Across these studies the explained variance in intention ranges from 56.5% to 75.5%. The belief-based TPB model is therefore highly effective in identifying important factors that influence intention to both perform and not perform target behaviours. In the previous section it was discussed that when applied to inaction, the belief-based models tend to exhibit lower indicator and construct validity than when applied to action. This suggests that modal salient belief sets may include a larger pool of beliefs that do not inform the belief-based construct, resulting in poorer validity in these models. However, these belief sets are still found to capture pertinent beliefs relevant to the belief-based construct and therefore result in a model with a high degree of predictive validity.

It was expected that the belief-based TPB model would explain greater variance in intention when applied to action than to inaction due to the action-inaction asymmetry. However, study 2.2 and 3.2 find that greater variance in intention is explained by the belief-based model when applied to inaction. When refined independently, the belief-based using and not using sunscreen models accounted for 56.5% and 63.9% of the extracted variance in intention, respectively. The eating high-calorie snack model explained 65.1% of the variance in intention, whereas the not eating high-calorie snack model explained 75.5%. A plausible explanation for this finding lies in the nature of the indirect measures utilised in the belief-

based models. Indirect measures capture more reasoned and thought out responses than direct measures (Ajzen, 1991). As such, indirect measures have the potential to tap into not only the beliefs that spontaneously come to mind when the individual thinks about the behaviour (i.e. readily accessible beliefs), but also additional beliefs retrieved from memory in a more effortful manner (Fishbein & Ajzen, 2010). The individual may consider forgotten information or make new inferences based on the information they hold about the behaviour. This can cause beliefs that were not previously accessible to become so in response to the belief-based questionnaire items. Furthermore, these newly-accessible beliefs sometimes become important determinants of attitude, subjective norm, and PBC (Fishbein & Ajzen, 2010).

People are likely to hold more readily accessible beliefs about using sunscreen than not using sunscreen. These readily accessible beliefs should capture a large portion of the important factors that influence the individual's attitude, subjective norm, and PBC in regard to using sunscreen. The belief-based measures may therefore prompt few previously inaccessible beliefs to become accessible about using sunscreen. Previously inaccessible beliefs that do become accessible in response to the belief-based measures may not provide much additional information that is not already accounted for by the existing readily accessible belief set. As such, few of these newly-accessible beliefs may go on to influence intention to use sunscreen. On the other hand, beliefs people hold about not using sunscreen are relatively less-accessible in memory than those held about using sunscreen. By prompting the respondent to think more deeply about not using sunscreen, the belief-based measures may lead to the formation of new beliefs based on information held about not using sunscreen in memory. Because there are important consequences associated with not using sunscreen (e.g. greater risk of sunburn, sun damage, premature aging, and skin cancer), these emergent accessible beliefs may be more likely to go on and inform attitude, subjective norm, and PBC because they capture information not already fully captured in the readily accessible belief set. This may result in the belief-based model explaining greater variance in intention in regard to not using sunscreen than in regard to using sunscreen.

People are assumed to hold highly accessible beliefs about both eating and not eating high-calorie snacks, although it is argued that beliefs about not eating high-calorie snacks will be relatively more accessible in memory. Thinking more deeply about eating and not eating high-calorie snacks may lead to the formation of new beliefs about both behaviours. Not

eating high-calorie snacks is associated with more certain and enduring outcomes (e.g. cravings, hunger, having to resist eating high-calorie snacks), whereas eating high-calorie snacks may be associated with more uncertain (e.g. weight gain) and momentary outcomes (e.g. enjoyment of taste, convenience). Newly accessible beliefs may therefore be more likely to go on and influence attitude, subjective norm, and PBC in regard to not eating high-calorie snacks. The belief-based model would therefore explain greater variance in intention to not eat high-calorie snacks than to eat high-calorie snacks. Alternatively, it is plausible that the belief-based measures will result in few previously inaccessible beliefs to become accessible in regard to either behaviour. Newly formed beliefs that do become accessible in memory may not provide important information about either behaviour that is not already accounted for by the readily accessible belief sets. The belief-based model in study 3.2 would therefore explain greater variance in intention to not eat high-calorie snacks than for eating high-calorie snacks because beliefs about not eating high-calorie snacks are more accessible in memory.

7.2.2.1.2 Comparison of extended direct measure structural models when applied to predict intention to act and not act

Studies 1.2 and 2.3 find that greater variance in intention is explained when the extended direct measure model is applied to action than to inaction. The donating and not donating blood models explain 65% and 51% of the variance in intention, respectively. The using sunscreen model accounts for 66.2% of the variance in intention whereas the not using sunscreen model explains 55%. Seven applications of the direct measure TPB model applied to both action and inaction within the same study are reported in the literature (Ajzen & Sheikh, 2013: study 1 drinking and avoiding alcohol, study 2 eating and avoiding fast food; Middlestadt et al., 2014: to continue smoking and taking measures to not smoke; Richetin et al., 2012: study 1 and 2 reducing and not reducing resource consumption, 2011: study 1 eating meat and not eating plenty of meat; study 2 doing and not doing vigorous physical exercise)[1]. Across these applications the TPB is consistently shown to explain greater variance in intention when applied to action than to inaction. In contrast, study 3.3 identifies that greater variance in intention is explained when the extended direct measure model is

[1] Richetin et al. (2011) report 3 applications of the direct measure TPB model when applied to action and inaction. However, study 3 investigates breastfeeding and formula feeding which do not constitute an action-inaction pairing.

applied to inaction. The eating high-calorie snack model predicts 69.8% of the variance in intention whereas the not eating high-calorie snack model accounts for 74.8% of the variance in intention. It is not possible to determine whether differences in the prediction of intention across action and inaction models are significant. The findings do, however, suggest that the extended direct measure TPB model does not operate equivalently when applied to predict intention to act and not act.

Research into the feature positive effect provides the most plausible explanation for why the extended direct measure TPB model tends to—but does not always—explain greater variance in intention when applied to action than inaction. Information processing is more challenging and less-efficient when it is based on non-occurrences than when it is based on occurrences (e.g. Hearst, 1991; Rassin, 2014). The feature positive effect has been attributed to the way in which occurrences tend to be more highly salient than non-occurrences. Information relating to inactions may be perceived as less relevant to the behaviour than information about action, and is therefore not attended to effectively during decision-making. However, when information relating to inaction is highly salient the feature positive effect may be reduced or eliminated so that information about inaction is processed equally or more effectively than that relating to action (Astley et al., 2015; Beckmann & Young, 2007; Johnston et al., 1990; Rassin, 2014). As previously discussed, people are expected to hold more readily accessible beliefs about donating blood, using sunscreen, and not eating high-calorie snacks than they are about not donating blood, not using sunscreen, and eating high-calorie snacks. The TPB posits that it is the readily accessible beliefs an individual holds about a behaviour that go on to inform attitude, subjective norm, and PBC in regard to that behaviour (Fishbein & Ajzen, 2010). Accordingly, the TPB may afford superior prediction of intention to donate blood, using sunscreen, and not eating high-calorie snacks because people possess a relatively more accessible belief set about these behaviours. These highly accessible beliefs mean a broader array of factors that influence intention will be accounted for, thus leading to greater prediction of intention to perform the behaviour. In contrast, a smaller portion of variance in intention may be explained in the not donating blood, not using sunscreen, and eating high-calorie snack models because the beliefs people hold about these behaviours may be less accessible in memory. As such, these models less effectively capture factors that impact intention and explain a lower portion of variance in intention.

7.2.3 Comparison of the belief-based and extended direct measure models when applied to predict action and inaction behaviour

Across studies 2.2 and 3.2 greater variance in behaviour is accounted for when the belief-based models are applied to action than inaction (objective 2.2). Greater variance in behaviour is also explained when the extended direct measure model is applied to action than inaction in studies 2.3 and 3.3 (objective 3.4). Together, these findings suggest that the TPB operates more effectively when applied to predict action than inaction behaviour. Richetin et al. (2011: study 1) also identified that greater variance in behaviour was explained when the direct measure TPB model was applied eating than not eating plenty of meat. A consistent finding across studies 2.2, 2.3, 3.2 and 3.3 is that there is a greater intention-behaviour gap when the belief-based and extended direct measure TPB models are applied to inaction than to action. Whether or not intentions lead to corresponding behaviour is an important issue in TPB research (Sniehotta, Scholz, & Schwarzer, 2005). A growing body of literature is focused on measuring the extent of this intention-behaviour gap, as well as identifying why people do not behave consistently with their intentions (e.g. Hassan et al., 2016). Despite this investigation, factors that impact the intention-behaviour relation remain poorly understood.

A wealth of research has been conducted into prospective memory which is defined as either “remembering to do something at a particular moment in the future or as the timely execution of a previously formed intention” (Kvavilashvili & Ellis, 1996b, p. 25). In contrast, only recently has research began to explore negative prospective memory—the process of remembering to not do something in response to a target cue (El Haj et al., 2017; Pink & Dodson, 2013). Nevertheless, prospective memory provides a tentative explanation for the finding that greater variance in behaviour is accounted for when the belief-based and extended direct measure models are applied to action than to inaction. Prospective memory theory holds that intentions lead to behaviour following a four stage process of encoding, retention, retrieval, and performance (Kvavilashvili & Ellis, 1996b). Encoding involves storing aspects of a newly formed intention in memory, such as what to do, where to do it, and when to do it (Fishbein & Ajzen, 2010). Retention of a prospective memory involves the inhibition of interference from activities performed between the encoding of the intention and the opportunity to enact the intention (Kvavilashvili & Ellis, 1996b). The retrieval phase is where an appropriate opportunity occurs to carry out an intention. Retrieval of an intention requires

the individual to respond to situational cues relevant to one or more of the encoded aspects of the intention. For example, intention to donate blood may be retrieved upon the receipt of a flyer advertising dates of a blood drive in the individual's local area. Situational cues are often, however, more subtle. An intention-superiority effect is identified in the literature whereby representations of intentions have a higher level of activation in long-term memory and decay more slowly than other memory content. More persistent and accessible representation of intention in memory is believed to enhance monitoring of the environment for intention-relevant cues (Förster et al., 2005; Goschke & Kuhl, 1993). Performance entails the individual responding to the intention in an appropriate way and at an appropriate time. Intention is only expected to predict behaviour in situations where the intention is successfully encoded, retained in memory effectively, retrieved in response to situational cues, and acted upon at an appropriate occasion (Fishbein & Ajzen, 2010).

There are several ways in which differences in the encoding and retrieval of intentions to act and not act may impact the intention-behaviour relation within the TPB. Firstly, prospective memory performance is shown to decrease with greater processing load and attentional demands, both at the time of intention encoding and retrieval (Einstein, Smith, McDaniel, & Shaw, 1997). Processing negations is more complex and entails greater cognitive demand than processing affirmations (Carpenter et al., 1999). It may therefore be more challenging to effectively encode intentions to not perform a target behaviour in memory than it is to effectively encode intention to perform the target behaviour. Secondly, encoding intentions to not perform a behaviour may be less effective than when encoding intentions to perform a behaviour because people form associations more readily when they are between two present stimuli than between a present and absent stimuli (e.g. Hearst, 1991; Rassin, 2014). Thirdly, people are relatively inattentive to information about inaction compared to that about action. Present information is utilised more readily in decision-making (e.g. Eerland & Rassin, 2012) and perceived to be more causal in nature than information about inaction (Snyder & Swann, 1978). Several studies also show that people are more perceptive of changes in their environment when they concern an addition to the environment than a deletion from the environment (Hearst, 1991; Miranda et al., 1992). Such differences in information processing for action and inaction suggest that people may be more sensitive to situational cues in their environment that relate to an intention to perform a behaviour than an intention to not perform a behaviour. As such, intentions in regard to performing a behaviour may be retrieved from memory in response to situational cues more readily than those relating to inaction. Finally, several studies suggest that the action-inaction asymmetry

may be reduced or eliminated when inactions (and negations) are highly salient (Astley et al., 2015; Beckmann & Young, 2007; Glenberg et al., 1999; Johnston et al., 1990; Lüdtke & Kaup, 2006; Rassin, 2014). However, Pink and Dodson (2013) argue that people exhibit particular issues with prospective memory commission errors (i.e. failure to act upon an intention to not perform a behaviour) when they encounter prospective cues that have previously been associated with a behaviour performed regularly—such as not eating high-calorie snacks. Overall, past literature suggests that action intentions may be encoded and retrieved from memory more effectively than inaction intentions, thus leading to greater intention-behaviour correspondence when the belief-based and extended direct measure TPB models are applied to action than inaction.

An alternative explanation for the differential intention-behaviour gap evident across studies 2.2, 2.3, 3.2 and 3.3 is that actual behavioural control factors influence action and inaction differently. Intentions may only be carried out successfully in circumstances where the individual has sufficient actual control over performing or not performing the target behaviour (Fishbein & Ajzen, 2010). Actual behavioural control is purported to moderate the intention-behaviour relationship such that the intention-behaviour relation is stronger when actual behavioural control is high, but weaker when actual behavioural control is low (Fishbein & Ajzen, 2010). Studies 2.3 and 3.3 find that actual capacity and actual autonomy moderate the intention-behaviour relation differently across action and inaction models (objective 3.3). In study 2.3 actual capacity moderates the intention-behaviour relationship in the using sunscreen model, but not in the not using sunscreen model. Actual autonomy moderates the intention-behaviour relationship at all levels in the using sunscreen model, but only when actual autonomy is at a high or average level in the not using sunscreen model. In study 3.3, the intention-behaviour relation is moderated by actual capacity but not actual autonomy in the eating high-calorie snack model, and actual autonomy but not actual capacity in the not eating high-calorie snack model. These findings identify that actual capacity and actual autonomy both moderate the intention-behaviour relationship in the contexts of sunscreen use and high-calorie snack consumption. However, the moderating role of actual capacity and actual autonomy on the intention-behaviour relationship is different across action and inaction models. These findings indicate that actual control factors influence the way in which intention leads to behaviour differently for performing and not performing the target behaviour. As such, the distinction between action and inaction within the TPB framework is not limited to internal processes and can fundamentally differ due to external forces.

Overall, the studies reported in this thesis suggest that the belief-based and extended direct measure TPB models do not operate equivalently when applied to action and inaction. Differences in the operation of the TPB are apparent across measurement and structural models. Furthermore, the pattern with which actual capacity and actual autonomy moderate the intention-behaviour relationship within the action and inaction models appears to differ. The findings suggest that respondents encounter greater challenges when answering TPB questionnaire items in regard to inaction than to action. Measures should be taken during questionnaire construction to mitigate the challenges faced by respondents when responding to items in regard to inaction. However, further research is necessary to identify particular aspects of the TPB questionnaire items that make responding to items more difficult in regard to inaction than action. Researchers must also use caution when drawing comparisons between applications of the TPB to action and inaction, even within the same study where the same instrument is used to asses both behavioural alternatives. The research also emphasises the utility of the belief-based TPB model when an understanding of the determinants of a behaviour are sought. The belief-based model may, therefore, be particularly useful when addressing the dearth in knowledge regarding the determinants of inaction.

7.3 The role of anticipated regret within the extended direct measure TPB model

This thesis aims to establish whether AR exerts a differential influence on intention and behaviour when an extended direct measure TPB model is applied to action and inaction (research aim 4). There is ongoing debate in the literature regarding the role of AR within the TPB framework. Ajzen and Sheikh (2013) argue that the enhanced prediction of intention often provided by AR in TPB studies may be attributed to the incompatible measurement of the standard TPB constructs and that of AR. At the time that the research detailed in this thesis was undertaken, no research had cross-validated the findings of Ajzen and Sheikh (2013) which is important considering the modest sample sizes utilised in the study. Sandberg et al. (2016) have since shown that AR can exert a significant influence on intention both when measured compatibly and incompatibly with the TPB constructs. Sandberg et al. (2016) argue that AR may influence intention differently depending on whether the target behaviour is an immediate hedonic or distal benefit behaviour. This

assertion has important implications for the exploration of the TPB when applied to action and inaction because performing and not performing a behaviour often constitute different behaviour types (i.e. within a given context action is an immediate hedonic behaviour and inaction is a distal benefit behaviour, or vice versa). As such, AR should exert a differential influence on intention to perform and not perform target behaviours.

A limitation of Sandberg et al.'s (2016) study is that it examined the role of anticipated action and inaction regret in regard to performing a target behaviour, but not in regard to not performing the behaviour. As such, it is not known whether the pattern of regret outlined in the study holds when the TPB is applied to inaction. This is an important consideration because the degree to which people experience regret differs when a negative outcome arises due to an error of commission than from an equally negative error of omission (e.g. Baron & Ritov, 1994; Gleicher et al., 1990; Kahneman & Tversky, 1982b; Landman, 1987; N'gbala & Branscombe, 1997; Ritov & Baron, 1995). According to norm theory, affective responses to outcomes are influenced by the perceived normality of the outcome. Greater regret is expected to follow a negative outcome stemming from an 'abnormal' behaviour than a 'normal' behaviour. Actions are viewed as abnormal, and inactions normal, unless there are compelling reasons to act (Kahneman & Tversky, 1982a). It is important to note that outcomes relating to action and inaction are unlikely to result in an equally negative outcome. Instead, action and inaction may result in very different outcomes which will sometimes be of different valence. However, norm theory provides valuable insight into the way in which the regret anticipated in regard to action and inaction may differ.

Study 1.2 explores the role of AIR on intentions to donate and not donate blood (objective 4.1). Study 2.3 investigates the influence of AIR on intentions and behaviour in regard to using and not using sunscreen (objectives 4.1 and 4.2). Study 3.3 examines the impact of AAR and AIR on intention and behaviour for eating and not eating high-calorie snacks (objectives 4.1-4.4). Across all three studies, support is found for the differential influence of AR on intention to perform and not perform the target behaviour. Study 1.2 shows that AIR exerts a significant influence on intention to donate blood, but not on intention to not donate blood. The structural relationship between AIR and intention was significantly different across action and inaction models. Thus, AIR exerts a significantly different influence on intention for donating and not donating blood. Study 2.3 found that AIR significantly impacts intention and behaviour in the using sunscreen model, but only intention in the not using

sunscreen model. The structural relationship between AIR and intention is significantly different across models. Conversely, the structural relationship between AIR and behaviour is not significantly different. Thus, AIR influences intention differently for using and not using sunscreen, but its influence on behaviour across behavioural alternatives does not differ. In study 3.3 AAR significantly influences intention to both eat and not eat high-calorie snacks, but does not significantly influence behaviour for either alternative. An examination of the structural relationship between AAR and intention identifies that this relationship is significantly different in the eating and not eating high-calorie snack models. AIR does not significantly influence intention or behaviour in the eating and not eating high-calorie snack model. Together, the three studies reported in this thesis provide strong support for the differential influence of AR on intentions to act and not act within the TPB (aim 4).

The results show that AR was a significant predictor of intention across 5 of the 6 applications of the direct measure TPB model reported in this thesis. The results are broadly consistent with a meta-analysis by Sandberg and Conner (2008) in which it AR was a significant predictor of intention across 25 applications. A further meta-analysis shows that constructs capturing anticipated affect significantly enhanced the prediction of intention in the TPB model (Rivis et al. 2009). However, AIR was not a significant predictor of intention to not donate blood in study 1.2. One explanation for this finding is that AR may not be an important determinant of intention for all behavioural decisions. Alternatively, intention to not donate blood may be influenced by AAR rather than AIR which was not assessed in the study. Sandberg et al. (2016) argue that while AR may be an important determinant of intention for most behavioural contexts, the type of regret (AAR or AIR) that will influence intention depends on whether the target behaviour is an immediate hedonic or distal benefit behaviour. As not donating blood is an immediate hedonic behaviour, it is plausible that intention to not donate blood is influenced by the anticipation of regret relating to negative outcomes of donating blood for the individual themselves, such as feeling anxious or encountering a vasovagal reaction rather than more ambiguous negative outcomes for other people. This explanation is supported by the findings of study 3.3 in which AAR, but not AIR, was a significant predictor of intention to both eat and not eat high calorie snacks. Overall, the present research lends support to previous research that identifies AR as an important additional determinant of intention within the TPB.

Study 2.3 found that AIR was not significant predictor of using or not sunscreen behaviour. Study 3.3 identified that neither AAR nor AIR was a significant predictor of eating and not eating high-calorie snack behaviour. These findings are reflective of those in the literature where AR is a significant determinant of behaviour in some studies (Abraham & Sheeran, 2003; e.g. Sheeran & Orbell, 1999) but not in others (Cooke, Sniehotta, & Schüz, 2007). In their meta-analysis, Sheeran and Conner (2008) note that AR was a significant predictor of behaviour in all 8 applications included in the review. AR was identified as a significant predictor of behaviour before, but not after, past behaviour was included in the model. Of particular interest is that Sandberg et al. (2016) find that neither AAR nor AIR significantly influenced distal benefit behaviours (study 1). In their second study which covered both distal benefit and immediate hedonic behaviours, however, the authors report that AR was a significant predictor of behaviour. Simple slopes analysis showed that AAR was a strong significant predictor of immediate hedonic behaviours, but a weak non-significant predictor of distal benefit behaviours. These findings partially contrast those of this thesis wherein AR was not found to significantly predict intention to use sunscreen (a distal benefit behaviour) nor intention to not use sunscreen (an immediate hedonic behaviour). The findings of study 3.3 of this thesis also contrast with those of Sandberg et al. (2016) because the AR-behaviour relationship was not significant for eating high-calorie snacks which is an immediate hedonic behaviour nor not eating high-calorie snacks which is a distal benefit behaviour.

The differential influence of AR on intention to perform and not perform target behaviours outlined in this thesis cannot be attributed to the incompatible measurement of AR and the standard TPB constructs. Study 1.2 finds that AIR significantly influences intention when measured incompatibly, but not compatibly, with the standard TPB constructs. This is consistent with the results of two studies presented by Ajzen and Sheikh (2013). However, studies 2.3 and 3.3 both show that AR can significantly impact intention when AR and the standard TPB constructs are measured in regard to the same behavioural alternative. Specifically, study 2.3 identifies that AIR is a significant predictor of intention to not use sunscreen, whereas in study 3.3 AAR significantly impacts intention to eat high-calorie snacks. These findings support earlier research that has identified that AR can significantly influence intention to perform a behaviour when measured compatibly with the standard TPB constructs (Sandberg et al., 2016). This thesis extends the work of Sandberg et al. (2016) by demonstrating that AR may significantly influence both intention to perform and not perform a given behaviour when measured compatibly with the TPB constructs.

The TPB posits that beliefs about the affective outcomes of a behaviour constitute behavioural beliefs. Accordingly, AR represents a partial, affective estimate of attitude toward the behaviour which concerns the possible affective outcomes relating to the behaviour (Fishbein & Ajzen, 2010). When the standard TPB constructs and that of AR are measured incompatibly, the model captures both a general attitude toward performing (or not performing) the behaviour in addition to a partial, affective attitude toward not performing (performing) the behaviour (Ajzen & Sheikh, 2013). By tapping into attitudes toward two different behaviours, the model is expected to explain greater variance in intention than if only attitude toward the target behaviour was captured (Ajzen & Sheikh, 2013). The findings of study 2.3 and 3.3 are at odds with this incompatible measurement explanation because they show that AR can enhance the prediction of intention when only one general attitude is captured in the study (i.e. where general attitude (captured by the standard attitude construct) and affective attitude (captured by the measure of AR) relate to the same behavioural alternative). Instead, the findings of study 2.3 and 3.3 support the view that the TPB does not adequately account for affective influences on the decision-making process and extending the TPB to include AR serves to address this shortcoming (e.g. Conner et al., 2013; Sandberg & Conner, 2008).

As discussed earlier in this section, Sandberg et al. (2016) present an alternative explanation for the role of AR within the TPB. Sandberg et al. (2016) argue that AR may exert a differential influence on intention when a behaviour is a distal benefit or immediate hedonic behaviour. Distal benefit behaviours are posited to be influenced by AIR because not performing the target behaviour may result in the loss of valued future positive outcomes. AAR is not expected to exert as strong an influence on intention for distal benefit behaviours because performing the behaviour leads to immediate outcomes that are more mixed in valence and are not as important to the individual. When measured simultaneously in the same model, AIR is expected to exert a stronger influence on intention than AAR (Sandberg et al., 2016). Both AAR and AIR are argued to influence intention for immediate hedonic behaviours, although AAR is thought to exert the stronger influence. Regret may be anticipated for action because performing the behaviour could result in important but negative future outcomes. AIR could also occur because not performing the behaviour may lead to the individual forgoing positive immediate outcomes (Sandberg et al., 2016).

Of the contexts investigated in this thesis, not donating blood, not using sunscreen, and eating high-calorie snacks may be categorised as immediate hedonic behaviours. Not donating blood ensures the individual will avoid any negative hedonic sensory or affective experience, such as pain while donating or fear about the donation process. However, not donating blood forgoes the distal benefit of helping other people and the experience of positive emotions such as pride. By not using sunscreen an individual can avoid the negative sensory experience of applying and wearing sunscreen, such as the skin feeling oily or uncomfortable, but may also lead to an increased risk of skin cancer and other skin damage in the future. Eating high-calorie snacks provides the opportunity for an individual to enjoy a positive sensory and affective experience but may also lead to weight gain and health-related illness in later life. Study 1.2 and 2.3 extended the direct measure TPB model with a measure of AIR, but not of AAR. The finding that AIR does not significantly impact intention to not donate blood, but does exert a significant influence on intention to not use sunscreen are both consistent with the behaviour type argument. Study 3.3 extends the direct measure TPB model with measures of both AAR and AIR. AAR, but not AIR, was shown to significantly influence intention to eat high-calorie snacks. This result is consistent with the notion that AAR should exert a stronger influence on intention to perform immediate hedonic behaviours than AIR when modelled together. Overall, the three studies reported in this thesis lend support to the view that AAR and AIR may exert a significant influence on intention for immediate hedonic behaviours. Furthermore, the pattern of regret outlined by Sandberg and colleagues (2008; 2016) is fitting both when the TPB is applied to action and inaction.

Donating blood, using sunscreen, and not eating high-calorie snacks may be categorised as distal benefit behaviours. A key motivation to donate blood is the prospect of helping individuals in need of blood or blood products in the future. Using sunscreen is typically motivated by a desire to remain healthy and avoid sunburn, skin cancer, and other skin damage. Not eating high-calorie snacks is motivated by a range of factors that involve remaining healthy in the long-term, such as to become or maintain a healthy weight. According to Sandberg et al. (2016) these behaviours should be influenced by AIR, whereas AAR (captured in study 3.3 only) is not expected to exert a strong influence on intention. Consistent with this argument, AIR is a significant predictor of intention to donate blood and use sunscreen. However, AIR is not shown to exert a significant influence on intention to not eat high-calorie snacks. Instead, in study 3.3 it is AAR that significantly impacts intention. This unexpected finding may have occurred because the immediate hedonic and distal

benefit behaviour categories outlined by Sandberg and Conner (2008) do not adequately account for the full spectrum of behaviours investigated within the TPB—most notably inaction. Specifically, the distal benefit behaviour category may not account for the way in which some behaviours are not performed in pursuit of positive outcomes in the future. Sandberg et al. (2016) argue that regret will be anticipated in regard to inaction for distal benefit behaviours because not acting may forgo the future positive outcomes associated with the behaviour. However, when a behaviour is not performed in pursuit of positive future outcomes this pattern of regret is implausible. Instead, people are much more likely to anticipate regret in regard to performing the behaviour as this may compromise the potential future outcomes associated with inaction. Accordingly, behaviour type categories could be extended to take into account the way in which AR may influence intention to perform and not perform a behaviour differently for distal benefit behaviours. Drawing from the behaviour type categories outlined by Sandberg and Conner (2008) two distal benefit behaviour categories are proposed. Firstly, distal benefit action behaviours represent those behaviours mainly performed because they lead to important positive outcomes in the future, but may also involve more immediate outcomes that are less positive or are mixed in valence. For such behaviours AIR should influence intention to perform the behaviour because not performing the behaviour may lead to the loss of important positive future outcomes. Distal benefit inaction behaviours are those mainly not performed because inaction leads to important positive outcomes in the future, but may also involve more immediate outcomes that are less positive or are mixed in valence. For distal benefit inaction behaviours it is AAR that is expected to influence intention to not perform the behaviour because action may lead to the loss of important positive future outcomes.

The research presented in this thesis demonstrates that AR exerts a differential influence on intention to perform and not perform target behaviours. The role of AR within the TPB cannot be attributed to the incompatible measurement of AR and the standard TPB constructs. Results of study 1.2 and 2.3 support the view that anticipated inaction regret may significantly impact intention for immediate hedonic behaviours. This extends previous research by identifying that this pattern of regret holds when the TPB is applied to action and inaction. However, study 3.3 identifies that the distal benefit behaviour category outlined by Sandberg and Conner (2008) does not adequately account for the way in which AR impacts intention to not perform distal benefit behaviours. An extension of the behaviour type categories for AR is therefore proposed. Future research into distal benefit inaction

behaviours may find that incorporating a measure of AAR accounts for important affective influence on intention.

7.4 Theoretical contributions of the thesis

This thesis presents the first in-depth exploration of the TPB framework when applied to action and inaction. The research makes several important theoretical contributions to the TPB literature. To date there has been a lack of clarity regarding the conceptual relation between action and inaction within the TPB framework. One view presented in the literature is that when a choice is between two mutually exclusive and exhaustive alternatives, it should be possible to explain the determinants of both action and inaction from the identification of the determinants of only one of the two behaviours (Ajzen, 2017; Fishbein & Middlestadt, 1987). As such, the decision to perform and not perform a behaviour are regarded as conceptually mirrored concepts. An alternative view is that the psychological distinctness of action and inaction is context-dependent because a different set of beliefs may influence action and inaction (Ajzen, 2015; Fishbein & Ajzen, 2010). In some behavioural contexts, the beliefs that guide action and inaction will be conceptually mirrored, whereas in others they may be highly distinct. However, no studies have sought to establish the contexts for which action and inaction will be underpinned by conceptually mirrored or distinct beliefs. The validity of the complementarity assumption is therefore unknown. This thesis addresses this gap in knowledge in several key ways. The research identifies that the beliefs people hold about action and inaction are not conceptually mirrored across three behavioural contexts with different characteristics. Instead, people hold both mirrored and distinct beliefs about action and inaction. Dodge and Jaccard (2008) identify that different behavioural beliefs inform attitude toward performing and not performing a behaviour. The present research builds upon this finding by establishing that a different set of beliefs inform attitude, subjective norm, and PBC for action and inaction. As such, each of the antecedents of intention has a different belief-based foundation in regard to performing and not performing the behaviour. Deepening our understanding of the belief-based foundations of action and inaction further, the research identifies that whilst people may hold mirrored beliefs about action and inaction, these mirrored beliefs rarely inform the antecedents of intention for both action and inaction. Therefore, simply identifying that people hold mirrored

beliefs about action and inaction is not sufficient to determine that the belief-based foundations of action and inaction are conceptually mirrored. Importantly, distinct beliefs serve as important determinants of attitude, subjective norm, and PBC for both action and inaction. Distinct beliefs are also shown to significantly enhance the prediction of intention to perform and not perform a given behaviour, over and above the variance explained by mirrored beliefs across action and inaction. This finding is at odds with the complementarity assumption which assumes that assessing cognitions in regard to both action and inaction will not provide information not already gleaned from assessing cognitions in regard to only one of the two behaviours (Sutton, 2004).

Several studies have demonstrated that intention (Ajzen & Sheikh, 2013; Middlestadt et al., 2014; Richetin et al., 2012, 2011) and behaviour (Richetin et al., 2011) are influenced by different determinants when the direct measure TPB model is applied to action than inaction. The studies do not, however, ascertain whether there are significant differences in the way antecedent variables influence intention and behaviour across action and inaction models. This thesis identifies that some of the structural relationships within the belief-based and extended direct measure TPB models significantly differ when the models are applied to action and inaction. Therefore, this thesis shows that the determinants of intention and behaviour can significantly differ for action and inaction. Together, these contributions provide evidence for the psychological distinction of action and inaction within the TPB.

A considerable body of literature identifies an action-inaction asymmetry in information processing whereby information relating to action or affirmation tends to be processed and utilised in decision-making more effectively than information relating to inaction or negation (e.g. Eerland & Rassin, 2012; Hearst, 1991; Mayo et al., 2004; Newman et al., 1980). When the inaction or negation is of high salience, however, information processing may be equivalent or exceed that relating to action or affirmation (Astley et al., 2015; Beckmann & Young, 2007; Glenberg et al., 1999; Lüdtke & Kaup, 2006; Rassin, 2014). No previous research has sought to identify whether an action-inaction asymmetry occurs within the TPB framework. Although several previous studies have applied the direct measure TPB model to action and inaction, these studies have focused on exploring the incremental validity of constructs relating to action and inaction in the prediction of intention and behaviour (Richetin et al., 2012, 2011); exploring the influence of AR on action and inaction intention (Ajzen & Sheikh, 2013); or comparing the determinants of intention to act and not act

(Middlestadt et al., 2014). Across all applications, measurement models are superior when belief-based (study 2.2 and 3.2) and extended direct measure (study 1.2, 2.3 and 3.3) models are applied to action than inaction. Differences are also observed in the predictive efficacy of the belief-based and extended direct measure models when applied to predict intention and behaviour in regard to action and inaction. Together, these results highlight that the belief-based and extended direct measure models do not operate equivalently when applied to predict intention and behaviour in regard to performing and not performing target behaviours.

Whilst the moderating role of ABC has been identified as a potential explanation for the intention-behaviour gap, the nature of ABC within the TPB is poorly understood (Fishbein & Ajzen, 2010). Conflicting findings have emerged in the literature where ABC is found to moderate the intention-behaviour relation in some studies, but not others (e.g. Hassan et al., 2016; Sheeran et al., 2003). The present research is first to explore the intention-behaviour relation across both action and inaction within the same context. The consistent finding that a greater intention-behaviour gap occurs when the belief-based (study 2.2 and 3.2) and extended direct measure (study 2.3 and 3.3) models are applied to inaction than to action suggests the TPB does not operate equivalently when applied to action and inaction. Further research is necessary to establish whether this pattern is consistent across other behavioural contexts and therefore constitutes an action-inaction asymmetry in the mechanisms that lead intention to translate into behaviour. Actual capacity and actual autonomy are shown to moderate the intention-behaviour relationship differently when the TPB is applied to action and inaction. The potential value of assessing the moderating role of actual capacity and actual autonomy on the intention-behaviour relationship separately is highlighted to gain a more in-depth view of how ABC moderates the intention-behaviour relation.

The role of AR within the TPB has been the subject of considerable debate in the literature. Ajzen and Sheikh (2013) explored the influence of AIR on intentions to perform and not perform two target behaviours. AIR was shown to significantly predict intention when measured incompatibly, but not compatibly, with the standard TPB constructs. In contrast, a recent study by Sandberg et al. (2016) identified that anticipated action and inaction regret can exert a significant influence on intention to perform target behaviours when measured both compatibly and incompatibly with the standard TPB constructs. However, Sandberg et

al. (2016) did not examine the role of AR on intention to not perform target behaviours. The finding that AR can exert a significant influence on intention to both perform and not perform a behaviour therefore extends this previous work and adds clarity to the role of AR within the TPB. Across all three behavioural contexts explored in this thesis, AR is shown to exert a differential impact on intention to perform and not perform target behaviours (study 1.2, 2.3 and 3.3). It has been postulated that AAR and AIR influence intention differently depending on whether the target behaviour is a distal benefit or immediate hedonic behaviour (Sandberg & Conner, 2008). Sandberg et al. (2016) argue that AIR should more strongly influence intention to perform distal benefit behaviours than AAR. Intention to perform immediate hedonic behaviours may be influenced by both AAR and AIR, but AAR should exert the stronger influence. This thesis draws attention to the way in which performing and not performing a target behaviour typically constitute different behaviour types (i.e. action is an immediate hedonic behaviour and inaction is a distal benefit behaviour, or vice versa). No previous studies have sought to identify whether the behaviour type pattern of regret outlined by Sandberg and colleagues (2008; 2016) holds in the prediction of intention to not perform a target behaviour. The present research extends knowledge by identifying that such categories do not account for the way in which AR influences intention to not perform distal benefit behaviours. The sub-division of the distal benefit behaviour category is therefore recommended to account for this.

Together, the research reported in this thesis makes a number of important contributions to knowledge regarding the psychological distinction of action and inaction within the TPB; the differential way in which the belief-based and extended direct measure models operate when applied to action and inaction; and the differential influence of AR on intentions to perform and not perform target behaviours.

7.4.1Practical implications of the research

The research reported in this thesis has a number of practical implications for researchers employing the TPB. The research finds that cognitions about action and inaction are not conceptual opposites. Therefore, an accurate understanding of why people do not perform a behaviour cannot be gleaned from research into the determinants of performing that behaviour, and vice versa. Researchers should refrain from making assumptions about the determinants of one behavioural alternative based on research into the other behavioural alternative. Because most TPB research is focused on exploring the determinants of action,

this research highlights that there is limited understanding of the determinants of inaction across the wide variety of behaviours investigated in TPB studies. To remedy this deficiency in knowledge and to gain a more comprehensive and accurate understanding of target behaviours, research should explore the determinants of both action and inaction within the same study. Where this is not possible, however, researchers should carefully consider whether investigating action or inaction better serves their research aims.

This thesis identifies that the belief-based and direct measure TPB models do not operate equivalently when applied to action and inaction. Overall, the belief-based inaction measurement models exhibited poorer construct and indicator validities than the action models (studies 2.2 and 3.2). Indeed, indicator and construct validities were very low in many instances in the inaction models. The direct measure inaction measurement models tend to exhibit poorer initial model fit and required greater refinement than their associated action models. These findings may be attributed to respondents' encountering greater difficulty interpreting and responding to questionnaire items about inaction than those about action. An important implication of this finding is that researchers must exercise caution when applying the belief-based and direct measure models to inaction. Particular care should be taken to ensure all instructions and questionnaire items are clear and easy to understand when they relate to inaction, this includes when using standard questionnaire items outlined by Fishbein and Ajzen (2010). Avoiding linguistically complex questionnaire items, such as double negatives would be beneficial. Pilot testing may be particularly important when designing a TPB questionnaire in regard to inaction.

Differences are also found in the predictive efficacy of the TPB models when applied to action and inaction. Results across studies suggest that the predictive validity of the TPB models may be influenced by the extent to which cognitions about the target behaviour are readily accessible in memory. In many behavioural contexts the accessibility of beliefs people hold about performing and not performing a target behaviour differ. In such cases, it should not be expected that the TPB will be similarly predictive of intention and behaviour for action and inaction. When designing TPB studies it is important that researchers consider the extent to which beliefs about performing and not performing the target behaviour are readily accessible in memory. Developing questionnaires in a manner that enhances the accessibility of beliefs about the target behaviour may prove useful. It is important to note, however, that all applications of the TPB reported in this thesis afforded a good level of predictive validity.

The utility of incorporating measures of AR into the TPB have been evidenced in a considerable body of literature. This thesis identifies that AR exerts a differential influence on intentions to perform and not perform target behaviours. Sandberg et al. (2016) find that the influence of AAR and AIR on intention to perform a behaviour is different depending on whether the target behaviour is a distal benefit or immediate hedonic behaviour. The present research shows that the behaviour type categories outlined by Sandberg et al. (2016) do not adequately account for the AR that influences intention to not perform distal benefit behaviours. An important practical implication is the consideration as to which type of AR to capture in future research. The present findings, and those of Sandberg et al. (2016), suggest that both AAR and AIR should be incorporated into studies exploring performing or not performing immediate hedonic behaviours. Studies exploring the determinants of distal benefit action behaviours should capture AIR whereas distal benefit inaction behaviours should incorporate a measure of AAR. More research is necessary, however, to clarify the role of AAR and AIR within the TPB for action and inaction behaviours. Therefore, it may be of benefit for studies to incorporate both AAR and AIR into the TPB.

The research reported in this thesis also has important practical implications for the development of behaviour change interventions. Because cognitions about action and inaction are not conceptual opposites, behaviour change interventions that seek to modify an inaction behaviour should not be developed upon research into the performance of the behaviour, and vice versa. Such an approach may not be optimally effective because key beliefs that underlie inaction may not be targeted in the intervention. Behaviour change interventions should instead be developed upon research into the behavioural alternative that the intervention seeks to modify. It may, however, be a more effective approach to tackle both the key beliefs that underline action and inaction within the same intervention. The research provides valuable insight into the factors that motivate people to donate and not donate blood (study 1), use and not use sunscreen (study 2), as well as eat and not eat high-calorie snacks (study 3). Such insights provides a basis for the development of behaviour change interventions to increase blood donation behaviour, increase use of sunscreen, and reduce the consumption of high-calorie snacks.

7.5 Limitations and avenues for future research

Several overarching limitations of the research detailed in this thesis must be acknowledged and opportunities for future research outlined. This thesis explored the application of the TPB framework to action and inaction across three behavioural contexts only. The generalisability of the findings across the broad range of behavioural contexts investigated using the TPB is therefore limited. However, it should be noted that the contexts investigated in this thesis were purposefully selected to possess a range of different characteristics. For example, blood donation, sunscreen use, and high-calorie snack consumption vary in regard to the frequency with which the behaviour may be performed or not performed; the relative effort required to perform or not perform the behaviour; and which behavioural alternative has greater cognition accessibility, amongst other differences. The behavioural contexts investigated in this thesis, therefore, provide a sound foundation upon which future research may explore the application of the TPB to action and inaction. The generalisability of the present findings would be greatly enhanced with future exploration of the TPB applied to action and inaction across a wider array of behavioural contexts.

The research aims of this thesis were addressed by comparing the application of the TPB to action and inaction in different samples. This approach has been used in a number of studies that explore the determinants of action and inaction within the TPB model (e.g. Ajzen & Sheikh, 2013; Middlestadt et al., 2014). The approach was utilised for two main reasons. Firstly, using separate samples avoided the potential issue of cross-over effects where responses to questionnaire items about the second behavioural alternative may have been influenced by responses to the first. This was a particular concern because cognitions about the first behavioural alternative are likely to have remained readily accessible in memory whilst the respondent completed questions about the second behavioural alternative. Whilst questionnaires about action and inaction could have been presented in counterbalanced order to minimise this potential effect, it is possible that a greater effect would have been encountered when respondents completed the inaction questionnaire after the action questionnaire. Secondly, answering questionnaire items about inaction were expected to be more challenging because information containing negation is more difficult to process (e.g. Bianchi, Savardi, Burro, & Torquati, 2011; Evans & Lynch, 1973). The greater cognitive load involved in answering questions about inaction may have impacted responses to a greater extent when the inaction questionnaire was presented second. As such, respondents required to answer questions about inaction after answering those about action may provide

responses that are less accurate. However, in study 3.3 a portion of responses completed the questionnaire about both eating and not eating high-calorie snacks. Half of these respondents completed the action questionnaire first followed by the inaction questionnaire, whereas the second half of these respondents answered the inaction questionnaire first followed by the action questionnaire. There was no evidence of an order effect. Further, there is also no evidence that respondents who completed the questionnaire about both action and inaction answered questions differently than those who completed only one of the questionnaires. An important limitation of making comparisons in different samples is that any differences identified across groups could be due to there being differences in the groups themselves. To minimise the potential for this issue, the present research utilised large samples and random assignment to complete the questionnaire about action or inaction. However, it is not possible to know with certainty that differences did not occur due to sample differences. Furthermore, several studies have examined the TPB when applied to action and inaction where comparisons are made within the same sample (e.g. Richetin et al., 2011; Richetin, Osterini, & Conner, 2020; Sandberg, Hutter, Richetin, & Conner, 2016). Future explorations of the TPB when applied to action and inaction would benefit from taking this approach and drawing such comparisons within the same sample of respondents.

This thesis did not examine the incremental validity of constructs relating to action and inaction in the prediction of intention and behaviour. Because intentions to act and not act are not strictly mirrored concepts their determinants may differ. Richetin et al. (2020) argue that to gain an accurate understanding of the determinants of a behaviour it is necessary to explore the determinants of both action and inaction together within the same model. It has been shown that constructs relating to action and inaction can independently contribute to the prediction of intention and behaviour (Richetin et al, 2011; Richetin et al. 2020). Failure to examine the incremental validity of TPB constructs in regard to performing and not performing the target behaviour for the prediction of action and inaction intentions and behaviour means that an understanding of the interplay of determinants of the target behaviour were not identified. Future research examining the application of the TPB to action and inaction should assess the incremental validity of cognitions about action and inaction to gain a more accurate and in depth understanding of the behavioural contexts investigated. Furthermore, this approach would provide greater insight into the way in which cognitions about action influence intention and behaviour in regard to not acting, and vice versa.

One line of argument in this thesis is that the differential accessibility of beliefs about action and inaction may explain why the belief-based and extended direct measure TPB models do not operate equivalently when applied to action and inaction. The relative accessibility of cognitions relating to the performance and non-performance of the behavioural contexts investigated in this thesis was evaluated based on past literature rather than empirically ascertained. Establishing the relative accessibility of cognitions relating to action and inaction would better test the validity of this argument. Future research would benefit from testing the relative difference in accessibility of beliefs about action and inaction. Researchers often use response latency as a proxy for attitude accessibility whereby the faster an attitude can be expressed, the more accessible it is regarded (Descheemaeker, Spruyt, Fazio, & Hermans, 2017). Belief accessibility could be captured by recording the speed at which respondents report beliefs during the belief-elicitation study. It would be necessary to assess belief accessibility separately for behavioural, normative, and control beliefs because it is possible that relative differences in belief accessibility will differ across belief types. Various online survey platforms capture response speed to individual questions or to each page of questionnaire items. In a controlled setting, this information could be used to identify whether people take longer to respond to questions relating to inaction than those relating to action, thus providing an indication of the relative belief accessibility in regard to performing and not performing the target behaviour.

A further limitation of this thesis is that AIR and AAR were both captured only in Study 3 in the context of high-calorie snack consumption. Studies 1 (blood donation) and 2 (sunscreen use) extend the direct measure TPB model to incorporate a measure of AIR, but did not assess AAR. This approach is consistent with most studies that examine AR within the TPB (Sandberg & Conner, 2008). Examining the differential influence of AIR on intention to perform and not performing a target behaviour was sufficient to meet research aim 4. However, greater insight into the way in which AR influences intention to act and not act differently would have been gained by examining the role of both AAR and AIR in all three studies. Sandberg et al. (2016) argue that AAR and AIR influence intention to perform target behaviours differently depending on whether the behaviour is a distal benefit or immediate hedonic behaviour. By not incorporating a measure of AAR, studies 1 and 2 did not examine the role of AAR on intention and behaviour, nor test whether the proposed pattern of prediction holds when the TPB is applied to inaction. To address this limitation, future studies should investigate the influence of both AAR and AIR on intention to not perform distal benefit and immediate hedonic behaviours.

Study 3 found that intention to not eat high-calorie snacks was significantly influenced by AAR, but not AIR. This is contrary to the pattern of regret posited to influence intention to perform distal benefit behaviours in Sandberg and Conner's (2008) behaviour type categories. This thesis argues that the distal benefit behaviour category should be sub-divided into two categories, namely 'distal benefit action behaviours' and 'distal benefit inaction behaviours'. It should be noted, however, that this thesis explored the influence of AAR and AIR on intention to not perform a distal benefit behaviour in one behavioural context only. It is, therefore, necessary for future research to cross-validate this finding by examining the influence of AAR and AIR on intention to not perform a range of distal benefit behaviours. Such cross-validation would provide greater insight into the extent to which this pattern of regret is representative of that which typically influences intention to not perform distal benefit behaviours.

This thesis aimed to establish whether the belief-based (research aim 2) and extended direct measure (research aim 3) models operate differently when applied to action and inaction. One way in which these research aims were met is the comparison of predictive efficacy of the models when applied to action and inaction. A limitation of the thesis is that it was not possible to determine whether differences in the prediction of intention and behaviour across action and inaction models were significant. Conclusions regarding the differential prediction of intention and behaviour when the belief-based and extended direct measure TPB models are applied to action and inaction are, therefore, tentatively made. Future research should establish whether differences in the predictive efficacy of the belief-based and direct measure TPB model when applied to action and inaction are significant.

Beyond the suggestions for overcoming limitations of this thesis outlined above, several opportunities for future research are identified that would deepen understanding of the TPB when applied to action and inaction. By identifying that cognitions about action and inaction are not conceptually mirrored concepts, this thesis highlights a significant dearth in knowledge regarding the determinants of inaction within the TPB framework. This constitutes an important area for future research because understanding the decision to not perform a behaviour is as important as understanding the decision to perform it (Michaelidou & Hassan, 2014). To address this gap in knowledge, future studies should explore the determinants of inaction across a broad range of behavioural contexts.

This thesis identifies that the belief-based and extended direct measure models operate differently when applied to action and inaction. Differences in the function of the model are evident at both measurement and structural levels. It is argued that these differences occur because of the action-inaction asymmetry whereby information is processed more effectively when it relates to action than inaction, except where cognitions relating to inaction are highly accessible in memory. An interesting avenue for future research is to explore whether enhancing the accessibility of beliefs in regard to the less-accessible behavioural alternative improves the operation of the TPB for contexts with relatively low belief accessibility. Such research may prove particularly useful when researchers seek to explore behavioural contexts for which beliefs are likely to be of low accessibility.

A consistent finding across all belief-based (study 2.2 and 3.2) and extended direct measure (study 1.2, 2.3 and 3.3) studies is that measurement models are superior when the models are applied to action than inaction. A wealth of information could be gleaned about how respondents answer questions in regard to performing and not performing a given behaviour by conducting a think aloud study. French et al. (2007) conducted a think aloud study wherein respondents were required to vocalise the thoughts they had whilst completing a TPB questionnaire in regard to performing target behaviours. The study provided valuable insight into the challenges respondents encountered when responding to the questionnaire. Conducting a similar study in regard to both performing and not performing a behaviour would facilitate the exploration into how questionnaire items about action and inaction are interpreted by respondents; the context within which answers are provided (e.g. whether mental simulations are used in the same way and to the same extent when responding to questions about action and inaction); and whether different challenges are faced by respondents when answering questions about action than about inaction. Such research may inform the development of questionnaire items for inaction that are simpler to understand, easier to respond to, and result in less response error than those currently suggested in the TPB questionnaire construction guidelines (Fishbein & Ajzen, 2010).

7.6 Conclusion

This thesis is the first to provide an in-depth exploration of the TPB framework when applied to action and inaction. Findings across three empirical studies show that, in contrast to the complementarity assumption, action and inaction are distinct yet related concepts and should not be regarded as conceptually mirrored within the TPB. The belief-based and extended direct measure TPB models are shown to operate differently when applied to action and inaction. These differences are identified at both measurement and structural level. The moderating influence of actual capacity and actual autonomy on the intention-behaviour relationship is also found to differ for action and inaction. Finally, AR is shown to exert a differential influence on intention to perform and not perform target behaviours. This may be attributed to the way in which action and inaction typically constitute different types of behaviour. This chapter has discussed these findings in the context of past literature and outlined the main theoretical contributions of the thesis. Limitations of the research have also been outlined and opportunities for future research discussed.

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Appendix A - Study 1 Blood donation

A.1 Ethics approval letter

COLEG BUSNES, Y GYFRAITH, ADDYSG A GWYDDORAU CYMDEITHAS
COLLEGE OF BUSINESS, LAW, EDUCATION AND SOCIAL SCIENCES

PRIFYSGOL BANGOR UNIVERSITY

17 March 2014

Dear Georgina

Re: Emotion and Blood Donation

Thank you for your recent revised application to the CBLESS Research Ethics Committee.

The committee has considered your application and I am now able to give permission, on behalf of the CBLESS Research Ethics Committee, for the commencement of your research project.

I wish you well with your research.

Yours sincerely

Dr. Diane Seddon
Chair, CBLESS Research Ethics Committee

cc: Professor Edward Shiu

Registered charity number: 1141565

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A.2 Elicitation study participant information and consent form

_ _ /_ _ / _ _

Participant Information
Emotion and Blood Donation

You are invited to take part in a study about blood donation. The study aims to gain insight into how the thoughts and feelings that students have about blood donation differ when they think about donating blood compared to when they think about not donating blood. The information collected in this questionnaire will be used to inform the development of a more in depth questionnaire into blood donation. The study does not include questions about your sexuality or sexual behaviour. It is up to you to decide whether or not to take part in the study, participation is anonymous and entirely voluntary. You are free to withdraw from the study at any time before completing the questionnaire. If you choose to withdraw from the study you will not be penalised or disadvantaged in any way. The questionnaire should take no more than 15 minutes to complete.

The results of this study will be used to inform the development of a more in depth questionnaire into blood donation. The results of the study will be used in the researcher's PhD thesis. The results may also be used in articles submitted for publication, in presentations and reports. If you have any questions about the study or would like to receive a summary of the results once the study has been completed please contact Georgina Smith (abpee1@bangor.ac.uk). If you have concerns about any aspect of the study please contact Professor Edward Shiu (e.shiu@bangor.ac.uk). If you feel upset after completing the study or an aspect of the study causes you distress, we recommend that you discuss this with Bangor Student Services by telephone (01248 382024) or via email (studentservices@bangor.ac.uk).

I confirm that I have read and understood the participant information detailed above and consent to participate in this study.

I agree ☐

I disagree ☐

A.3 Elicitation study questionnaire

A.3.1 Donating blood

Blood Donation Study
(Donating Blood Elicitation Questionnaire)

Instructions: Please take a few minutes to tell us what you think about the possibility of donating blood at a blood session in the next month. There are no right or wrong responses; we are merely interested in your personal opinions.

In response to the questions below, please list the thoughts that come immediately to mind. Write each thought on a separate line.

What do you see as the advantages of you donating blood at a blood donation session in the next month?

_____ _____

_____ _____

_____ _____

What do you see as the disadvantages of you donating blood at a blood donation session in the next month?

_____ _____

_____ _____

_____ _____

What else comes to mind when you think about donating blood at a blood donation session in the next month?

_____ _____

_____ _____

_____ _____

What do you think are the possible outcomes of you donating blood at a blood donation session in the next month for **yourself**?

_____ _____

_____ _____

_____ _____

What do you think are the possible outcomes of you donating blood at a blood donation session in the next month for **other people**?

_____ _____

_____ _____

_____ _____

When it comes to you donating blood at a blood session in the next month, there might be individuals or groups who would think you should or should not perform this behavior.

Please list the individuals or groups who would approve of you donating blood at a blood donation session in the next month.

_____ _____

_____ _____

_____ _____

Please list the individuals or groups who would disapprove of you donating blood at a blood donation session in the next month.

_____ _____

_____ _____

_____ _____

Sometimes, when we are not sure what to do, we look to see what others are doing.

Please list the individuals or groups who are most likely to donate blood at a blood donation session in the next month.

_____ _____

_____ _____

_____ _____

Please list the individuals or groups who are least likely to donate blood at a blood donation session in the next month.

_____ _____

_____ _____

_____ _____

Please list any factors or circumstances that would make it easy or enable you to donate blood at a blood donation session in the next month.

_____ _____

_____ _____

_____ _____

Please list any factors or circumstances that would make it difficult or prevent you from donating blood at a blood donation session in the next month.

_____ _____

_____ _____

_____ _____

Imagine that you intend to donate blood at a blood session in the next month. What factors do you think **might lead you to actually not donate blood** at a blood session in the next month?

_____ _____

_____ _____

_____ _____

Background Information

What is your age?

_____

What is your gender?

☐ Male ☐ Female

What is your nationality?

☐Welsh British

☐English British

☐Scottish British

☐ Other (please specify) _____

What is your year of study? 1 2 3

Do you believe that you would be eligible to donate blood, if you wanted to?

☐ Yes ☐ No ☐ Don't know

Please read the statements below and indicate which statement best describes your past blood donation behaviour

☐ I have never donated blood

☐ I have donated blood once

☐ I have donated blood 2-10 times

☐ I have donated blood 11-20 times

☐ I have donated blood more than 20 times

If you have never donated blood, please read the statements below and indicate which statement best describes your blood donation status:

☐ I have never thought of donating blood myself

☐ I have given some thought to donating blood

☐ I have seriously considered donating blood

☐ I have recently registered for blood donation

A.3.2 Not donating blood

Blood Donation Study
(Not Donating Blood Elicitation Questionnaire)

Instructions: Please take a few minutes to tell us what you think about the possibility of **not** donating blood at a blood session in the next month. There are no right or wrong responses; we are merely interested in your personal opinions.

In response to the questions below, please list the thoughts that come immediately to mind. Write each thought on a separate line.

What do you see as the advantages of you **not** donating blood at a blood donation session in the next month?

_____ _____

_____ _____

_____ _____

What do you see as the disadvantages of you **not** donating blood at a blood donation session in the next month?

_____ _____

_____ _____

_____ _____

What else comes to mind when you think about **not** donating blood at a blood donation session in the next month?

_____ _____

_____ _____

_____ _____

What do you think are the possible outcomes of you **not** donating blood at a blood donation session in the next month for **yourself**?

_____ _____

_____ _____

_____ _____

What do you think are the possible outcomes of you **not** donating blood at a blood donation session in the next month for **other people**?

_____ _____

_____ _____

_____ _____

When it comes to you **not** donating blood at a blood session in the next month, there might be individuals or groups who would think you should or should not perform this behavior.

Please list the individuals or groups who would approve of you **not** donating blood at a blood donation session in the next month.

_____ _____

_____ _____

_____ _____

Please list the individuals or groups who would disapprove of you **not** donating blood at a blood donation session in the next month.

_____ _____

_____ _____

_____ _____

Sometimes, when we are not sure what to do, we look to see what others are doing.

Please list the individuals or groups who are most likely to **not** donate blood at a blood donation session in the next month.

_____ _____

_____ _____

_____ _____

Please list the individuals or groups who are least likely to **not** donate blood at a blood donation session in the next month.

_____ _____

_____ _____

_____ _____

Please list any factors or circumstances that would make it easy or enable you to **not** donate blood at a blood donation session in the next month.

_____ _____

_____ _____

_____ _____

Please list any factors or circumstances that would make it difficult or prevent you from **not** donating blood at a blood donation session in the next month.

_____ _____

_____ _____

_____ _____

Imagine that you intend to **not** donate blood at a blood session in the next month. What factors do you think **might lead you to actually donate blood** at a blood session in the next month?

_____ _____

_____ _____

_____ _____

Background Information

What is your age?

_____

What is your gender?

☐ Male ☐ Female

What is your nationality?

☐Welsh British

☐English British

☐Scottish British

☐ Other (please specify) _____

What is your year of study? 1 2 3

Do you believe that you would be eligible to donate blood, if you wanted to?

☐ Yes ☐ No ☐ Don't know

Please read the statements below and indicate which statement best describes your past blood donation behaviour

☐ I have never donated blood

☐ I have donated blood once

☐ I have donated blood 2-10 times

☐ I have donated blood 11-20 times

☐ I have donated blood more than 20 times

If you have never donated blood, please read the statements below and indicate which statement best describes your blood donation status:

☐ I have never thought of donating blood myself

☐ I have given some thought to donating blood

☐ I have seriously considered donating blood

☐ I have recently registered for blood donation

A.4 Main study participant information and consent forms

_ _/_ _/ _ _

Participant Information
Emotion and Blood Donation

You are invited to take part in a study about blood donation. The study aims to better understand how the thoughts and feelings students have about blood donation differ when they think about donating blood compared to when they think about not donating blood. The study will also investigate the influence of anticipated guilt and AR on blood donation intentions and how the role of these emotions are different when considering donating blood and not donating blood. The study does not include questions about your sexuality or sexual behaviour. It is up to you to decide whether or not to take part in the study, participation is anonymous and entirely voluntary. You are free to withdraw from the study at any time before completing the questionnaire. If you choose to withdraw from the study you will not be penalised or disadvantaged in any way. The questionnaire should take no more than 20 minutes to complete.

The results of the study will be used in the researcher's PhD thesis. The results may also be used in articles submitted for publication, in presentations and reports. If you have any questions about the study or would like to receive a summary of the results once the study has been completed please contact Georgina Smith (abpee1@bangor.ac.uk). If you have concerns about any aspect of the study please contact Professor Edward Shiu (e.shiu@bangor.ac.uk). If you feel upset after completing the study or an aspect of the study causes you distress, we recommend that you discuss this with Bangor Student Services by telephone (01248 382024) or via email (studentservices@bangor.ac.uk).

I confirm that I have read and understood the participant information detailed above and consent to participate in this study.

I agree ☐

I disagree ☐

A.5 Main study questionnaire

A.5.1 Donating blood

Blood Donation Study

You are invited to take part in a study about blood donation. The study aims to better understand the thoughts and feelings students have about donating and not donating blood. The study does not include questions about your sexuality or sexual behaviour. It is up to you to decide whether or not to take part in the study, participation is anonymous and entirely voluntary. You are free to withdraw from the study at any time before completing the questionnaire. If you choose to withdraw from the study you will not be penalised or disadvantaged in any way. The questionnaire should take no more than 10 minutes to complete.

The results of the study will be used in the researcher's PhD thesis. The results may also be used in articles submitted for publication, in presentations and reports. If you have any questions about the study or would like to receive a summary of the results once the study has been completed please contact Georgina Smith (abpee1@bangor.ac.uk). If you have concerns about any aspect of the study please contact Professor Edward Shiu (e.shiu@bangor.ac.uk). If you feel upset after completing the study or an aspect of the study causes you distress, we recommend that you discuss this with Bangor Student Services by telephone (01248 382024) or via email (studentservices@bangor.ac.uk).

I confirm that I have read and understood the participant information detailed above and consent to participate in this study.

I agree ☐

I disagree ☐

The next blood donation sessions held at Bangor University will take place on Monday the 16th June from 10.30am - 1pm and 2.30 – 5pm in Powis Hall.

Assuming you are still in Bangor on Monday the 16th June, please answer all questions based on your opinion about donating blood at the next blood donation sessions at Bangor University.

Please answer each of the following questions by circling the number that best describes your opinion.

Q1(a). How likely are you to donate blood at the next blood donation sessions at Bangor University?

Very Unlikely						Very Likely
0	1	2	3	4	5	6

Q1(b). How strong is your intention to donate blood at the next blood donation sessions at Bangor University?

No intention at all						Very Strong
0	1	2	3	4	5	6

Q1(c). How much do you agree with this statement about you "I will donate blood at the next blood donation sessions at Bangor University"?

Strongly disagree						Strongly agree
0	1	2	3	4	5	6

P.T.O for Q2

Q2. Please indicate how you feel about donating blood at the next blood donation sessions at Bangor University.

	Not at all						Definitely
(a) I want to donate blood	0	1	2	3	4	5	6
(b) I have a strong desire to donate blood	0	1	2	3	4	5	6
(c) I feel that there are compelling reasons to donate blood	0	1	2	3	4	5	6
(d) I will try to donate blood	0	1	2	3	4	5	6
(e) I have made plans to donate blood	0	1	2	3	4	5	6
(f) I have taken steps to ensure that I will donate blood	0	1	2	3	4	5	6

Q3. For me to donate blood at the next blood donation sessions in Bangor University would be

Good	+3	+2	+1	0	-1	-2	-3	Bad
Valuable	+3	+2	+1	0	-1	-2	-3	Worthless
Beneficial	+3	+2	+1	0	-1	-2	-3	Harmful
Satisfying	+3	+2	+1	0	-1	-2	-3	Unsatisfying
Pleasant	+3	+2	+1	0	-1	-2	-3	Unpleasant
Rewarding	+3	+2	+1	0	-1	-2	-3	Unrewarding
Not Frightening	+3	+2	+1	0	-1	-2	-3	Frightening

Q4(a). People who are **important to me** would think I 'should'/'should not' donate blood at the next blood donation sessions in Bangor University.

Should donate						Should not donate
+3	+2	+1	0	-1	-2	-3

Q4(b). People who are **important to me** would 'approve'/disapprove' of me donating blood at the next blood donation sessions in Bangor University.

Approve						Disapprove
+3	+2	+1	0	-1	-2	-3

Q4(c). People who are **like me** would think I 'should'/'should not' donate blood at the next blood donation sessions in Bangor University.

Should donate						Should not donate
+3	+2	+1	0	-1	-2	-3

P.T.O for Q4(d)

Q4(d). People who are **like me** would 'approve'/disapprove' of me donating blood at the next blood donation sessions in Bangor University.

Approve						Disapprove
+3	+2	+1	0	-1	-2	-3

Q5(a). For me, donating blood at the next blood donation sessions in Bangor University would be

Easy						Difficult
+3	+2	+1	0	-1	-2	-3

Q5(b). I am confident that I am able to donate blood at the next blood donation sessions in Bangor University.

Strongly agree						Strongly disagree
+3	+2	+1	0	-1	-2	-3

Q5(c). Donating blood at the next blood donation sessions in Bangor University is completely up to me.

Strongly agree						Strongly disagree
+3	+2	+1	0	-1	-2	-3

Q5(d). I am confident that I am able to overcome any obstacles that would prevent me from donating blood at the next blood donation sessions in Bangor University.

Strongly agree						Strongly disagree
+3	+2	+1	0	-1	-2	-3

Q6. My donating blood at the next blood donation sessions in Bangor University will

	Very Likely						Very Unlikely
(a) help save lives	6	5	4	3	2	1	0
(b) make me feel good about myself	6	5	4	3	2	1	0
(c) cause me pain or discomfort	6	5	4	3	2	1	0
(d) make me feel faint	6	5	4	3	2	1	0
(e) make me feel nervous or tense	6	5	4	3	2	1	0
(f) take up my spare time	6	5	4	3	2	1	0
(g) inspire other people to donate blood	6	5	4	3	2	1	0
(h) not be rewarding	6	5	4	3	2	1	0

P.T.O for Q7

Q7. I believe that for me

	Very Good						Very Bad
(a) helping save lives would be	6	5	4	3	2	1	0
(b) feeling good about myself would be	6	5	4	3	2	1	0
(c) experiencing pain or discomfort would be	6	5	4	3	2	1	0
(d) feeling faint would be	6	5	4	3	2	1	0
(e) feeling nervous or tense would be	6	5	4	3	2	1	0
(f) taking up my spare time would be	6	5	4	3	2	1	0
(g) inspiring other people to donate blood would be	6	5	4	3	2	1	0
(h) not being rewarded would be	6	5	4	3	2	1	0

Q8. Please indicate **how likely** it is that the following groups think you should donate blood at the next blood donation session in Bangor University.

	Very Likely						Very Unlikely
(a) Your friends	6	5	4	3	2	1	0
(b) Your family	6	5	4	3	2	1	0
(c) Your partner	6	5	4	3	2	1	0
(d) Your religious organisation	6	5	4	3	2	1	0
(e) Health care workers	6	5	4	3	2	1	0

Q9. Please indicate **how much**, in general, you want to do what the following groups think you should do.

	Not at all						Very Much
(a) Your friends	0	1	2	3	4	5	6
(b) Your family	0	1	2	3	4	5	6
(c) Your partner	0	1	2	3	4	5	6
(d) Your religious organisation	0	1	2	3	4	5	6
(e) Health care workers	0	1	2	3	4	5	6

P.T.O for Q10

Q10. Please indicate **how likely** it is that each of the following factors would make it **easy or enable you to donate blood** at the next blood donation sessions at Bangor University.

	Very Likely						Very Unlikely
(a) Convenient locations	6	5	4	3	2	1	0
(b) Convenient appointment dates and times	6	5	4	3	2	1	0

Q11. Please indicate **how important** each of the following factors is in **influencing you to donate blood** at the next blood donation sessions at Bangor University.

	Not at all important						Very important
(a) Convenient locations	0	1	2	3	4	5	6
(b) Convenient appointment dates and times	0	1	2	3	4	5	6

Q12. Please indicate **how likely** it is that each of the following factors would **make it difficult or prevent you from** donating blood at the next blood donation sessions at Bangor University.

	Very Likely						Very Unlikely
(a) Not being eligible	6	5	4	3	2	1	0
(b) Illness	6	5	4	3	2	1	0
(c) Busy with other commitments	6	5	4	3	2	1	0
(d) Having to travel to donate	6	5	4	3	2	1	0

Q13. Please indicate **how important** each of the following factors is in **influencing you to donate blood** at the next blood donation sessions at Bangor University.

	Not at all important						Very important
(a) Not being eligible to donate	0	1	2	3	4	5	6
(b) Illness	0	1	2	3	4	5	6
(c) Being busy with other commitments	0	1	2	3	4	5	6
(d) Having to travel to donate	0	1	2	3	4	5	6

P.T.O for Q14

Q14. Thinking about the next blood donation sessions at Bangor University, if I choose to **NOT** donate blood at the sessions...

	Not at all						Very Much
(a) I would regret it	0	1	2	3	4	5	6
(b) it would bother me	0	1	2	3	4	5	6
(c) I would be disappointed	0	1	2	3	4	5	6
(d) I would feel guilty	0	1	2	3	4	5	6
(e) I would feel tense	0	1	2	3	4	5	6
(f) I would feel apologetic	0	1	2	3	4	5	6
(g) I would feel I am in the wrong	0	1	2	3	4	5	6

Q15. Final section: Facts about you

Gender: Male [ ] Female [ ]

Age (years) : _____

What is your nationality?

Welsh [ ] English [ ] Scottish [ ] Northern Irish [ ] British [ ]

Other (please specify) _____

Course type : Undergraduate [ ] Postgraduate Taught [ ] Postgraduate Research [ ]

Other (please specify) _____

Year of study: _____

Do you believe you would be eligible to donate blood, if you wanted to?

Yes [ ] No [ ] Don't know [ ]

Have you completed any other questionnaires about blood donation in the last month?

Yes [ ] No [ ] Don't know [ ]

Please indicate which statement best describes your past blood donation behaviour:

[ ] I have never donated blood
[ ] I have donated blood once
[ ] I have donated blood 2-10 times
[ ] I have donated blood 11-20 times
[ ] I have donated blood more than 20 times

PTO

Please indicate which statement best describes your past blood donation status:

[ ] I have never thought of donating blood myself
[ ] I have given some thought to donating blood
[ ] I have seriously considered donating blood
[ ] I have applied for information
[ ] I am considering registering for blood donation this year
[ ] I am considering registering for blood donation this month
[ ] I am a blood donor
[ ] I am a blood donor, but am considering withdrawing my registration
[ ] I used to be a blood donor, but I have withdrawn my registration

Blood donation session information

The questionnaire required you to answer questions based on your opinions about donating blood at Bangor University on Monday the 2nd June from 10.30am - 1pm and 2.30 – 5pm in Powis Hall. These blood donation sessions were fabricated for the purpose of the questionnaire and will therefore not take place. Information about donating blood, including details of local blood donation sessions, can be found at www.blood.co.uk

Thank you for completing our questionnaire

Please ensure that you have answered all of the questions and leave your completed questionnaire in the box labelled 'Blood Donation Study', which can be found next to the issue desk in the main library.

A.5.2 Not donating blood

Blood Donation Study

You are invited to take part in a study about blood donation. The study aims to better understand the thoughts and feelings students have about donating and not donating blood. The study does not include questions about your sexuality or sexual behaviour. It is up to you to decide whether or not to take part in the study, participation is anonymous and entirely voluntary. You are free to withdraw from the study at any time before completing the questionnaire. If you choose to withdraw from the study you will not be penalised or disadvantaged in any way. The questionnaire should take no more than 10 minutes to complete.

The results of the study will be used in the researcher's PhD thesis. The results may also be used in articles submitted for publication, in presentations and reports. If you have any questions about the study or would like to receive a summary of the results once the study has been completed please contact Georgina Smith (abpee1@bangor.ac.uk). If you have concerns about any aspect of the study please contact Professor Edward Shiu (e.shiu@bangor.ac.uk). If you feel upset after completing the study or an aspect of the study causes you distress, we recommend that you discuss this with Bangor Student Services by telephone (01248 382024) or via email (studentservices@bangor.ac.uk).

I confirm that I have read and understood the participant information detailed above and consent to participate in this study.

I agree ☐

I disagree ☐

The next blood donation sessions held at Bangor University will take place on Monday the 16th June from 10.30am - 1pm and 2.30 – 5pm in Powis Hall.

Assuming you are still in Bangor on Monday the 16th June, please answer all questions based on your opinion about donating blood at the next blood donation sessions at Bangor University.

Please answer each of the following questions by circling the number that best describes your opinion.

Q1(a). How likely are you to **not donate blood** at the next blood donation sessions at Bangor University?

Very Unlikely						Very Likely
0	1	2	3	4	5	6

Q1(b). How strong is your intention to **not donate blood** at the next blood donation sessions at Bangor University?

No intention at all						Very Strong
0	1	2	3	4	5	6

Q1(c). How much do you agree with this statement about you "I will **not donate blood** at the next blood donation sessions at Bangor University"?

Strongly disagree						Strongly agree
0	1	2	3	4	5	6

P.T.O for Q2

Q2. Please indicate how you feel about **not donating blood** at the next blood donation sessions at Bangor University.

	Not at all						Definitely
(a) I want to not donate blood	0	1	2	3	4	5	6
(b) I have a strong desire to not donate blood	0	1	2	3	4	5	6
(c) I feel that there are compelling reasons to not donate blood	0	1	2	3	4	5	6
(d) I will try to not donate blood	0	1	2	3	4	5	6
(e) I have made plans to not donate blood	0	1	2	3	4	5	6
(f) I have taken steps to ensure that I will not donate blood	0	1	2	3	4	5	6

Q3. For me to **not donate blood** at the next blood donation sessions in Bangor University would be

Good	+3	+2	+1	0	-1	-2	-3	Bad
Valuable	+3	+2	+1	0	-1	-2	-3	Worthless
Beneficial	+3	+2	+1	0	-1	-2	-3	Harmful
Satisfying	+3	+2	+1	0	-1	-2	-3	Unsatisfying
Pleasant	+3	+2	+1	0	-1	-2	-3	Unpleasant
Rewarding	+3	+2	+1	0	-1	-2	-3	Unrewarding
Not Frightening	+3	+2	+1	0	-1	-2	-3	Frightening

Q4(a). People who are **important to me** would think I 'should'/'should **not**' **not donate blood** at the next blood donation sessions in Bangor University.

Should donate						Should not donate
-3	-2	-1	0	+1	+2	+3

Q4(b). People who are **important to me** would 'approve'/disapprove' of me **not donating blood** at the next blood donation sessions in Bangor University.

Approve						Disapprove
+3	+2	+1	0	-1	-2	-3

Q4(c). People who are **like me** would think I 'should'/'should **not**' **not donate blood** at the next blood donation sessions in Bangor University.

Should donate						Should not donate
-3	-2	-1	0	+1	+2	+3

P.T.O for Q4(d)

Q4(d). People who are **like me** would 'approve'/disapprove' of me **not donating blood** at the next blood donation sessions in Bangor University.

Approve						Disapprove
+3	+2	+1	0	-1	-2	-3

Q5(a). For me, **not donating blood** at the next blood donation sessions in Bangor University would be

Easy						Difficult
+3	+2	+1	0	-1	-2	-3

Q5(b). I am confident that I am able to **not donate blood** at the next blood donation sessions in Bangor University.

Strongly agree						Strongly disagree
+3	+2	+1	0	-1	-2	-3

Q5(c). **Not donating blood** at the next blood donation sessions in Bangor University is completely up to me.

Strongly agree						Strongly disagree
+3	+2	+1	0	-1	-2	-3

Q5(d). I am confident that I am able to overcome any obstacles that would prevent me from **not donating** blood at the next blood donation sessions in Bangor University.

Strongly agree						Strongly disagree
+3	+2	+1	0	-1	-2	-3

Q6. My **not donating blood** at the next blood donation sessions in Bangor University will

	Very Likely						Very Unlikely
(a) not help people who need blood	6	5	4	3	2	1	0
(b) give me more time to do other things	6	5	4	3	2	1	0
(c) result in less blood being available in blood banks	6	5	4	3	2	1	0
(d) avoid the hassle of making an appointment	6	5	4	3	2	1	0
(e) make me feel disappointed in myself	6	5	4	3	2	1	0
(f) avoid pain and discomfort	6	5	4	3	2	1	0
(g) avoid me feeling nervous or tense	6	5	4	3	2	1	0
(h) avoid me being frightened of blood and/or needles	6	5	4	3	2	1	0

P.T.O for Q7

Q7. I believe that for me

	Very Good						Very bad
(a) not helping people who need blood would be	6	5	4	3	2	1	0
(b) having more time to do other things would be	6	5	4	3	2	1	0
(c) less blood being available in blood banks would be	6	5	4	3	2	1	0
(d) avoiding the hassle of making an appointment would be	6	5	4	3	2	1	0
(e) feeling disappointed in myself would be	6	5	4	3	2	1	0
(f) avoiding pain and discomfort would be	6	5	4	3	2	1	0
(g) avoiding feeling nervous or tense would be	6	5	4	3	2	1	0
(h) avoiding being frightened of blood and/or needles would be	6	5	4	3	2	1	0

Q8. Please indicate **how likely** it is that the following groups think you should **not donate blood** at the next blood donation session in Bangor University.

	Very Likely						Very Unlikely
(a) Your friends	6	5	4	3	2	1	0
(b) Your parents	6	5	4	3	2	1	0
(c) Your family	6	5	4	3	2	1	0
(d) My religious organisation	6	5	4	3	2	1	0
(e) Blood donors	6	5	4	3	2	1	0
(f) Blood transfusion recipients	6	5	4	3	2	1	0

Q9. Please indicate **how much**, in general, you want to do what the following groups think you should do.

	Not at all						Very much
(a) Your friends	0	1	2	3	4	5	6
(b) Your parents	0	1	2	3	4	5	6
(c) Your family	0	1	2	3	4	5	6
(d) My religious organisation	0	1	2	3	4	5	6
(e) Blood donors	0	1	2	3	4	5	6
(f) Blood transfusion recipients	0	1	2	3	4	5	6

P.T.O for Q10

Q10. Please indicate **how likely** it is that each of the following factors would **make it easy or enable you to not donate blood** at the next blood donation sessions at Bangor University.

	Very Likely						Very Unlikely
(a) No convenient appointments	6	5	4	3	2	1	0
(b) Having a busy schedule	6	5	4	3	2	1	0
(c) Having other commitments	6	5	4	3	2	1	0
(d) Not being aware of the blood sessions	6	5	4	3	2	1	0

Q11. Please indicate **how important** each of the following factors is **in influencing you to not donate blood** at the next blood donation sessions at Bangor University.

	Not at all Important						Very Important
(a) No convenient appointments	0	1	2	3	4	5	6
(b) Having a busy schedule	0	1	2	3	4	5	6
(c) Having other commitments	0	1	2	3	4	5	6
(d) Not being aware of the blood sessions	0	1	2	3	4	5	6

Q12. Please indicate **how likely** it is that each of the following factors would make it **difficult or prevent you from not donating blood** at the next blood donation sessions at Bangor University.

	Very Likely						Very Unlikely
(a) Friends donating blood	6	5	4	3	2	1	0
(b) Someone you know needing blood	6	5	4	3	2	1	0
(c) Someone you know wanting you to donate blood with them							

Q13. Please indicate **how important** each of the following factors is in **influencing you to not donate blood** at the next blood donation sessions at Bangor University.

	Not at all Important						Very Important
(a) Friends donating blood	0	1	2	3	4	5	6
(b) Someone you know needing blood	0	1	2	3	4	5	6
(c) Someone you know wanting you to donate blood with them	0	1	2	3	4	5	6

P.T.O for Q14

Q14. Thinking about the next blood donation sessions at Bangor University, if I choose to **NOT** donate blood at the sessions...

	Not at all						Very Much
(a) I would regret it	0	1	2	3	4	5	6
(b) it would bother me	0	1	2	3	4	5	6
(c) I would be disappointed	0	1	2	3	4	5	6
(d) I would feel guilty	0	1	2	3	4	5	6
(e) I would feel tense	0	1	2	3	4	5	6
(f) I would feel apologetic	0	1	2	3	4	5	6
(g) I would feel I am in the wrong	0	1	2	3	4	5	6

Q15. Final section: Facts about you

Gender: Male [ ] Female [ ]

Age (years): _____

What is your nationality?

Welsh [ ] English [ ] Scottish [ ] Northern Irish [ ] British [ ]

Other (please specify) _____

Course type : Undergraduate [ ] Postgraduate Taught [ ] Postgraduate Research [ ]

Other (please specify) _____

Year of study: _____

Do you believe you would be eligible to donate blood, if you wanted to?

Yes [ ] No [ ] Don't know [ ]

Have you completed any other questionnaires about blood donation in the last month?

Yes [ ] No [ ] Don't know [ ]

Please indicate which statement best describes your past blood donation behaviour:

[ ] I have never donated blood
[ ] I have donated blood once
[ ] I have donated blood 2-10 times
[ ] I have donated blood 11-20 times
[ ] I have donated blood more than 20 times

P.T.O

Please indicate which statement best describes your past blood donation status:

[ ] I have never thought of donating blood myself
[ ] I have given some thought to donating blood
[ ] I have seriously considered donating blood
[ ] I have applied for information
[ ] I am considering registering for blood donation this year
[ ] I am considering registering for blood donation this month
[ ] I am a blood donor
[ ] I am a blood donor, but am considering withdrawing my registration
[ ] I used to be a blood donor, but I have withdrawn my registration

Blood donation session information

The questionnaire asked you to answer questions based on your opinions about not donating blood at Bangor University on Monday the 2nd June from 10.30am - 1pm and 2.30 – 5pm in Powis Hall. These blood donation sessions were fabricated for the purpose of the questionnaire and will therefore not take place. Information about donating blood, including details of local blood donation sessions, can be found at www.blood.co.uk

Thank you for completing our questionnaire

Please ensure that you have answered all of the questions and leave your completed questionnaire in the box labelled 'Blood Donation Study', which can be found next to the issue desk in the main library.

Appendix B - Study 2 Sunscreen

B.1 Ethics approval letter

COLEG BUSNES, Y GYFRAITH, ADDYSG A GWYDDORAU CYMDEITHAS
COLLEGE OF BUSINESS, LAW, EDUCATION AND SOCIAL SCIENCES

PRIFYSGOL BANGOR UNIVERSITY

1 July 2014

Dear Georgina

Re: Using and not using sunscreen

Thank you for your recent application to the CBLESS Research Ethics Committee.

The committee has considered your application and I am now able to give permission, on behalf of the CBLESS Research Ethics Committee, for the commencement of your research project.

I wish you well with your research.

Yours sincerely

Dr. Diane Seddon
Chair, CBLESS Research Ethics Committee

cc: Dr Edward Shui

Registered charity number: 1141565

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www.bangor.ac.uk

B.2 Elicitation study participant information and consent form

_ _ /_ _ / _ _

Participant Information
Sunscreen use belief-elicitation survey

You are invited to take part in a study about sunscreen use. The study aims to better understand the thoughts and feelings people have about using and not using sunscreen. You will be presented with X short statements and asked to write down the thoughts that come immediately to mind in response to each statement. You will then be asked a number of demographic questions such as your age, gender and goal weight. The survey should take approximately 5-10 minutes to complete. For completing the questionnaire satisfactorily, you will receive $X. For your survey to be accepted you must answer every question.
It is up to you to decide whether or not to take part in the study, participation is entirely voluntary and your responses will be treated confidentially. You are free to withdraw from the study at any time before completing the questionnaire, but it you do so you will not be paid.
The results of the study will be used in the researcher's PhD thesis. The results may also be used in articles submitted for publication, in presentations and reports. If you have any questions about the study or would like to receive a summary of the results once the study has been completed please contact Georgina Smith (abpee1@bangor.ac.uk). If you have concerns about any aspect of the study please contact Professor Edward Shiu (e.shiu@bangor.ac.uk).

I confirm that I have read and understood the participant information detailed above and consent to participate in this study.

I agree ☐

I disagree ☐

B.3 Elicitation study questionnaire

B.3.1 Using sunscreen

Sunscreen Study

Instructions: Please take a few minutes to tell us what you think about the possibility of using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity. Outdoor leisure activities include behaviors such as spending time at a pool, lake, beach or park, camping, playing sport or exercising.

There are no right or wrong responses; we are merely interested in your personal opinions.

In response to the questions below, please list the thoughts that come immediately to mind. Write each thought on a separate line.

Q1 - What do you see as the advantages of you using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Q2 - What do you see as the disadvantages of you using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Q3 - What else comes to mind when you think about using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

When it comes to you using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity, there might be individuals or groups who would approve or disapprove of you not performing this behaviour.

Q4a - Please list the individuals or groups who would approve of you using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Q4b - Please list the individuals or groups who would disapprove of you using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Sometimes, when we are not sure what to do, we look to see what others are doing.

Q5a - Please list the individuals or groups who are most likely to use sunscreen with an SPF of 15 or more the next time they engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Q5b - Please list the individuals or groups who are least likely to use sunscreen with an SPF of 15 or more the next time they engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Q6a - Please list any factors or circumstances that would make it easy or enable you to use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Q6b - Please list any factors or circumstances that would make it difficult or prevent you from using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Q7 - Imagine that you intend to use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity. What factors do you think **might lead you to actually NOT** use sunscreen with an SPF of 15 or more on this occasion?

_____ _____

_____ _____

_____ _____

Background Information

What is your age (years) *

_____

What is your gender *

Male	Female

What is your nationality *

_____

What is your city/state of residence *

_____

What is your highest education level *

Less or equal to high school	Some college	College graduate
Graduate School	Other, please specify	

What is your race and ethnicity? *

Asian/Pacific Islander	Black	Native American
White Hispanic	White non-Hispanic	Other, please specify

Which of the following would best describe your reaction to your first exposure to summer sun, without sunscreen, for one hour at midday? *

Always burn easily and never tan	Always burn easily and tan minimally
Burn moderately and tan gradually	Burn minimally and tan well
Burn rarely and tan profusely	Never burn with deep pigmentation

Thank you for completing our survey!

B.3.2 Not using sunscreen

Sunscreen Study

Instructions: Please take a few minutes to tell us what you think about the possibility of **not** using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity. Outdoor leisure activities include behaviors such as spending time at a pool, lake, beach or park, camping, playing sport or exercising.

There are no right or wrong responses; we are merely interested in your personal opinions.

In response to the questions below, please list the thoughts that come immediately to mind. Write each thought on a separate line.

Q1 - What do you see as the advantages of you **not** using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Q2 - What do you see as the disadvantages of you **not** using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Q3 - What else comes to mind when you think about **not** using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

When it comes to you **not** using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity, there might be individuals or groups who would approve or disapprove of you not performing this behaviour.

Q4a - Please list the individuals or groups who would approve of you **not** using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Q4b - Please list the individuals or groups who would disapprove of you **not** using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Sometimes, when we are not sure what to do, we look to see what others are doing.

Q5a - Please list the individuals or groups who are most likely to **not** use sunscreen with an SPF of 15 or more the next time they engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Q5b - Please list the individuals or groups who are least likely to **not** use sunscreen with an SPF of 15 or more the next time they engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Q6a - Please list any factors or circumstances that would make it easy or enable you to **not** use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Q6b - Please list any factors or circumstances that would make it difficult or prevent you from **not** using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity?

_____ _____

_____ _____

_____ _____

Q7 - Imagine that you intend to **not** use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity. What factors do you think **might lead you to actually** use sunscreen with an SPF of 15 or more on this occasion?

_____ _____

_____ _____

_____ _____

Background Information

What is your age (years) *

_____

What is your gender *

Male	Female

What is your nationality *

_____

What is your city/state of residence *

_____

What is your highest education level *

Less or equal to high school	Some college	College graduate
Graduate School	Other, please specify	

What is your race and ethnicity? *

Asian/Pacific Islander	Black	Native American
White Hispanic	White non-Hispanic	Other, please specify

Which of the following would best describe your reaction to your first exposure to summer sun, without sunscreen, for one hour at midday? *

Always burn easily and never tan	Always burn easily and tan minimally
Burn moderately and tan gradually	Burn minimally and tan well
Burn rarely and tan profusely	Never burn with deep pigmentation

Thank you for completing our survey!

B.4 Main study information sheet

_ _ /_ _ / _ _

Participant Information
Sunscreen use TPB study

You are invited to take part in a study about sunscreen use. The study aims to better understand the thoughts and feelings people have about using and not using sunscreen. Participation in this study will require you to complete two questionnaires. The first questionnaire should take no longer than 10 minutes to complete. In two weeks you will be asked to complete a follow-up questionnaire which should take no longer than 5 minutes to complete. Payment is dependent on the completion of both questionnaires. For completing both questionnaires satisfactorily, you will receive $*.

It is up to you to decide whether or not to take part in the study, participation is entirely voluntary and your responses will be treated confidentially. You are free to withdraw from the study at any time before completing the questionnaire. If you choose to withdraw from the study you will not be penalised or disadvantaged in any way.

The results of the study will be used in the researcher's PhD thesis. The results may also be used in articles submitted for publication, in presentations and reports. If you have any questions about the study or would like to receive a summary of the results once the study has been completed please contact Georgina Smith (abpee1@bangor.ac.uk). If you have concerns about any aspect of the study please contact Professor Edward Shiu (e.shiu@bangor.ac.uk).

I confirm that I have read and understood the participant information detailed above and consent to participate in this study.

I agree ☐

I disagree ☐

B.5 Main study questionnaire

B.5.1 Using sunscreen

Main Sunscreen Study Final Questionnaire
Using Sunscreen

Many questions in this survey will ask you to rate your opinion about using sunscreen with an SPF (Sun Protection Factor) of 15 or more the next time you engage in an outdoor leisure activity.

Outdoor leisure activities include behaviors such as spending time at a pool, lake, beach or park, camping, playing sport or exercising.

Please answer each of the following questions by selecting the number that best describes your opinion.

1a. How likely are you to use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity? *

Very unlikely	0	1	2	3	4	5	6	Very likely

1b. How strong is your intention to use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity? *

No intention at all	0	1	2	3	4	5	6	Very strong intention

1c. How much do you agree with this statement about you "I will use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity"? *

Strongly Disagree	0	1	2	3	4	5	6	Strongly Agree

2. Please indicate how you feel about using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity. *

	Not at all						Definitely
a. I want to use sunscreen	0	1	2	3	4	5	6
b. I have a strong desire to use sunscreen	0	1	2	3	4	5	6
c. I feel that there are compelling reasons for me to use sunscreen	0	1	2	3	4	5	6
d. I will try to use sunscreen	0	1	2	3	4	5	6
e. I have taken steps to ensure that I will use sunscreen	0	1	2	3	4	5	6
f. I have made plans to use sunscreen	0	1	2	3	4	5	6

3. For me to use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity would be *

a. Pleasant	+3	+2	+1	0	-1	-2	-3	Unpleasant
b. Enjoyable	+3	+2	+1	0	-1	-2	-3	Unenjoyable
c. Beneficial	+3	+2	+1	0	-1	-2	-3	Harmful
d. Satisfactory	+3	+2	+1	0	-1	-2	-3	Unsatisfactory
e. Good	+3	+2	+1	0	-1	-2	-3	Bad
f. Positive	+3	+2	+1	0	-1	-2	-3	Negative

4a. People who are important to me would think I 'should'/'should not' use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity. *

Should	+3	+2	+1	0	-1	-2	-3	Should not

4b. People who are important to me would 'approve'/disapprove' of me using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity. *

Approve	+3	+2	+1	0	-1	-2	-3	Disapprove

4c. People who are like me would think I 'should'/'should not' use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity. *

Should	+3	+2	+1	0	-1	-2	-3	Should not

4d. People who are like me would 'approve'/disapprove' of me using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity. *

Approve	+3	+2	+1	0	-1	-2	-3	Disapprove

5a. For me, using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity would be *

Easy	+3	+2	+1	0	-1	-2	-3	Difficult

5b. I am confident that I am able to use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity. *

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

5c.Using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity is completely up to me. *

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

5d. I am confident that I am able to overcome any obstacles that would prevent me from using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity. *

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

6. If I use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity it will *

	Not at all						Very much
a. prevent sunburn	0	1	2	3	4	5	6
b. prevent skin cancer	0	1	2	3	4	5	6
c. protect me from UV rays	0	1	2	3	4	5	6
d. ease my mind	0	1	2	3	4	5	6
e. cost me money	0	1	2	3	4	5	6
f. make me smell of sunscreen	0	1	2	3	4	5	6
g. take time to apply	0	1	2	3	4	5	6
h. make my skin feel sticky	0	1	2	3	4	5	6
i. feel uncomfortable	0	1	2	3	4	5	6
j. be a healthy thing to do	0	1	2	3	4	5	6

7. I believe that for me *

	Very bad						Very good
a. preventing sunburn would be	0	1	2	3	4	5	6
b. preventing skin cancer would be	0	1	2	3	4	5	6
c. protecting myself from UV rays would be	0	1	2	3	4	5	6
d. easing my mind would be	0	1	2	3	4	5	6
e. sunscreen costing me money would be	0	1	2	3	4	5	6
f. smelling of sunscreen would be	0	1	2	3	4	5	6
g. taking the time to apply sunscreen would be	0	1	2	3	4	5	6
h. my skin feeling sticky would be	0	1	2	3	4	5	6
i. feeling uncomfortable	0	1	2	3	4	5	6
j. doing something healthy would be	0	1	2	3	4	5	6

8. Please indicate how likely it is that the following groups think you should use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity.

	Very unlikely						Very likely
a. Your friends	0	1	2	3	4	5	6
b. Your family	0	1	2	3	4	5	6
c. Your partner	0	1	2	3	4	5	6
d. Your parents	0	1	2	3	4	5	6
e. Your doctor	0	1	2	3	4	5	6
f. People you know who have/have had skin cancer	0	1	2	3	4	5	6
g. Teenagers you know	0	1	2	3	4	5	6
h. People you know who have a dark skin tone	0	1	2	3	4	5	6
i. People you know who don't care about the risks of not using sunscreen	0	1	2	3	4	5	6

9. Please indicate how much, in general, you want to do what the following groups think you should do.

	Not at all						Very much
a. Your friends	0	1	2	3	4	5	6
b. Your family	0	1	2	3	4	5	6
c. Your partner	0	1	2	3	4	5	6
d. Your parents	0	1	2	3	4	5	6
e. Your doctor	0	1	2	3	4	5	6
f. People you know who have/have had skin cancer	0	1	2	3	4	5	6
g. Teenagers you know	0	1	2	3	4	5	6
h. People you know who have a dark skin tone	0	1	2	3	4	5	6
i. People you know who don't care about the risks of not using sunscreen	0	1	2	3	4	5	6

10. Please indicate how likely it is that each of the following factors would make it easy or enable you to use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity. *

	Very unlikely						Very likely
a. Cheaper sunscreen	0	1	2	3	4	5	6
b. Having spray on sunscreen	0	1	2	3	4	5	6
c. Sunscreen being available at the locations you would use it	0	1	2	3	4	5	6
d. Sunscreen being easy to carry around	0	1	2	3	4	5	6

11. Please indicate the extent to which each of the following factors would make it easy or enable you to use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity. *

	Not at all						Very much
a. Cheaper sunscreen	0	1	2	3	4	5	6
b. Having spray on sunscreen	0	1	2	3	4	5	6
c. Sunscreen being available at the locations you would use it	0	1	2	3	4	5	6
d. Sunscreen being easy to carry around	0	1	2	3	4	5	6

12. Please indicate how likely it is that each of the following factors would make it difficult or prevent you from using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity *

	Very unlikely						Very likely
a. Not having the money to buy sunscreen	0	1	2	3	4	5	6
b. Forgetting to take sunscreen out with you	0	1	2	3	4	5	6
c. Not having sunscreen when you want it	0	1	2	3	4	5	6

13. Please indicate the extent to which each of the following factors would make it difficult or prevent you from using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity. *

	Not at all						Very much
a. Not having the money to buy sunscreen	0	1	2	3	4	5	6
b. Forgetting to take sunscreen out with you	0	1	2	3	4	5	6
c. Not having sunscreen when you want it	0	1	2	3	4	5	6

14. If I choose to NOT use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity… *

	Not at all						Very much
a. I would regret it	0	1	2	3	4	5	6
b. It would bother me	0	1	2	3	4	5	6
c. I would be disappointed	0	1	2	3	4	5	6
d. I would feel guilty	0	1	2	3	4	5	6
e. I would feel tense	0	1	2	3	4	5	6
f. I would feel apologetic	0	1	2	3	4	5	6
g. I would feel I am in the wrong	0	1	2	3	4	5	6

Final section: Facts about you

What is your age (years) *

_____

What is your gender *

Male	Female

What is your nationality *

_____

What is your city/state of residence *

_____

What is your highest education level *

Less or equal to high school	Some college	College graduate
Graduate School	Other, please specify	

What is your race and ethnicity? *

Asian/Pacific Islander	Black	Native American
White Hispanic	White non-Hispanic	Other, please specify

Which of the following would best describe your reaction to your first exposure to summer sun, without sunscreen, for one hour at midday? *

Always burn easily and never tan	Always burn easily and tan minimally
Burn moderately and tan gradually	Burn minimally and tan well
Burn rarely and tan profusely	Never burn with deep pigmentation

Follow-up Using Sunscreen Questionnaire

Many of the questions in this survey will ask you about your use of sunscreen with an SPF of 15 or more when engaging in outdoor leisure activities.
Outdoor leisure activities include behaviors such as spending time at a pool, lake, beach or park, camping, playing sport or exercising.

Please think about the occasions when you engaged in an outdoor leisure activity since completing the first sunscreen survey (i.e. in the last two weeks).

1a. On how many separate occasions did you engage in an outdoor leisure activity in the past two weeks? *

Drop down options : 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 or more

1b. On how many of the above occasions did you use sunscreen with an SPF of 15 or more? *

Drop down options : 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 or more

2a. Think of the last time you engaged in an outdoor leisure activity. Did you use sunscreen with an SPF of 15 or more? *

Options: Yes, No

2b. Please list the main reasons why you did not use sunscreen with an SPF of 15 or more the last time you engaged in an outdoor leisure activity *

Open response format with 6 text boxes

3a. For me, using sunscreen with an SPF of 15 or more the last time I engaged in an outdoor leisure activity was *

Easy	+3	+2	+1	0	-1	-2	-3	Difficult

3b. Using sunscreen with an SPF of 15 or more the last time I engaged in an outdoor leisure activity was completely up to me. *

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

3c. I was able to overcome any obstacles that would prevent me from using sunscreen with an SPF of 15 or more last time I engaged in an outdoor leisure activity. *

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

Now cast your mind further back to the two weeks BEFORE you completed the first sunscreen survey.

4a. On how many separate occasions did you engage in an outdoor leisure activity during that two week period? *

Drop down options : 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 or more

4b. On how many of the above occasions did you use sunscreen with an SPF of 15 or more? *

Drop down options : 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 or more

Please cast you mind back to the last 12 months and think about the occasions when you have engaged in an outdoor leisure activity.

5. What percentage of these occasions did you use sunscreen with an SPF of 15 or more? *

Sliding scale: 1-100

B.5.2 Not using sunscreen

Not Using Sunscreen Main Survey

Many questions in this survey will ask you to rate your opinion about not using sunscreen with an SPF (Sun Protection Factor) of 15 or more the next time you engage in an outdoor leisure activity.

Outdoor leisure activities include behaviors such as spending time at a pool, lake, beach or park, camping, playing sport or exercising.

Please answer each of the following questions by selecting the number that best describes your opinion.

1a. How likely are you to not use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity? *

Very unlikely	0	1	2	3	4	5	6	Very likely

1b. How strong is your intention to not use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity? *

No intention at all	0	1	2	3	4	5	6	Very strong intention

1c. How much do you agree with this statement about you "I will not use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity"? *

Strongly Disagree	0	1	2	3	4	5	6	Strongly Agree

2. Please indicate how you feel about not using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity. *

	Not at all						Definitely
a. I want to not use sunscreen	0	1	2	3	4	5	6
b. I have a strong desire to not use sunscreen	0	1	2	3	4	5	6
c. I feel that there are compelling reasons for me to not use sunscreen	0	1	2	3	4	5	6
d. I will try to not use sunscreen	0	1	2	3	4	5	6
e. I have taken steps to ensure that I will not use sunscreen	0	1	2	3	4	5	6
f. I have made plans to not use sunscreen	0	1	2	3	4	5	6

3. For me to not use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity would be *

a. Pleasant	+3	+2	+1	0	-1	-2	-3	Unpleasant
b. Enjoyable	+3	+2	+1	0	-1	-2	-3	Unenjoyable
c. Beneficial	+3	+2	+1	0	-1	-2	-3	Harmful
d. Satisfactory	+3	+2	+1	0	-1	-2	-3	Unsatisfactory
e. Good	+3	+2	+1	0	-1	-2	-3	Bad
f. Positive	+3	+2	+1	0	-1	-2	-3	Negative

4a. People who are important to me would think I 'should'/'should not' not use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity. *

Should	+3	+2	+1	0	-1	-2	-3	Should not

4b. People who are important to me would 'approve'/disapprove' of me not using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity. *

Approve	+3	+2	+1	0	-1	-2	-3	Disapprove

4c. People who are like me would think I 'should'/'should not' not use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity. *

Should	+3	+2	+1	0	-1	-2	-3	Should not

4d. People who are like me would 'approve'/disapprove' of me not using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity. *

Approve	+3	+2	+1	0	-1	-2	-3	Disapprove

5a. For me, not using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity would be *

Easy	+3	+2	+1	0	-1	-2	-3	Difficult

5b. I am confident that I am able to not use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity. *

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

5c. Not using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity is completely up to me. *

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

5d. I am confident that I am able to overcome any obstacles that would prevent me from not using sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity. *

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

6. If I do not use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity *

	+3	**+2**	**+1**	**0**	**-1**	**-2**	**-3**
a. I will get sunburn	+3	+2	+1	0	-1	-2	-3
b. I will increase my risk of skin cancer	+3	+2	+1	0	-1	-2	-3
c. My skin won't feel greasy	+3	+2	+1	0	-1	-2	-3
d. I will save time putting it on	+3	+2	+1	0	-1	-2	-3
e. I will get a better tan	+3	+2	+1	0	-1	-2	-3
f. I won't smell of sunscreen	+3	+2	+1	0	-1	-2	-3
g. I will save money	+3	+2	+1	0	-1	-2	-3
h. It will damage my skin	+3	+2	+1	0	-1	-2	-3

7. I believe that for me *

	+3	**+2**	**+1**	**0**	**-1**	**-2**	**-3**
a. Getting sunburn would be	+3	+2	+1	0	-1	-2	-3
b. Increasing my risk of skin cancer would be	+3	+2	+1	0	-1	-2	-3
c. My skin feeling greasy would be	+3	+2	+1	0	-1	-2	-3
d. Saving time putting sunscreen on would be	+3	+2	+1	0	-1	-2	-3
e. Getting a better tan would be	+3	+2	+1	0	-1	-2	-3
f. Not smelling of sunscreen would be	+3	+2	+1	0	-1	-2	-3
g. Saving money would be	+3	+2	+1	0	-1	-2	-3
h. Damage to my skin would be	+3	+2	+1	0	-1	-2	-3

8. Please indicate how likely it is that the following groups think you should not use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity.

	+3	**+2**	**+1**	**0**	**-1**	**-2**	**-3**
a. Your friends	+3	+2	+1	0	-1	-2	-3
b. Your family	+3	+2	+1	0	-1	-2	-3
c. Your partner	+3	+2	+1	0	-1	-2	-3
d. Your dermatologist	+3	+2	+1	0	-1	-2	-3
e. Your doctor	+3	+2	+1	0	-1	-2	-3
f. People you know who tan	+3	+2	+1	0	-1	-2	-3
g. Young adults you know	+3	+2	+1	0	-1	-2	-3
h. People you know who have a light skin tone	+3	+2	+1	0	-1	-2	-3
i. People you know who have a dark skin tone	+3	+2	+1	0	-1	-2	-3

9. Please indicate how much, in general, you want to do what the following groups think you should do.

	+3	**+2**	**+1**	**0**	**-1**	**-2**	**-3**
a. Your friends	+3	+2	+1	0	-1	-2	-3
b. Your family	+3	+2	+1	0	-1	-2	-3
c. Your partner	+3	+2	+1	0	-1	-2	-3
d. Your dermatologist	+3	+2	+1	0	-1	-2	-3
e. Your doctor	+3	+2	+1	0	-1	-2	-3
f. People you know who tan	+3	+2	+1	0	-1	-2	-3
g. Young adults you know	+3	+2	+1	0	-1	-2	-3
h. People you know who have a light skin tone	+3	+2	+1	0	-1	-2	-3
i. People you know who have a dark skin tone	+3	+2	+1	0	-1	-2	-3

10. Please indicate how likely it is that each of the following factors would make it easy or enable you to not use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity. *

	Not at all						Very Much
a. Forgetting to take it with me	0	1	2	3	4	5	6
b. Being at a location with shade or under cover	0	1	2	3	4	5	6
c. If it was cloudy or not very hot	0	1	2	3	4	5	6
d. If I wore clothing which covered up my skin	0	1	2	3	4	5	6
e. If the sunscreen was greasy	0	1	2	3	4	5	6

11. Please indicate the extent to which each of the following factors would make it easy or enable you to not use sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity. *

	Not at all						Very Much
a. Forgetting to take it with me	0	1	2	3	4	5	6
b. Being at a location with shade or under cover	0	1	2	3	4	5	6
c. If it was cloudy or not very hot	0	1	2	3	4	5	6
d. If I wore clothing which covered up my skin	0	1	2	3	4	5	6
e. If the sunscreen was greasy	0	1	2	3	4	5	6

12. Please indicate how likely it is that each of the following factors would make it difficult or prevent you from not using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity. *

	Not at all						Very Much
a. Having sunburn	0	1	2	3	4	5	6
b. Someone I know getting skin cancer	0	1	2	3	4	5	6
c. Very hot weather	0	1	2	3	4	5	6

13. Please indicate the extent to which each of the following factors would make it difficult or prevent you from not using sunscreen with an SPF of 15 or more the next time you engage in an outdoor leisure activity. *

	Not at all						Very Much
a. Having sunburn	0	1	2	3	4	5	6
b. Someone I know getting skin cancer	0	1	2	3	4	5	6
c. Very hot weather	0	1	2	3	4	5	6

14. If I choose to NOT use sunscreen with an SPF of 15 or more the next time I engage in an outdoor leisure activity… *

	Not at all						Very much
a. I would regret it	0	1	2	3	4	5	6
b. It would bother me	0	1	2	3	4	5	6
c. I would be disappointed	0	1	2	3	4	5	6
d. I would feel guilty	0	1	2	3	4	5	6
e. I would feel tense	0	1	2	3	4	5	6
f. I would feel apologetic	0	1	2	3	4	5	6
g. I would feel I am in the wrong	0	1	2	3	4	5	6

Final section: Facts about you

What is your age (years) *

_____

What is your gender *

Male	Female

What is your nationality *

_____

What is your city/state of residence *

_____

What is your highest education level *

Less or equal to high school	Some college	College graduate
Graduate School	Other, please specify	

What is your race and ethnicity? *

Asian/Pacific Islander	Black	Native American
White Hispanic	White non-Hispanic	Other, please specify

Which of the following would best describe your reaction to your first exposure to summer sun, without sunscreen, for one hour at midday? *

Always burn easily and never tan	Always burn easily and tan minimally
Burn moderately and tan gradually	Burn minimally and tan well
Burn rarely and tan profusely	Never burn with deep pigmentation

Follow-up Using Sunscreen Questionnaire

Many of the questions in this survey will ask you about your use of sunscreen with an SPF of 15 or more when engaging in outdoor leisure activities.
Outdoor leisure activities include behaviors such as spending time at a pool, lake, beach or park, camping, playing sport or exercising.

Please think about the occasions when you engaged in an outdoor leisure activity since completing the first sunscreen survey (i.e. in the last two weeks).

1a. On how many separate occasions did you engage in an outdoor leisure activity in the past two weeks? *

Drop down options : 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 or more

1b. On how many of the above occasions did you NOT use sunscreen with an SPF of 15 or more? *

Drop down options : 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 or more

2a. Think of the last time you engaged in an outdoor leisure activity. Did you use sunscreen with an SPF of 15 or more? *

Options: Yes, No

2b. Please list the main reasons why you used sunscreen with an SPF of 15 or more the last time you engaged in an outdoor leisure activity *

Open response format with 6 text boxes

3a. For me, NOT using sunscreen with an SPF of 15 or more the last time I engaged in an outdoor leisure activity was *

Easy	+3	+2	+1	0	-1	-2	-3	Difficult

3b. NOT using sunscreen with an SPF of 15 or more the last time I engaged in an outdoor leisure activity was completely up to me. *

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

3c. I was able to overcome any obstacles that would prevent me from NOT using sunscreen with an SPF of 15 or more last time I engaged in an outdoor leisure activity. *

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

Now cast your mind further back to the two weeks BEFORE you completed the first sunscreen survey.

4a. On how many separate occasions did you engage in an outdoor leisure activity during that two week period? *

Drop down options : 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 or more

4b. On how many of the above occasions did you NOT use sunscreen with an SPF of 15 or more? *

Drop down options : 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 or more

Please cast you mind back to the last 12 months and think about the occasions when you have engaged in an outdoor leisure activity.

5. What percentage of these occasions did you NOT use sunscreen with an SPF of 15 or more? *

Sliding scale: 1-100

Appendix C - Study 3 High-calorie snack consumption

C.1 Ethics approval letter

COLEG BUSNES, Y GYFRAITH, ADDYSG A GWYDDORAU CYMDEITHAS
COLLEGE OF BUSINESS, LAW, EDUCATION AND SOCIAL SCIENCES

PRIFYSGOL
BANGOR
UNIVERSITY

31 March 2015

Dear Georgina Smith

Re: **Exploring the application of the theory of planned behaviour to eating and not eating high calory snacks.**

Thank you for your recent application to the CBLESS Research Ethics Committee.

The committee has considered your application and I am now able to give permission, on behalf of the CBLESS Research Ethics Committee, for the commencement of your research project.

I wish you well with your research.

Diolch am eich cais diweddar i Bwyllgor Ymchwil Moeseg CBLESS.

Mae'r pwyllgor wedi ystyried eich cais, ac fe wyf yn awr mewn sefyllfa i roi caniatâd, ar ran y Pwyllgor Ymchwil Moeseg CBLESS, i chi gychwyn eich prosiect ymchwil.

Dymunaf yn dda i chi gyda'ch ymchwil.

Yours sincerely/Yn gywir iawn

John Bailey

Vice-Chair, CBLESS Research Ethics Committee
Is-Gadair, Pwyllgor Ymchwil Moeseg CBLESS

Cc: Edward Shiu

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YR ATHRO/PROFESSOR PHIL MOLYNEUX BA, Mphil, PhD
DEON Y COLEG/DEAN OF COLLEGE

www.bangor.ac.uk

Registered charity number: 1141565

C.2 Elicitation study participant information and consent form

PRIFYSGOL BANGOR UNIVERSITY

_ _ /_ _ / _ _

Participant Information
High-calorie snack belief-elicitation survey

You are invited to take part in a study about high-calorie snack consumption. The study aims to better understand the thoughts and feelings people have about eating and not eating high-calorie snacks. You will be presented with X short statements and asked to write down the thoughts that come immediately to mind in response to each statement. You will then be asked a number of demographic questions such as your age, gender and goal weight. The survey should take approximately 5-10 minutes to complete. For completing the questionnaire satisfactorily, you will receive $X. For your survey to be accepted you must answer every question.

It is up to you to decide whether or not to take part in the study, participation is entirely voluntary and your responses will be treated confidentially. You are free to withdraw from the study at any time before completing the questionnaire, but it you do so you will not be paid.

The results of the study will be used in the researcher's PhD thesis. The results may also be used in articles submitted for publication, in presentations and reports. If you have any questions about the study or would like to receive a summary of the results once the study has been completed please contact Georgina Smith (abpee1@bangor.ac.uk). If you have concerns about any aspect of the study please contact Professor Edward Shiu (e.shiu@bangor.ac.uk).

I confirm that I have read and understood the participant information detailed above and consent to participate in this study.

I agree ☐

I disagree ☐

*Payment amount was at MTurk's recommended rate

Declaration (Students)
(PhD, MPhil, MA by Research, MA Taught and Undergraduate Degrees)

A scanned copy of this declaration should be emailed to Anwen Evans, Secretary, CBLESS Ethics Committee (CBLESSEthics@bangor.ac.uk).

This should be accompanied by:

1. A copy of the research proposal detailing any risk as defined in the University's Ethics Policy.
2. Copies of relevant supporting documentation (for example, letters of invitation to study participants, participant information sheets and consent forms).

Prior to undertaking any research projects, students should familiarise themselves with the University's Research Ethics Policy:
http://www.bangor.ac.uk/ar/ro/recordsmanagement/REF.php

Projects entailing no risk, as that term is understood in the context of the Ethics Policy, are generally projects that do not entail the collection of primary data from subjects. They **do not** have to be referred to the Ethics Committee for approval. Examples of **no risk**:

1. Statistical analyses of time series data published by the Office of National Statistics to investigate the impact of fiscal policy on unemployment.
2. Investigations of interlocking membership on executive boards and executive remuneration committees in the not-for-profit social enterprise companies, conducted using data obtained from government agencies, commercial databases and other public records.
3. Investigation of the British Crime Survey data to examine why some police authorities appear to be more efficient than others.

Students should note that the following research activities would normally be considered as involving more than minimal risk and, consequently, **require ethical review** by the College Ethics Committee:

1. Research involving vulnerable groups – for example, children and young people, those with a learning disability or cognitive impairment, or individuals in a dependent or unequal relationship.
2. Research involving sensitive topics – for example, participants' sexual behaviour, their illegal or political behaviour, their experience of violence, their abuse or exploitation, their mental health, or their gender or ethnic status.
3. Research involving groups where permission of a gatekeeper is normally required for initial access to members.
4. Research necessarily involving deception or which is conducted without participants' full and informed consent at the time the study is carried out.
5. Research involving access to records of personal or confidential information, including genetic and other biological information, concerning identifiable individuals.
6. Research that would induce psychological stress, anxiety or humiliation or cause more than minimal pain.
7. Research involving intrusive interventions – for example, the administration of drugs or other substances, vigorous physical exercise, or techniques such as hypnotherapy.

Data Protection
If it is anticipated that human participants will be engaged, duly signed consent forms and information sheets should be drawn up and copies lodged with the secretary of the College Ethics Committee. Special attention must be given to compliance with the legal requirement of checks by the Criminal Records Bureau.

Declaration
The declaration must be accompanied by the research proposal and relevant supporting documentation. It should be signed by the student and then counter-signed by the supervisor.

I certify that I have read the University Research Ethics Policy. The issues raised there that are relevant for this research project are described in the attached research proposal.

(Sd)..... Date 17.03.15

Student (NAME): GEORGINA SMITH

I agree with the declaration above

(Sd)..... Date 17.03.15

Supervisor (NAME): PROF. EDWARD SHILO

C.3 Elicitation study questionnaire

C.3.1 Eating high-calorie snacks

Eating High-calorie snack Study

Snacks refer to food consumed between main meals (breakfast, lunch and dinner). High-calorie snacks include foods such as cookies, cakes, pastries, candy, pizza, hot dogs, potato chips etc.

Instructions: Please take a few minutes to tell us what you think about the possibility of eating high-calorie snacks in the next two weeks. There are no right or wrong responses; we are merely interested in your personal opinions.

In response to the questions below, please list the thoughts that come immediately to mind. Write each thought on a separate line.

Q1a - What do you see as the advantages of you eating high-calorie snacks in the next two weeks?

_____ _____

_____ _____

_____ _____

Q1b - Please list the things that you would like or enjoy about eating high-calorie snacks in the next two weeks?

_____ _____

_____ _____

_____ _____

Q2a - What do you see as the disadvantages of you eating high-calorie snacks in the next two weeks?

_____ _____

_____ _____

_____ _____

Q2b - Please list the things that you would dislike or hate about eating high-calorie snacks in the next two weeks?

_____ _____

_____ _____

_____ _____

Q3 - What else comes to mind when you think about eating high-calorie snacks in the next two weeks?

_____ _____

_____ _____

_____ _____

Q4 - What do you think are the possible outcomes of you eating high-calorie snacks in the next two weeks?

_____ _____

_____ _____

_____ _____

When it comes to you eating high-calorie snacks in the next two weeks, there might be individuals or groups who would approve or disapprove of you performing this behaviour.

Q5 - Please list the individuals or groups who would approve of you eating high-calorie snacks in the next two weeks.

_____ _____

_____ _____

_____ _____

Q6 - Please list the individuals or groups who would disapprove of you eating high-calorie snacks in the next two weeks.

_____ _____

_____ _____

_____ _____

Sometimes, when we are not sure what to do, we look to see what others are doing.

Q7 - Please list the individuals or groups who are most likely to eat high-calorie snacks in the next two weeks.

_____ _____

_____ _____

_____ _____

Q8 - Please list the individuals or groups who are least likely to eat high-calorie snacks in the next two weeks.

_____ _____

_____ _____

_____ _____

Q9 - Please list any factors or circumstances that would make it easy or enable you to eat high-calorie snacks in the next two weeks.

_____ _____

_____ _____

_____ _____

Q10 - Please list any factors or circumstances that would make it difficult or prevent you from eating high-calorie snacks in the next two weeks.

_____ _____

_____ _____

_____ _____

Q11 - Imagine that you intend to eat high-calorie snacks in the next two weeks. What factors do you think might lead you to actually not eat high-calorie snacks in the next two weeks?

_____ _____

_____ _____

_____ _____

Background Information

Gender : Male [ ] Female [ ]

Age (years) : _____

Nationality: _____

Highest education level:
Less or equal to high school [ ] Some college [ ]
College graduate [ ] Graduate school [ ] Other, please specify _____

Height: ___ foot ____inches

Weight: ____ lb

In the next two weeks, what is your weight related aim?
Lose weight [ ] Gain weight [ ] Maintain weight [ ]

Please briefly describe your dieting regime.
_____
_____
_____

C.3.2 Not eating high-calorie snacks

Not Eating High-calorie snack Study

Snacks refer to food consumed between main meals (breakfast, lunch and dinner). High-calorie snacks include foods such as cookies, cakes, pastries, candy, pizza, hot dogs, potato chips etc.

Instructions: Please take a few minutes to tell us what you think about the possibility of **NOT** eating high-calorie snacks in the next two weeks. There are no right or wrong responses; we are merely interested in your personal opinions.

In response to the questions below, please list the thoughts that come immediately to mind. Write each thought on a separate line.

Q1a - What do you see as the advantages of you NOT eating high-calorie snacks in the next two weeks?

_____ _____

_____ _____

_____ _____

Q1b - Please list the things that you would like or enjoy about NOT eating high-calorie snacks in the next two weeks?

_____ _____

_____ _____

_____ _____

Q2a - What do you see as the disadvantages of you NOT eating high-calorie snacks in the next two weeks?

_____ _____

_____ _____

_____ _____

Q2b - Please list the things that you would dislike or hate about NOT eating high-calorie snacks in the next two weeks?

_____ _____

_____ _____

_____ _____

Q3 - What else comes to mind when you think about NOT eating high-calorie snacks in the next two weeks?

_____ _____

_____ _____

_____ _____

Q4 - What do you think are the possible outcomes of you NOT eating high-calorie snacks in the next two weeks?

_____ _____

_____ _____

_____ _____

When it comes to you NOT eating high-calorie snacks in the next two weeks, there might be individuals or groups who would approve or disapprove of you performing this behaviour.

Q5 - Please list the individuals or groups who would approve of you NOT eating high-calorie snacks in the next two weeks.

_____ _____

_____ _____

_____ _____

Q6 - Please list the individuals or groups who would disapprove of you NOT eating high-calorie snacks in the next two weeks.

_____ _____

_____ _____

_____ _____

Sometimes, when we are not sure what to do, we look to see what others are doing.

Q7 - Please list the individuals or groups who are most likely to NOT eat high-calorie snacks in the next two weeks.

_____ _____

_____ _____

_____ _____

Q8 - Please list the individuals or groups who are least likely to NOT eat high-calorie snacks in the next two weeks.

_____ _____

_____ _____

_____ _____

Q9 - Please list any factors or circumstances that would make it easy or enable you to NOT eat high-calorie snacks in the next two weeks.

_____ _____

_____ _____

_____ _____

Q10 - Please list any factors or circumstances that would make it difficult or prevent you from NOT eating high-calorie snacks in the next two weeks.

_____ _____

_____ _____

_____ _____

Q11 - Imagine that you intend to NOT eat high-calorie snacks in the next two weeks. What factors do you think might lead you to actually eat high-calorie snacks in the next two weeks?

_____ _____

_____ _____

_____ _____

Background Information

Gender : Male [ ] Female [ ]

Age (years) : _____

Nationality: _____

Highest education level:
Less or equal to high school [ ] Some college [ ]
College graduate [ ] Graduate school [ ] Other, please specify _____

Height: ___ foot ____inches

Weight: ____ lb

In the next two weeks, what is your weight related aim?
Lose weight [ ] Gain weight [ ] Maintain weight [ ]

Please briefly describe your dieting regime.
_____
_____
_____

C.4 Main study participant information and consent forms

PRIFYSGOL BANGOR UNIVERSITY

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Participant Information
High-calorie snack consumption TPB study

You are invited to take part in a study about high-calorie snack consumption. The study aims to better understand the thoughts and feelings people have about eating and not eating high-calorie snacks. Participation in this study will require you to complete two questionnaires. The first questionnaire should take no longer than x minutes to complete. Approximately two weeks after completing the first survey you will be asked to complete a follow-up questionnaire which should take no longer than 5 minutes to complete. Payment is dependent on the completion of both questionnaires. For completing both questionnaires satisfactorily, you will receive $*.

It is up to you to decide whether or not to take part in the study, participation is entirely voluntary and your responses will be treated confidentially. You are free to withdraw from the study at any time before completing the questionnaire, however if you do so you will not be paid.

The results of the study will be used in the researcher's PhD thesis. The results may also be used in articles submitted for publication, in presentations and reports. If you have any questions about the study or would like to receive a summary of the results once the study has been completed please contact Georgina Smith (abpee1@bangor.ac.uk). If you have concerns about any aspect of the study please contact Professor Edward Shiu (e.shiu@bangor.ac.uk).

I confirm that I have read and understood the participant information detailed above and consent to participate in this study.

I agree ☐

I disagree ☐

*Payment amount was at MTurk's recommended rate

C.5 Main study questionnaire

C.5.1 Eating high-calorie snacks

Eating High-calorie snack Survey

Many questions in this survey will ask you to rate your opinion about eating high-calorie snacks in the next two weeks. Snacks refer to food consumed between main meals (breakfast, lunch and dinner). High-calorie snacks include foods such as cookies, cakes, pastries, candy, pizza, hot dogs, potato chips etc.

Please answer each of the following questions by selecting the number that best describes your opinion. There are no right or wrong responses; we are merely interested in your personal opinions.

1a. How likely are you to eat high-calorie snacks in the next two weeks?

Very Unlikely	0	1	2	3	4	5	6	Very Likely

1b. How strong is your intention to eat high-calorie snacks in the next two weeks?

No intention at all	0	1	2	3	4	5	6	Very strong intention

1c. How much do you agree with this statement about you "I will eat high-calorie snacks in the next two weeks"?

Strongly Disagree	0	1	2	3	4	5	6	Strongly Agree

2. Please indicate how you feel about eating high-calorie snacks in the next two weeks.

	Not at all						Definitely
a. I want to eat high-calorie snacks	0	1	2	3	4	5	6
b. I need to eat high-calorie snacks	0	1	2	3	4	5	6
c. I have a strong desire to eat high-calorie snacks	0	1	2	3	4	5	6
d. I aim to eat high-calorie snacks	0	1	2	3	4	5	6
e. I will try to eat high-calorie snacks	0	1	2	3	4	5	6
f. I have made plans to eat high-calorie snacks	0	1	2	3	4	5	6
g. I have taken steps to enable me to eat high-calorie snacks	0	1	2	3	4	5	6

3. For me to eat high-calorie snacks in the next two weeks would be…

a. Pleasant	+3	+2	+1	0	-1	-2	-3	Unpleasant
b. Enjoyable	+3	+2	+1	0	-1	-2	-3	Unenjoyable
c. Relaxing	+3	+2	+1	0	-1	-2	-3	Stressful
d. Satisfying	+3	+2	+1	0	-1	-2	-3	Unsatisfying

5a. People who are important to me would think I 'should'/'should not' eat high-calorie snacks in the next two weeks

Should	+3	+2	+1	0	-1	-2	-3	Should not

5b. People who are important to me would 'approve'/disapprove' of me eating high-calorie snacks in the next two weeks

Approve	+3	+2	+1	0	-1	-2	-3	Disapprove

5c. People who are important to me would want me to eat high-calorie snacks in the next two weeks

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

5d. I feel under social pressure to eat high-calorie snacks in the next two weeks*

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

7a. For me, eating high-calorie snacks in the next two weeks would be…

Easy	+3	+2	+1	0	-1	-2	-3	Difficult

7b. I believe I have the ability to eat high-calorie snacks in the next two weeks'

Definitely do	+3	+2	+1	0	-1	-2	-3	Definitely do not

7c. I am confident that I am able to overcome any obstacles that would prevent me from eating high-calorie snacks in the next two weeks?

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

7d. How confident are you that you will be able to eat high-calorie snacks in the next weeks?

Very confident	+3	+2	+1	0	-1	-2	-3	Very unconfident

9. If I choose to eat high-calorie snacks in the next two weeks…

	Not at all						Very much
a. I would regret it	0	1	2	3	4	5	6
b. It would bother me	0	1	2	3	4	5	6
c. I would be disappointed	0	1	2	3	4	5	6

11. If I choose to eat high-calorie snacks in the next two weeks…

	Not at all						Very much
a. I would feel guilty	0	1	2	3	4	5	6
b. I would feel tense	0	1	2	3	4	5	6
c. I would feel apologetic	0	1	2	3	4	5	6
d. I would feel I am in the wrong	0	1	2	3	4	5	6

6. If I eat high-calorie snacks in the next two weeks it will…

	Very unlikely						Very likely
a. give me more energy	0	1	2	3	4	5	6
b. satisfy my cravings and hunger	0	1	2	3	4	5	6
c. taste good	0	1	2	3	4	5	6
d. be convenient	0	1	2	3	4	5	6
e. be enjoyable	0	1	2	3	4	5	6
f. be unhealthy	0	1	2	3	4	5	6
g. make me gain weight	0	1	2	3	4	5	6
h. lead to low energy	0	1	2	3	4	5	6
i. lead to long term health problems	0	1	2	3	4	5	6

7. I believe that for me

	Very bad						Very good
a. more energy would be	0	1	2	3	4	5	6
b. satisfying my cravings and hunger would be	0	1	2	3	4	5	6
c. food that taste good would be	0	1	2	3	4	5	6
d. convenience would be	0	1	2	3	4	5	6
e. enjoyment would be	0	1	2	3	4	5	6
f. being unhealthy would be	0	1	2	3	4	5	6
g. gaining weight would be	0	1	2	3	4	5	6
h. having low energy would be	0	1	2	3	4	5	6
i. long-term health problems would be	0	1	2	3	4	5	6

8. How likely it is that the following groups think you should eat high-calorie snacks in the next two weeks.

	Very unlikely						Very likely
a. your friends	0	1	2	3	4	5	6
b. your family	0	1	2	3	4	5	6
c. your doctor	0	1	2	3	4	5	6
d. your kids	0	1	2	3	4	5	6
e. your fitness instructor	0	1	2	3	4	5	6
f. snack retailers	0	1	2	3	4	5	6
g. overweight people you know	0	1	2	3	4	5	6
h. active people you know	0	1	2	3	4	5	6
i. health conscious people you know	0	1	2	3	4	5	6
j. people you know with a low income	0	1	2	3	4	5	6

9. How much, in general, do you want to do what the following groups think you should do?

	Not at all						Very much
a. friends	0	1	2	3	4	5	6
b. family	0	1	2	3	4	5	6
c. doctor	0	1	2	3	4	5	6
d. kids	0	1	2	3	4	5	6
e. fitness instructor	0	1	2	3	4	5	6
f. snack retailers	0	1	2	3	4	5	6
g. overweight people	0	1	2	3	4	5	6
h. active people	0	1	2	3	4	5	6
i. health conscious people	0	1	2	3	4	5	6
j. people with a low income	0	1	2	3	4	5	6

10. How likely it is that each of the following factors would make it easy or enable you to eat high-calorie snacks in the next two weeks.

	Very unlikely						Very likely
a. easily available	0	1	2	3	4	5	6
b. low cost	0	1	2	3	4	5	6
c. a special or social occasion	0	1	2	3	4	5	6

11. To what extent would each of the following factors make it easy or enable you to eat high-calorie snacks in the next two weeks?

	Not at all						Very much
a. easily available	0	1	2	3	4	5	6
b. low cost	0	1	2	3	4	5	6
c. a special or social occasion	0	1	2	3	4	5	6

12. How likely it is that each of the following factors would make it difficult or prevent you from eating high-calorie snacks in the next two weeks. *

	Very unlikely						Very likely
a. health concerns	0	1	2	3	4	5	6
b. not having them around	0	1	2	3	4	5	6
c. watching your weight	0	1	2	3	4	5	6
d. having no money	0	1	2	3	4	5	6

13. Please indicate the extent to which each of the following factors would make it difficult or prevent you from eating high-calorie snacks in the next two weeks

	Not at all						Very much
a. health concerns	0	1	2	3	4	5	6
b. not having them around	0	1	2	3	4	5	6
c. watching your weight	0	1	2	3	4	5	6
d. having no money	0	1	2	3	4	5	6

4. For me to eat high-calorie snacks in the next two weeks would be…

Beneficial	+3	+2	+1	0	-1	-2	-3	Harmful
Healthy	+3	+2	+1	0	-1	-2	-3	Unhealthy
Good	+3	+2	+1	0	-1	-2	-3	Bad
Positive	+3	+2	+1	0	-1	-2	-3	Negative
Satisfactory	+3	+2	+1	0	-1	-2	-3	Unsatisfactory

6a. How often do you think the people who are important to you will themselves eat high-calorie snacks in the next two weeks

Everyday	+3	+2	+1	0	-1	-2	-3	Never

6b. Of the people you know, how many do you think will eat high-calorie snacks in the next two weeks

All of them	+3	+2	+1	0	-1	-2	-3	None of them

6c. Most people important to me will eat high-calorie snacks in the next two weeks

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

8a. Whether or not I eat high-calorie snacks in the next two weeks is entirely up to me

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

8b. How much control do you feel you have over eating high-calorie snacks in the next 2 weeks?

Complete control	+3	+2	+1	0	-1	-2	-3	Very little control

8c. How much do you feel that eating high-calorie snacks in the next two weeks is beyond your control?

Very much	+3	+2	+1	0	-1	-2	-3	Not at all

10. If I choose to NOT eat high-calorie snacks in the next two weeks…

	Not at all						Very much 6
a. I would regret it	0	1	2	3	4	5	6
b. It would bother me	0	1	2	3	4	5	6
c. I would be disappointed	0	1	2	3	4	5	6

12. If I choose to NOT eat high-calorie snacks in the next two weeks…

	Not at all						Very much
a. I would feel guilty	0	1	2	3	4	5	6
b. I would feel tense	0	1	2	3	4	5	6
c. I would feel apologetic	0	1	2	3	4	5	6
d. I would feel I am in the wrong	0	1	2	3	4	5	6

13. In the last two weeks, how often have you eaten high-calorie snacks?

Never	0	1	2	3	4	5	6	Several times a day

Final section

Gender : Male [ ] Female [ ]

Age (years) : _____

Nationality: _____

Highest education level:
Less or equal to high school [ ] Some college [ ]
College graduate [ ] Graduate school [ ] Other, please specify _____

Height: ___ foot ____inches

Weight: ____ lb

In the next two weeks, what is your weight related aim?
Lose weight [ ] Gain weight [ ] Maintain weight [ ]

Please briefly describe your dieting regime.
_____
_____
_____

Follow-up Survey
Eating High-calorie snacks

Many of the questions in this survey will ask you about your eating high-calorie snacks in the last two weeks.
Snacks refer to food consumed been main meals (breakfast, lunch and dinner). High-calorie snacks include foods such as cookies, cakes, pastries, candy, hot dogs, pizza, potato chips etc.

Please think about the occasions when you have eaten high-calorie snacks since completing the first high-calorie snack survey (i.e. in the last two weeks).

1. In the last two weeks, have you eaten any high-calorie snacks?
Options: Yes No

2. On how many days did you eat high-calorie snacks in the last two weeks?
0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14

3a. For me, eating high-calorie snacks in the last two weeks was…

Difficult						Easy
0	1	2	3	4	5	6

3b. Eating high-calorie snacks was completely up to me.

Strongly disagree						Strongly agree
0	1	2	3	4	5	6

3c. I was able to overcome any obstacles that would prevent me from eating high-calorie snacks in the last two weeks.

Strongly disagree						Strongly agree
0	1	2	3	4	5	6

C.5.2 Not eating high-calorie snacks

Not Eating High-calorie snack Survey

The questions in the first part in this survey will ask you to rate your opinion about **not** eating high-calorie snacks in the next two weeks. Snacks refer to food consumed between main meals (breakfast, lunch and dinner). High-calorie snacks include foods such as cookies, cakes, pastries, candy, pizza, potato chips etc.

Please answer each of the following questions by selecting the number that best describes your opinion. There are no right or wrong responses; we are merely interested in your personal opinions.

1a. How likely are you to NOT eat high-calorie snacks in the next two weeks?

Very Unlikely	0	1	2	3	4	5	6	Very Likely

1b. How strong is your intention to NOT eat high-calorie snacks in the next two weeks?

No intention at all	0	1	2	3	4	5	6	Very Strong Intention

1c. How much do you agree with this statement about you "I will NOT eat high-calorie snacks in the next two weeks"?

Strongly Disagree	0	1	2	3	4	5	6	Strongly Agree

2. Please indicate how you feel about NOT eating high-calorie snacks in the next two weeks.

	Not at all						Definitely
a. I want to NOT eat high-calorie snacks	0	1	2	3	4	5	6
b. I need to NOT eat high-calorie snacks	0	1	2	3	4	5	6
c. I have a strong desire to NOT eat high-calorie snacks	0	1	2	3	4	5	6
d. I aim to NOT eat high-calorie snacks	0	1	2	3	4	5	6
e. I will try to NOT eat high-calorie snacks	0	1	2	3	4	5	6
f. I have made plans to NOT eat high-calorie snacks	0	1	2	3	4	5	6
g. I have taken steps to enable me to NOT eat high-calorie snacks	0	1	2	3	4	5	6

3. Please indicate how you feel about NOT eating high-calorie snacks in the next two weeks.

a. Pleasant	+3	+2	+1	0	-1	-2	-3	Unpleasant
b. Enjoyable	+3	+2	+1	0	-1	-2	-3	Unenjoyable
c. Relaxing	+3	+2	+1	0	-1	-2	-3	Stressful
d. Satisfying	+3	+2	+1	0	-1	-2	-3	Unsatisfying

5a. People who are important to me would think I 'should'/'should not' NOT eat high-calorie snacks in the next two weeks

Should	+3	+2	+1	0	-1	-2	-3	Should not

5b. People who are important to me would 'approve'/disapprove' of me NOT eating high-calorie snacks in the next two weeks

Approve	+3	+2	+1	0	-1	-2	-3	Disapprove

5c. People who are important to me would want me to NOT eat high-calorie snacks in the next two weeks

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

5d. I feel under social pressure to NOT eat high-calorie snacks in the next two weeks

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

7a. For me, NOT eating high-calorie snacks in the next two weeks would be…

Easy	+3	+2	+1	0	-1	-2	-3	Difficult

7b. I believe I have the ability to NOT eat high-calorie snacks in the next two weeks'

Definitely do	+3	+2	+1	0	-1	-2	-3	Definitely do not

7c. I am confident that I am able to overcome any obstacles that would prevent me from NOT eating high-calorie snacks in the next two weeks?

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

7d. How confident are you that you will be able to NOT eat high-calorie snacks in the next weeks?

Very confident	+3	+2	+1	0	-1	-2	-3	Very unconfident

9. If I choose to NOT eat high-calorie snacks in the next two weeks…

	Not at all						Very much
a. I would regret it	0	1	2	3	4	5	6
b. It would bother me	0	1	2	3	4	5	6
c. I would be disappointed	0	1	2	3	4	5	6

11. If I choose to NOT eat high-calorie snacks in the next two weeks…

	Not at all						Very much
a. I would feel guilty	0	1	2	3	4	5	6
b. I would feel tense	0	1	2	3	4	5	6
c. I would feel apologetic	0	1	2	3	4	5	6
d. I would feel I am in the wrong	0	1	2	3	4	5	6

6. If I do NOT eat high-calorie snacks in the next two weeks it will…

	Very unlikely						Very likely
a. make me lose weight	0	1	2	3	4	5	6
b. lead to better health	0	1	2	3	4	5	6
c. lead to more energy	0	1	2	3	4	5	6
d. lead to me eating healthier food	0	1	2	3	4	5	6
e. make me feel better about myself	0	1	2	3	4	5	6
f. save money	0	1	2	3	4	5	6
g. make me feel more healthy	0	1	2	3	4	5	6
h. make me miss them	0	1	2	3	4	5	6
i. not be as convenient	0	1	2	3	4	5	6
j. make me feel hungry	0	1	2	3	4	5	6
k. make me have cravings	0	1	2	3	4	5	6

7. I believe that for me

	Very bad						Very good
a. losing weight would be	0	1	2	3	4	5	6
b. better health would be	0	1	2	3	4	5	6
c. more energy would be	0	1	2	3	4	5	6
d. eating healthier food would be	0	1	2	3	4	5	6
e. feeling better about myself would be	0	1	2	3	4	5	6
f. saving money would be	0	1	2	3	4	5	6
g. feeling more healthy would be	0	1	2	3	4	5	6
h. missing them would be	0	1	2	3	4	5	6
i. not being as convenient would be	0	1	2	3	4	5	6
j. feeling hungry would be	0	1	2	3	4	5	6
k. having cravings would be	0	1	2	3	4	5	6

8. How likely it is that the following groups think you should NOT eat high-calorie snacks in the next two weeks.

	Very unlikely						Very likely
a. your friends	0	1	2	3	4	5	6
b. your family	0	1	2	3	4	5	6
c. your doctor	0	1	2	3	4	5	6
d. your parents	0	1	2	3	4	5	6
e. snack retailers	0	1	2	3	4	5	6
f. people you know who are trying to lose weight	0	1	2	3	4	5	6
g. health conscious people you know	0	1	2	3	4	5	6
h. health professionals	0	1	2	3	4	5	6
i. people you know with diet related health problems	0	1	2	3	4	5	6
j. overweight people you know	0	1	2	3	4	5	6

9. How much, in general, do you want to do what the following groups think you should do?

	Not at all						Very much
a. your friends	0	1	2	3	4	5	6
b. your family	0	1	2	3	4	5	6
c. your doctor	0	1	2	3	4	5	6
d. your parents	0	1	2	3	4	5	6
e. snack retailers	0	1	2	3	4	5	6
f. people you know who are trying to lose weight	0	1	2	3	4	5	6
g. health conscious people you know	0	1	2	3	4	5	6
h. health professionals	0	1	2	3	4	5	6
i. people you know with diet related health problems	0	1	2	3	4	5	6
j. overweight people you know	0	1	2	3	4	5	6

10. How likely it is that each of the following factors would make it easy or enable you to NOT eat high-calorie snacks in the next two weeks.

	Very unlikely						Very likely
a. having low calorie snacks available	0	1	2	3	4	5	6
b. not buying any	0	1	2	3	4	5	6
c. a special or social occasion	0	1	2	3	4	5	6

11. To what extent would each of the following factors make it easy or enable you to NOT eat high-calorie snacks in the next two weeks??

	Not at all						Very much
a. having low calorie snacks available	0	1	2	3	4	5	6
b. not buying any	0	1	2	3	4	5	6
c. a special or social occasion	0	1	2	3	4	5	6

12. How likely it is that each of the following factors would make it difficult or prevent you from NOT eating high-calorie snacks in the next two weeks.

	Very unlikely						Very likely
a. social occasions	0	1	2	3	4	5	6
b. available close by	0	1	2	3	4	5	6
c. being busy	0	1	2	3	4	5	6
d. stress	0	1	2	3	4	5	6

e. temptation	0	1	2	3	4	5	6

13. Please indicate the extent to which each of the following factors would make it difficult or prevent you from NOT eating high-calorie snacks in the next two weeks

	Not at all						Very much
a. social occasions	0	1	2	3	4	5	6
b. available close by	0	1	2	3	4	5	6
c. being busy	0	1	2	3	4	5	6
d. stress	0	1	2	3	4	5	6
e. temptation	0	1	2	3	4	5	6

4. Please indicate how you feel about NOT eating high-calorie snacks in the next two weeks.

Beneficial	+3	+2	+1	0	-1	-2	-3	Harmful
Healthy	+3	+2	+1	0	-1	-2	-3	Unhealthy
Good	+3	+2	+1	0	-1	-2	-3	Bad
Positive	+3	+2	+1	0	-1	-2	-3	Negative
Satisfactory	+3	+2	+1	0	-1	-2	-3	Unsatisfactory

6a. 'How often do you think the people who are important to you will themselves NOT eat high-calorie snacks in the next two weeks

Everyday	+3	+2	+1	0	-1	-2	-3	Never

6b. Of the people you know, how many do you think will NOT eat high-calorie snacks in the next two weeks

All of them	+3	+2	+1	0	-1	-2	-3	None of them

6c. Most people important to me will NOT eat high-calorie snacks in the next two weeks

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

8a. Whether or not I do NOT eat high-calorie snacks in the next two weeks is entirely up to me

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

8b. How much control do you feel you have over NOT eating high-calorie snacks in the next 2 weeks?

Complete control	+3	+2	+1	0	-1	-2	-3	Very little control

8c. How much do you feel that NOT eating high-calorie snacks in the next two weeks is beyond your control?

Very much	+3	+2	+1	0	-1	-2	-3	Not at all

10. If I choose TO EAT high-calorie snacks in the next two weeks…

	Not at all						Very much
a. I would regret it	0	1	2	3	4	5	6
b. It would bother me	0	1	2	3	4	5	6
c. I would be disappointed	0	1	2	3	4	5	6

12. If I choose TO EAT high-calorie snacks in the next two weeks…

	Not at all						Very much
a. I would feel guilty	0	1	2	3	4	5	6
b. I would feel tense	0	1	2	3	4	5	6
c. I would feel apologetic	0	1	2	3	4	5	6
d. I would feel I am in the wrong	0	1	2	3	4	5	6

14. In the last two weeks, how often have you eaten high-calorie snacks?

Never	0	1	2	3	4	5	6	Several times a day

Final section

Gender : Male [ ] Female [ ]

Age (years) : _____

Nationality: _____

Highest education level: Less or equal to high school [ ] Some college [ ]
College graduate [ ] Graduate school [ ] Other, please specify _____

Height: ___ foot ____inches

Weight: ____ lb

In the next two weeks, what is your weight related aim?
Lose weight [ ] Gain weight [ ] Maintain weight [ ]

Please briefly describe your dieting regime.
_____
_____
_____

Follow-up Survey
Not Eating High-calorie snacks

Many of the questions in this survey will ask you about your **not** eating high-calorie snacks in the last two weeks.
Snacks refer to food consumed been main meals (breakfast, lunch and dinner). High-calorie snacks include foods such as cookies, cakes, pastries, candy, hot dogs, pizza, potato chips etc.

Please think about the occasions when you have eaten high-calorie snacks since completing the first high-calorie snack survey (i.e. in the last two weeks).

1. In the last two weeks, have you eaten any high-calorie snacks?
Options: Yes No

2. On how many days did you NOT eat high-calorie snacks in the last two weeks?
0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14

3a. For me, NOT eating high-calorie snacks in the last two weeks was…

Difficult						Easy
0	1	2	3	4	5	6

3b. NOT eating high-calorie snacks was completely up to me.

Strongly disagree						Strongly agree
0	1	2	3	4	5	6

3c. I was able to overcome any obstacles that would prevent me from NOT eating high-calorie snacks in the last two weeks.

Strongly disagree						Strongly agree
0	1	2	3	4	5	6

C.5.3 Eating and not eating high-calorie snacks

Eating and not eating high-calorie snack main survey

The questions in the first part of this survey will ask you to rate your opinion about eating high-calorie snacks in the next two weeks. Snacks refer to food consumed between main meals (breakfast, lunch and dinner). High-calorie snacks include foods such as cookies, cakes, pastries, candy, pizza, hot dogs, potato chips etc.

Please answer each of the following questions by selecting the number that best describes your opinion. There are no right or wrong responses; we are merely interested in your personal opinions.

1a. How likely are you to eat high-calorie snacks in the next two weeks?

Very Unlikely	0	1	2	3	4	5	6	Very Likely

1b. How strong is your intention to eat high-calorie snacks in the next two weeks?

No intention at all	0	1	2	3	4	5	6	Very strong intention

1c. How much do you agree with this statement about you "I will eat high-calorie snacks in the next two weeks"?

Strongly Disagree	0	1	2	3	4	5	6	Strongly Agree

2. Please indicate how you feel about eating high-calorie snacks in the next two weeks.

	Not at all						Definitely
a. I want to eat high-calorie snacks	0	1	2	3	4	5	6
b. I need to eat high-calorie snacks	0	1	2	3	4	5	6
c. I have a strong desire to eat high-calorie snacks	0	1	2	3	4	5	6
d. I aim to eat high-calorie snacks	0	1	2	3	4	5	6
e. I will try to eat high-calorie snacks	0	1	2	3	4	5	6
f. I have made plans to eat high-calorie snacks	0	1	2	3	4	5	6
g. I have taken steps to enable me to eat high-calorie snacks	0	1	2	3	4	5	6

3.For me to eat high-calorie snacks in the next two weeks would be…

a. Pleasant	+3	+2	+1	0	-1	-2	-3	Unpleasant
b. Enjoyable	+3	+2	+1	0	-1	-2	-3	Unenjoyable
c. Relaxing	+3	+2	+1	0	-1	-2	-3	Stressful
d. Satisfying	+3	+2	+1	0	-1	-2	-3	Unsatisfying

5a. People who are important to me would think I 'should'/'should not' eat high-calorie snacks in the next two weeks

Should	+3	+2	+1	0	-1	-2	-3	Should not

5b. People who are important to me would 'approve'/disapprove' of me eating high-calorie snacks in the next two weeks

Approve	+3	+2	+1	0	-1	-2	-3	Disapprove

5c. People who are important to me would want me to eat high-calorie snacks in the next two weeks

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

5d. I feel under social pressure to eat high-calorie snacks in the next two weeks

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

7a. For me, eating high-calorie snacks in the next two weeks would be…

Easy	+3	+2	+1	0	-1	-2	-3	Difficult

7b. I believe I have the ability to eat high-calorie snacks in the next two weeks'

Definitely do	+3	+2	+1	0	-1	-2	-3	Definitely do not

7c. I am confident that I am able to overcome any obstacles that would prevent me from eating high-calorie snacks in the next two weeks?

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

7d. How confident are you that you will be able to eat high-calorie snacks in the next weeks?

Very confident	+3	+2	+1	0	-1	-2	-3	Very unconfident

9. If I choose to eat high-calorie snacks in the next two weeks…

	Not at all						Very much
a. I would regret it	0	1	2	3	4	5	6
b. It would bother me	0	1	2	3	4	5	6
c. I would be disappointed	0	1	2	3	4	5	6

11. If I choose to eat high-calorie snacks in the next two weeks…

	Not at all						Very much
a. I would feel guilty	0	1	2	3	4	5	6
b. I would feel tense	0	1	2	3	4	5	6
c. I would feel apologetic	0	1	2	3	4	5	6
d. I would feel I am in the wrong	0	1	2	3	4	5	6

6.
If I eat high-calorie snacks in the next two weeks it will…

	Very unlikely						Very likely
a. give me more energy	0	1	2	3	4	5	6
b. satisfy my cravings and hunger	0	1	2	3	4	5	6
c. taste good	0	1	2	3	4	5	6
d. be convenient	0	1	2	3	4	5	6
e. be enjoyable	0	1	2	3	4	5	6
f. be unhealthy	0	1	2	3	4	5	6
g. make me gain weight	0	1	2	3	4	5	6
h. lead to low energy	0	1	2	3	4	5	6
i. lead to long term health problems	0	1	2	3	4	5	6

7. I believe that for me

	Very bad						Very good
a. more energy would be	0	1	2	3	4	5	6
b. satisfying my cravings and hunger would be	0	1	2	3	4	5	6
c. food that taste good would be	0	1	2	3	4	5	6
d. convenience would be	0	1	2	3	4	5	6
e. enjoyment would be	0	1	2	3	4	5	6
f. being unhealthy would be	0	1	2	3	4	5	6
g. gaining weight would be	0	1	2	3	4	5	6
h. having low energy would be	0	1	2	3	4	5	6
i. long-term health problems would be	0	1	2	3	4	5	6

8. How likely it is that the following groups think you should eat high-calorie snacks in the next two weeks.

	Very unlikely						Very likely
a. your friends	0	1	2	3	4	5	6
b. your family	0	1	2	3	4	5	6
c. your doctor	0	1	2	3	4	5	6
d. your kids	0	1	2	3	4	5	6
e. your fitness instructor	0	1	2	3	4	5	6
f. snack retailers	0	1	2	3	4	5	6
g. overweight people you know	0	1	2	3	4	5	6
h. active people you know	0	1	2	3	4	5	6
i. health conscious people you know	0	1	2	3	4	5	6
j. people you know with a low income	0	1	2	3	4	5	6

9. How much, in general, do you want to do what the following groups think you should do?

	Not at all						Very much
a. friends	0	1	2	3	4	5	6
b. family	0	1	2	3	4	5	6
c. doctor	0	1	2	3	4	5	6
d. kids	0	1	2	3	4	5	6
e. fitness instructor	0	1	2	3	4	5	6
f. snack retailers	0	1	2	3	4	5	6
g. overweight people	0	1	2	3	4	5	6
h. active people	0	1	2	3	4	5	6
i. health conscious people	0	1	2	3	4	5	6
j. people with a low income	0	1	2	3	4	5	6

10. How likely it is that each of the following factors would make it easy or enable you to eat high-calorie snacks in the next two weeks.

	Very unlikely						Very likely
a. easily available	0	1	2	3	4	5	6
b. low cost	0	1	2	3	4	5	6
c. a special or social occasion	0	1	2	3	4	5	6

11. To what extent would each of the following factors make it easy or enable you to eat high-calorie snacks in the next two weeks?

	Not at all						Very much
a. easily available	0	1	2	3	4	5	6
b. low cost	0	1	2	3	4	5	6
c. a special or social occasion	0	1	2	3	4	5	6

12. How likely it is that each of the following factors would make it difficult or prevent you from eating high-calorie snacks in the next two weeks.

	Very unlikely						Very likely
a. health concerns	0	1	2	3	4	5	6
b. not having them around	0	1	2	3	4	5	6
c. watching your weight	0	1	2	3	4	5	6
d. having no money	0	1	2	3	4	5	6

13. Please indicate the extent to which each of the following factors would make it difficult or prevent you from eating high-calorie snacks in the next two weeks

	Not at all						Very much
a. health concerns	0	1	2	3	4	5	6
b. not having them around	0	1	2	3	4	5	6
c. watching your weight	0	1	2	3	4	5	6
d. having no money	0	1	2	3	4	5	6

4. For me to eat high-calorie snacks in the next two weeks would be…

Beneficial	+3	+2	+1	0	-1	-2	-3	Harmful
Healthy	+3	+2	+1	0	-1	-2	-3	Unhealthy
Good	+3	+2	+1	0	-1	-2	-3	Bad
Positive	+3	+2	+1	0	-1	-2	-3	Negative
Satisfactory	+3	+2	+1	0	-1	-2	-3	Unsatisfactory

6a. How often do you think the people who are important to you will themselves eat high-calorie snacks in the next two weeks

Everyday	+3	+2	+1	0	-1	-2	-3	Never

6b. Of the people you know, how many do you think will eat high-calorie snacks in the next two weeks

All of them	+3	+2	+1	0	-1	-2	-3	None of them

6c. Most people important to me will eat high-calorie snacks in the next two weeks

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

8a. Whether or not I eat high-calorie snacks in the next two weeks is entirely up to me

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

8b. How much control do you feel you have over eating high-calorie snacks in the next 2 weeks?

Complete control	+3	+2	+1	0	-1	-2	-3	Very little control

8c. How much do you feel that eating high-calorie snacks in the next two weeks is beyond your control?

Very much	+3	+2	+1	0	-1	-2	-3	Not at all

14. In the last two weeks, how often have you eaten high-calorie snacks?

Never	0	1	2	3	4	5	6	Several times a day

The questions in the next part of this survey will ask you to rate your opinion about NOT eating high-calorie snacks in the next two weeks.

1a. How likely are you to NOT eat high-calorie snacks in the next two weeks?

Very Unlikely	0	1	2	3	4	5	6	Very Likely

1b. How strong is your intention to NOT eat high-calorie snacks in the next two weeks?

No intention at all	0	1	2	3	4	5	6	Very Strong Intention

1c. How much do you agree with this statement about you "I will NOT eat high-calorie snacks in the next two weeks"?

Strongly Disagree	0	1	2	3	4	5	6	Strongly Agree

2. Please indicate how you feel about NOT eating high-calorie snacks in the next two weeks.

	Not at all						Definitely
a. I want to NOT eat high-calorie snacks	0	1	2	3	4	5	6
b. I need to NOT eat high-calorie snacks	0	1	2	3	4	5	6
c. I have a strong desire to NOT eat high-calorie snacks	0	1	2	3	4	5	6
d. I feel that there are compelling reasons for me to NOT eat high-calorie snacks	0	1	2	3	4	5	6
e. I aim to NOT eat high-calorie snacks	0	1	2	3	4	5	6
f. I will try to NOT eat high-calorie snacks	0	1	2	3	4	5	6
g. I have made plans to NOT eat high-calorie snacks	0	1	2	3	4	5	6
h. I have taken steps to enable me to NOT eat high-calorie snacks	0	1	2	3	4	5	6

3. Please indicate how you feel about NOT eating high-calorie snacks in the next two weeks.

a. Pleasant	+3	+2	+1	0	-1	-2	-3	Unpleasant
b. Enjoyable	+3	+2	+1	0	-1	-2	-3	Unenjoyable
c. Relaxing	+3	+2	+1	0	-1	-2	-3	Stressful
d. Satisfying	+3	+2	+1	0	-1	-2	-3	Unsatisfying

5a. People who are important to me would think I 'should'/'should not' NOT eat high-calorie snacks in the next two weeks

Should	+3	+2	+1	0	-1	-2	-3	Should not

5b. People who are important to me would 'approve'/disapprove' of me NOT eating high-calorie snacks in the next two weeks

Approve	+3	+2	+1	0	-1	-2	-3	Disapprove

5c. People who are important to me would want me to NOT eat high-calorie snacks in the next two weeks

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

5d. I feel under social pressure to NOT eat high-calorie snacks in the next two weeks

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

7a. For me, NOT eating high-calorie snacks in the next two weeks would be…

Easy	+3	+2	+1	0	-1	-2	-3	Difficult

7b. I believe I have the ability to NOT eat high-calorie snacks in the next two weeks'

Definitely do	+3	+2	+1	0	-1	-2	-3	Definitely do not

7c. I am confident that I am able to overcome any obstacles that would prevent me from NOT eating high-calorie snacks in the next two weeks?

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

7d. How confident are you that you will be able to NOT eat high-calorie snacks in the next weeks?

Very confident	+3	+2	+1	0	-1	-2	-3	Very unconfident

9. If I choose to NOT eat high-calorie snacks in the next two weeks…

	Not at all						Very much
a. I would regret it	0	1	2	3	4	5	6
b. It would bother me	0	1	2	3	4	5	6
c. I would be disappointed	0	1	2	3	4	5	6

11. If I choose to NOT eat high-calorie snacks in the next two weeks…

	Not at all						Very much
a. I would feel guilty	0	1	2	3	4	5	6
b. I would feel tense	0	1	2	3	4	5	6
c. I would feel apologetic	0	1	2	3	4	5	6
d. I would feel I am in the wrong	0	1	2	3	4	5	6

6. If I do NOT eat high-calorie snacks in the next two weeks it will…

	Very unlikely						Very likely
a. make me lose weight	0	1	2	3	4	5	6
b. lead to better health	0	1	2	3	4	5	6
c. lead to more energy	0	1	2	3	4	5	6
d. lead to me eating healthier food	0	1	2	3	4	5	6
e. make me feel better about myself	0	1	2	3	4	5	6
f. save money	0	1	2	3	4	5	6
g. make me feel more healthy	0	1	2	3	4	5	6
h. make me miss them	0	1	2	3	4	5	6
i. not be as convenient	0	1	2	3	4	5	6
j. make me feel hungry	0	1	2	3	4	5	6
k. make me have cravings	0	1	2	3	4	5	6

7. I believe that for me

	Very bad						Very good
a. losing weight would be	0	1	2	3	4	5	6
b. better health would be	0	1	2	3	4	5	6
c. more energy would be	0	1	2	3	4	5	6
d. eating healthier food would be	0	1	2	3	4	5	6
e. feeling better about myself would be	0	1	2	3	4	5	6
f. saving money would be	0	1	2	3	4	5	6
g. feeling more healthy would be	0	1	2	3	4	5	6
h. missing them would be	0	1	2	3	4	5	6
i. not being as convenient would be	0	1	2	3	4	5	6
j. feeling hungry would be	0	1	2	3	4	5	6
k. having cravings would be	0	1	2	3	4	5	6

8. How likely it is that the following groups think you should NOT eat high-calorie snacks in the next two weeks.

	Very unlikely						Very likely
a. your friends	0	1	2	3	4	5	6
b. your family	0	1	2	3	4	5	6
c. your doctor	0	1	2	3	4	5	6
d. your parents	0	1	2	3	4	5	6
e. snack retailers	0	1	2	3	4	5	6
f. people you know who are trying to lose weight	0	1	2	3	4	5	6
g. health conscious people you know	0	1	2	3	4	5	6
h. health professionals	0	1	2	3	4	5	6
i. people you know with diet related health problems	0	1	2	3	4	5	6
j. overweight people you know	0	1	2	3	4	5	6

9. How much, in general, do you want to do what the following groups think you should do?

	Not at all						Very much
a. your friends	0	1	2	3	4	5	6
b. your family	0	1	2	3	4	5	6
c. your doctor	0	1	2	3	4	5	6
d. your parents	0	1	2	3	4	5	6
e. snack retailers	0	1	2	3	4	5	6
f. people you know who are trying to lose weight	0	1	2	3	4	5	6
g. health conscious people you know	0	1	2	3	4	5	6
h. health professionals	0	1	2	3	4	5	6
i. people you know with diet related health problems	0	1	2	3	4	5	6
j. overweight people you know	0	1	2	3	4	5	6

10. How likely it is that each of the following factors would make it easy or enable you to NOT eat high-calorie snacks in the next two weeks.

	Very unlikely						Very likely
a. having low calorie snacks available	0	1	2	3	4	5	6
b. not buying any	0	1	2	3	4	5	6
c. a special or social occasion	0	1	2	3	4	5	6

11. To what extent would each of the following factors make it easy or enable you to NOT eat high-calorie snacks in the next two weeks??

	Not at all						Very much
a. having low calorie snacks available	0	1	2	3	4	5	6
b. not buying any	0	1	2	3	4	5	6
c. a special or social occasion	0	1	2	3	4	5	6

12. How likely it is that each of the following factors would make it difficult or prevent you from NOT eating high-calorie snacks in the next two weeks. *

	Very unlikely						Very likely
a. social occasions	0	1	2	3	4	5	6
b. available close by	0	1	2	3	4	5	6
c. being busy	0	1	2	3	4	5	6
d. stress	0	1	2	3	4	5	6
e. temptation	0	1	2	3	4	5	6

13. Please indicate the extent to which each of the following factors would make it difficult or prevent you from NOT eating high-calorie snacks in the next two weeks

	Not at all						Very much
a. social occasions	0	1	2	3	4	5	6
b. available close by	0	1	2	3	4	5	6
c. being busy	0	1	2	3	4	5	6
d. stress	0	1	2	3	4	5	6
e. temptation	0	1	2	3	4	5	6

4. For me to NOT eat high-calorie snacks in the next two weeks would be

Beneficial	+3	+2	+1	0	-1	-2	-3	Harmful
Healthy	+3	+2	+1	0	-1	-2	-3	Unhealthy
Good	+3	+2	+1	0	-1	-2	-3	Bad
Positive	+3	+2	+1	0	-1	-2	-3	Negative
Satisfactory	+3	+2	+1	0	-1	-2	-3	Unsatisfactory

6a. How often do you think the people who are important to you will themselves NOT eat high-calorie snacks in the next two weeks

Everyday	+3	+2	+1	0	-1	-2	-3	Never

6b. Of the people you know, how many do you think will NOT eat high-calorie snacks in the next two weeks

All of them	+3	+2	+1	0	-1	-2	-3	None of them

6c. Most people important to me will NOT eat high-calorie snacks in the next two weeks

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

8a. Whether or not I do NOT eat high-calorie snacks in the next two weeks is entirely up to me

Strongly agree	+3	+2	+1	0	-1	-2	-3	Strongly disagree

8b. How much control do you feel you have over NOT eating high-calorie snacks in the next 2 weeks?

Complete control	+3	+2	+1	0	-1	-2	-3	Very little control

8c. How much do you feel that NOT eating high-calorie snacks in the next two weeks is beyond your control?

Very much	+3	+2	+1	0	-1	-2	-3	Not at all

10. If I choose to NOT eat high-calorie snacks in the next two weeks…

	Not at all						Very much
a. I would regret it	0	1	2	3	4	5	6
b. It would bother me	0	1	2	3	4	5	6
c. I would be disappointed	0	1	2	3	4	5	6

12. If I choose to NOT eat high-calorie snacks in the next two weeks…

	Not at all						Very much
a. I would feel guilty	0	1	2	3	4	5	6
b. I would feel tense	0	1	2	3	4	5	6
c. I would feel apologetic	0	1	2	3	4	5	6
d. I would feel I am in the wrong	0	1	2	3	4	5	6

Final section

Gender : Male [ ] Female [ ]

Age (years) : _____

Nationality: _____

Highest education level: Less or equal to high school [ ] Some college [ ]
College graduate [ ] Graduate school [ ] Other, please specify _____

Height: ___ foot ____inches

Weight: ____ lb

In the next two weeks, what is your weight related aim?
Lose weight [ ] Gain weight [ ] Maintain weight [ ]

Please briefly describe your dieting regime.
_____
_____
_____

Follow-up Survey
Eating and Not Eating High-calorie snacks

Many of the questions in this survey will ask you about your eating and not eating high-calorie snacks in the last two weeks.
Snacks refer to food consumed been main meals (breakfast, lunch and dinner). High-calorie snacks include foods such as cookies, cakes, pastries, candy, hot dogs, pizza, potato chips etc.

Please think about the occasions when you have eaten high-calorie snacks since completing the first high-calorie snack survey (i.e. in the last two weeks).

3a. For me, eating high-calorie snacks in the last two weeks was…

Difficult						Easy
0	1	2	3	4	5	6

3b. Eating high-calorie snacks was completely up to me.

Strongly disagree						Strongly agree
0	1	2	3	4	5	6

3c. I was able to overcome any obstacles that would prevent me from eating high-calorie snacks in the last two weeks.

Strongly disagree						Strongly agree
0	1	2	3	4	5	6

1. In the last two weeks, have you eaten any high-calorie snacks?

Options: Yes No

2. On how many days did you eat high-calorie snacks in the last two weeks?

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14

3a. For me, NOT eating high-calorie snacks in the last two weeks was…

Difficult						Easy
0	1	2	3	4	5	6

3b. NOT eating high-calorie snacks was completely up to me.

Strongly disagree						Strongly agree
0	1	2	3	4	5	6

3c. I was able to overcome any obstacles that would prevent me from NOT eating high-calorie snacks in the last two weeks.

Strongly disagree						Strongly agree
0	1	2	3	4	5	6