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**Adaptability in Youth:
Components, Predictors and Consequences**

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A thesis submitted to the University of Sydney in fulfilment of the requirements for

the degree of

Doctor of Philosophy

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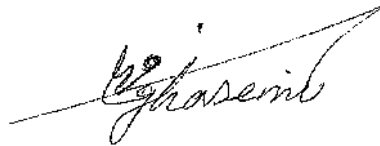
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Author's Declaration

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Date:.....

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List of Abbreviations

ABS	Academic Buoyancy Scale
ACARA	Australian Curriculum, Assessment and Reporting Authority
ACM	Adaptive Change Model
ALS	Adaptive Learning System
APA	American Psychological Association
ARC	Australian Research Council
CBT	Cognitive-behaviour Therapy
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
EFA	Exploratory and Confirmatory Factor Analysis
EM	Expectation Maximisation
ESB	English-speaking Background
ESEM	Exploratory Structural Equation Modelling
FC	Factor Correlations/Variances
FL	Factor Loadings
HBE	Human Behavioural Ecology
ICSEA	Index of Community Socio-educational Advantage
NAPLAN	National Assessment Program in Literacy and Numeracy
NESB	Non-English Speaking Background
REBT	Rational Emotive Behaviour Therapy
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modelling
SES	Socio-economic Status
SRL	Self-regulated Learning
SWLS	Satisfaction with Life Scale
TTM	Transtheoretical Model
WHOQOL	World Health Organization Quality of Life

Abstract

There has been an extensive amount of research on human defence and coping mechanisms. This body of work spans evolutionary and coping perspectives, as well as work on cognitive appraisal, self-regulation, resilience and buoyancy. Relative to the body of work addressing adversity (e.g., coping, resilience, buoyancy, hardiness), little research has investigated the range of personal resources individuals may use as they seek to navigate uncertainty and novelty. Adaptability is a recently developed construct that aims to extend current research and knowledge with regards to the regulation and adjustment of cognition, behaviour, and emotion relevant to situational uncertainty and novelty. Given this, the present investigation proposes an integrative process model that assesses the relative roles of socio-demographic and ability covariates, personality and other dispositional presage factors, and adaptability (and buoyancy as a cognate correlate) in predicting psychological well-being outcomes such as life satisfaction and self-esteem. Students from nine Australian high schools in years 7 through 12 participated in this study. Time 1 ($N = 2,731$ students) data were collected in the middle of the academic year and Time 2 ($N = 2,292$ students) data were collected one year later (resulting in a longitudinal sample, $N = 969$ students). Using confirmatory factor analysis, key psychometric findings demonstrated sound factor structure of adaptability itself, and also within the context of the study's broader multidimensional instrumentation. Structural equation modelling (SEM) supported the hypothesised adaptability process model at Time 1, such that: (a) prior achievement, agreeableness, openness, conscientiousness, entity and incremental beliefs (positively) and neuroticism (negatively) predicted adaptability and (b) adaptability positively predicted general self-esteem, satisfaction with life, and meaning and purpose. Time 2 analyses showed: (a) non-English speaking background, prior achievement, extraversion, conscientiousness and incremental beliefs predicted adaptability (positively), and neuroticism (negatively) predicted adaptability and (b) adaptability positively predicted general self-esteem, satisfaction with life and meaning and purpose. Importantly, longitudinal SEM demonstrated that Time 1 factors positively predicted their corresponding Time 2 factors and the majority of predictive paths at Time 2 remained significant after controlling for shared

variance with Time 1 counterparts. Findings from this research hold implications for the theoretical understanding of adaptability, where it resides in the context of cognate theories and factors, and for educational practice and research relating to how young people navigate situational uncertainty and novelty.

Chapter 1: Introduction

It is a truism that life presents many situations and circumstances that represent significant uncertainty and novelty. Research investigating individuals' cognitive, behavioural and emotional responses aimed at negotiating such situations and circumstances is important. This cognitive, behavioural and emotional regulation in the face of uncertainty and novelty is referred to as adaptability (Martin, Nejad, Colmar, & Liem, 2012, 2013). Some developmental periods are points in life where novelty and uncertainty are particularly salient and influential in shaping later pathways. Adolescence is considered one such period and is the developmental focus in this study. Accordingly, the present study assesses adolescents' cognitive, behavioural and emotional regulation, dispositional factors that predict adaptability and their effect on psychological well-being that takes the form of general self-esteem, life satisfaction, emotional instability and sense of meaning and purpose. This process is referred to as the 'adaptability model' or 'adaptability process' (see Figure 1.1). This study forms part of an Australian Research Council (ARC) Discovery Project focusing on determinants and consequences of adaptability. Portions of this research project have been published in Martin, Nejad et al. (2012, 2013).

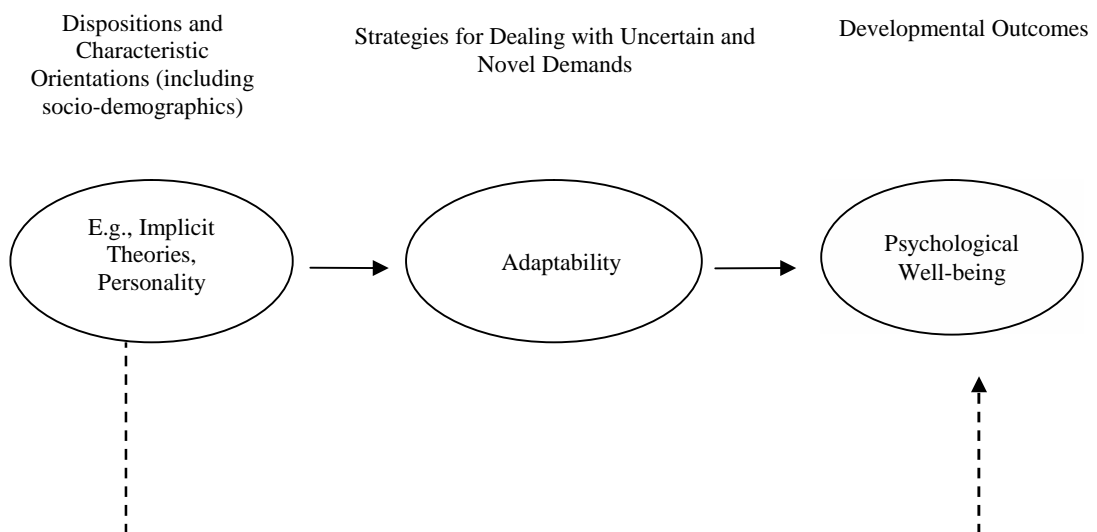


Figure 1.1: Hypothesised adaptability process model.

Note. Dashed paths are not central to the study's substantive focus but are included to account for all variance in the model and to better estimate unique effects attributable to factors of central interest

The adaptability model hypothesised here aligns with major models of traits and strategies relevant to optimal human outcomes. For example, it is informed by Buss and Cantor's (1989) proposed model of human functioning and development, as well as by the subsequent applications of their work in the educational context (Martin, Marsh, & Debus, 2001a, 2001b, 2003). Buss and Cantor suggested that individuals' characteristic orientations influence the strategies they utilise to manage life demands. Thus, there is a transaction between dispositions and context that affects the development of strategies (e.g., adaptability) that are used to navigate life demands, leading to enhanced psychological well-being (e.g., general self-esteem, satisfaction with life) (Kyl-Heiku & Buss, 1996). Learning further about this developmental process may shed light on the means by which dispositions and traits can be adaptively expressed to explain the capacity to manage life uncertainty and novelty (Cantor, 1990). Accordingly, the present investigation explores a model in which characteristic and dispositional capacities assume the form of personality and implicit beliefs about intelligence and ability, strategies are represented in the form of adaptability, and well-being is represented in the form of psychological well-being constructs (see Figure 1.1).

This integrative and multidimensional approach to adaptability draws on numerous lines of theoretical, applied and methodological work, including that relating to coping (Folkman, Lazarus, Dukel-Schetter, DeLongis, & Gruen, 1986; Frydenberg & Lewis, 1993; Motamedi, 1977), resilience (Martin, 2002; Martin & Marsh, 2006; Olsson, Bond, Burns, Vella-Brodrick, & Sawyer, 2003; Werner, 1993) and buoyancy (Martin, Colmar, Davey, & Marsh, 2010) – all frameworks that are aligned with the present research interests. This study puts forward that adaptability is an extension to coping, resilience and buoyancy models. It is also, however, distinct in numerous ways. For example, it is not concerned with adversity per se (as the other factors are); instead, it is focused on uncertainty and novelty (Martin, Nejad et al., 2012, 2013).

Another relevant line of theory informing this research involves self-regulation (Cleary & Zimmerman, 2004; Zimmerman, 1995, 2008; Zimmerman & Kitsantas, 1997). Importantly, however, adaptability is distinct from self-regulation in that it is explicitly concerned with a tripartite framework involving the regulation of cognition, behaviour, and emotion—whereas self-regulation tends to be more behaviourally and cognitively focused (Cleary, Callan, & Zimmerman 2012; Cleary

& Chen, 2009). Notwithstanding this, it is important to note that researchers such as Pekrun and colleagues have shown that emotion regulation (as a component of self-regulation) is achieved through cognitive appraisal and through some physiological antecedents and arousals (Pekrun, Goetz, Titz, & Perry 2002). Also important in the study's framing is literature around adaptation models (e.g., Howes & Lewis, 2009; Martin, Nejad et al., 2013; Martin et al., 2012; Motamedi, 1977; Walker, Holling, Carpenter, & Kinzing, 2004), evolutionary psychology (e.g., Barrett, Dunbar, & Lycett, 2002; Burghardt, 2009; Buss, 1995; Cosmides & Tooby, 1987; Fullan & Loubser, 1972; Geary, 2008; Quine, 1981; Smit & Wandel, 2006; Smith, 2000; Sweller, 2004; Tooby, & Cosmides, 1992) and positive psychology (e.g., Seligman, Ernst, Gillhan, Reivich, & Linkins, 2009; Seligman, Steen, Park, & Peterson, 2005). The present study details these and how they play into the present operationalisation of adaptability and its associated processes.

Alongside conceptual and applied underpinnings are complex methodological dimensions that demand sophisticated multivariate approaches. Indeed, as detailed later in the review of literature, the present study can be considered something of a 'substantive-methodological synergy'. Marsh and Hau (2007) detail how substantive-methodological research brings together strong conceptual and methodological components to generate a more robust study than a study prioritising one element over the other. Accordingly, in the present study, various data analytic methods are utilised to progress the substantive and methodological components relevant to adaptability. Through integrating complex theoretical dimensions with multivariate approaches, the research is better placed to shed valid light on young people's adaptability, both as a measured construct and as a factor in an important process of psychological well-being (e.g., general self-esteem, satisfaction with life, emotional instability and meaning and purpose).

Under this substantive-methodological framework, the present study: (a) makes use of a cross-sectional and longitudinal research design, (b) involves relatively large samples, (c) establishes the construct validity of adaptability and the full set of measures relevant to its processes, and (d) applies appropriate multivariate statistical methods and techniques to empirically examine the hypothesised links in the adaptability process model within and across time. Through these frameworks, the study comprises numerous methodological elements that underpin its robustness and validity. It has longitudinal data central to its design. Hence, the study allows for

adjustments in prior variance in well-being outcomes. This means unique variance in adaptability can be identified (beyond prior variance in outcomes), and also allows an examination of how adaptability predicts upward and downward shifts in well-being outcomes over time. The study also examines relevant covariates and therefore provides a better sense of unique variance attributable to adaptability. The focus on adolescence is important because development through this stage of life presents many experiences of uncertainty and novelty (Berk, 2012).

Taken together, the present study is an effort to disentangle sets of interwoven constructs, extending recent work into cognate areas such as adaptation, coping, resilience, buoyancy and self-regulation. In doing so, the current investigation's findings have the potential to:

1. Confirm recent preliminary measurement work into adaptability;
2. Extend previous research into cognate constructs by clarifying cognitive, behavioural and emotional repertoires that individuals modulate as they face life's uncertainties and novelties;
3. Better differentiate between constructs relevant to uncertainty and novelty (i.e., adaptability) on the one hand, and constructs relevant to adversity (i.e., buoyancy, resilience, coping) on the other;
4. Broaden self-regulatory research by assessing a tripartite adaptability construct that comprises adjustments in cognition, behaviour, and emotion;
5. Elucidate the complex nature of relations between adaptability, its predictors and its psychological well-being outcomes;
6. Shed further light on factors that may assist adolescent development, particularly with regards to the very real nature of uncertainty and novelty that are typically characteristic of this stage of life;
7. Demonstrate the utility of substantive-methodological synergies in deriving reliable and valid findings that hold implications for theorists, researchers and practitioners alike;
8. Suggest conceptual and methodological implications for future research that relate to positive youth development, and the situational uncertainty and novelty inherent in this developmental process;
9. Infer from findings in order to identify applied implications for psycho-educational policy and practice.

Chapter 1 presents an orientation to the guiding body of work underpinning the hypothesised adaptability process model. Chapter 2 evaluates the literature encompassing the formulation of the links suggested in the theorised model and scopes the theoretical issues pertinent to the current study and its constructs. In Chapter 3, the central hypotheses are presented, followed by Chapter 4, which outlines the methodology underpinning this study. This chapter argues for the substantive-methodological synergistic approach to the study and puts forward the construct validity and other multivariate approaches directing the empirical components of the present investigation.

The chapters following the methodology present the results of statistical analyses and the discussion and implications of findings. Specifically, Chapter 5 provides details concerning the Time 1 psychometric properties of the instrumentation underpinning the hypothesised adaptability process model. This chapter also evaluates the Time 1 relations between adaptability, its predictors and the well-being outcomes that are predicted by it. Chapter 6 presents Time 2 psychometric testing as well as tests of the Time 2 adaptability process model. Chapter 7 provides psychometric findings for the longitudinal sample as well as the results of the longitudinal adaptability process model. Chapter 8 presents a discussion of key findings relevant to the cross-sectional and longitudinal analyses, the significance of findings for psycho-educational research and conceptualising, the relevance to psycho-educational intervention, as well as an examination of limitations and suggestions for future research. Chapter 9 provides concluding remarks.

In summary, adaptability refers to appropriate adjustments in cognition, behaviour, and/or emotion in response to novel and/or uncertain circumstances and situations. Following prior psychometric work into adaptability, this research investigates dispositional predictors (personality, implicit theories) of adaptability and the extent to which adaptability predicts psychological well-being (self-esteem, life satisfaction, meaning and purpose, and emotional instability). Taken together, it is proposed that this investigation holds potential conceptual, applied and methodological implications for researchers and practitioners seeking to better assist children and young people to effectively deal with their ever-changing world.

Chapter 2: Literature Review

2.1 Introduction

2.1.1 Adapting to new and uncertain circumstances.

The world undergoes change, variability, uncertainty and novelty on many fronts. These include cultural, economic, political, global, technological and health-related changes and variability (Bronfenbrenner, 1992, 2001; Hofacker, Buchholz, & Blossfeld, 2010; Tomasik, Silbereisen, & Heckhausen, 2010). Individuals' own lives are also characterised by novelty and uncertainty, including adjusting to new siblings, relatives and friends, beginning school, adjusting to new grades and teachers during school, adjusting to different school subjects, moving out of home, starting and changing jobs, getting married or developing partnerships, child rearing and retirement.

How individuals deal with such uncertainty and new situations and circumstances has been an essential and central question under many disciplines such as sociology, business, philosophy, education and psychology. Formal interest related to these go as far back as figures such as Lao Tzu and the Buddha. Of relevance to the present study, the ability to adapt to new and uncertain conditions and situations is essential to young people's endeavours throughout their academic and non-academic lives (Cattell, 1971, 1987; Ferrer & McArdle, 2003; Horn & Cattell, 1966, 1967). Novelty and uncertainty disrupt routines and create new circumstances to which young people must adjust (Pinquart & Silbereisen 2004; Tomasik & Silbereisen 2009; Tomasik et al., 2010). Further, new, uncertain and changing circumstances can potentially disrupt their cognitive, behavioural and emotional balance and present possible threats to life effectiveness (Zohar & Aharon-Kravetsky, 2005).

It is, therefore, reasonable to deduce that such disturbances may be costly to them at a personal level. Disrupted routines and an inability to adapt may impede academic achievement and competency, as well as affect the level and quality of self-esteem and self-efficacy (Marsh, Trautwein, Lüdtke, Köller, & Baumert, 2006). Problematic youth pathways also increase the chances of social barriers (MacDonald, 2007) and limit access to life opportunities (Roberts, 1995) that are available to other

students. Accordingly, youth who do not adapt to their changing world may be detached from positive pathways (Pavis & Cunningham-Burley, 1999). Less dramatically, a generally low-level inability to adapt may limit one's personal potential (Martin, 2006).

Importantly, however, there are many young people who possess the capacity to effectively manage change, uncertainty and novelty in their lives (Jimerson, Egeland, & Teo, 1999), leading to adaptive outcomes, both academic and non-academic. Many researchers and numerous research studies assess a wide range of issues and factors that help these young people manage the challenges inherent in new and/or uncertain situations and tasks. For example, resilience (Rutter, 2006), buoyancy (Martin & Marsh, 2006; Putwain, Connors, Symes, & Douglas-Osborn, 2012; Putwain & Daly, 2013), self-regulation (Boekaerts & Corno, 2005; Paris & Paris, 2001; VandenBos, 2007; Winne & Hadwin, 2008; Zimmerman, 1990, 2002) and coping (Folkman et al., 1986; Putwain et al., 2012; Putwain & Daly, 2013) are all suggested as significant factors that assist young people in their academic and non-academic pathways. Without doubt, important insights have been achieved from these various studies (summarised in more detail below). Through its focus on young people's adaptability, the present research is a complement to and an extension of these recent contributions to psycho-educational research and theorising.

The starting point for this research emanates from the general definition of adaptability provided by the American Psychological Association (APA), as follows: "the capacity to make appropriate responses to changed or changing situations; the ability to modify or adjust one's behaviour in meeting different circumstances or different people" (VandenBos, 2007, p. 17). As will be discussed below, for the purposes of the present research, this definition is expanded from behavioural adaptability to also include cognitive and emotional components. Hence, adaptability is here formally defined as the capacity to appropriately adjust cognition, behaviour, and emotion in response to novel and/or uncertain situations and circumstances.

In line with this definition, the present investigation first validates the adaptability measure (the Adaptability Scale) and then explores its role in a hypothesised process model of predictors and consequences. This new scale evaluates individuals' ability to appropriately adjust and modify psycho-behavioural functions and resources (cognitive, behavioural and emotional repertoire) in response to novel and/or uncertain circumstances, conditions and situations (Martin, Nejad et

al., 2012, 2013) through cross-sectional construct validity procedures in the initial phase of the current study. In this phase (Time 1), the study assesses reliability, factor structure and correlations with selected outcome measures. In subsequent stages of the study (Time 1 and Time 2), the predictors (personality, implicit theories of ability and intelligence) and developmental well-being consequences (self-esteem, life satisfaction, sense of meaning, emotional instability) of adaptability are assessed. The role of potential confounds such as socio-demographics and prior achievement is also accounted for. A measure of buoyancy is also included as a further effort to identify unique variance attributable to adaptability. The study builds longitudinal data into its design; this is important because it allows controlling for or purging of prior variance in psychological well-being and thereby evaluates the unique effects of adaptability on psychological well-being through auto-regressive paths (i.e., the paths linking Time 1 factors and their Time 2 corresponding factors, see MacCallum & Austin, 2000; Martin, 2011). The basic design of this model is presented in Figure 2.1. Much of this review of literature describes each part of this model and the rationale for its inclusion.

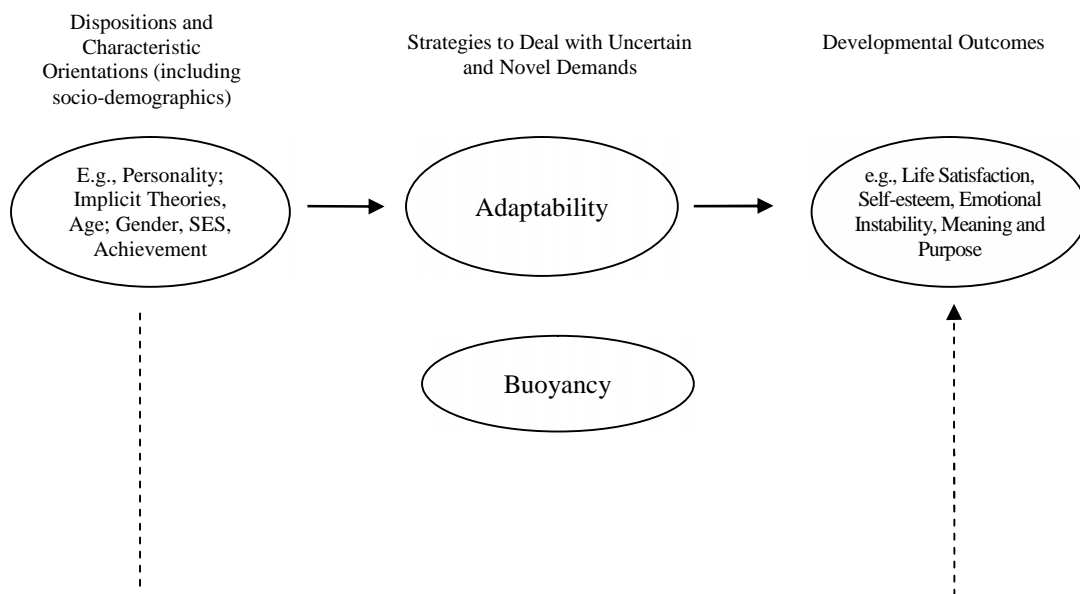


Figure 2.1: Proposed process model investigated in the present study.

Note. Dashed paths are not central to the study's substantive focus but are included to account for all variance in the model and to better estimate unique effects attributable to factors of central interest.

Based on the work of Martin, Nejad et al. (2012, 2013), this study investigates these issues in the developmental context of adolescence and well-being factors highly relevant and formative at this stage of development (self-esteem, sense of meaning, life satisfaction and emotional instability). The present study focuses on adolescence because development through this stage of life offers various experiences of change, uncertainty, variability and novelty (Berk, 2012; Erikson, 1963). These experiences require individuals to adjust and modify appropriate functions to maintain healthy development (Martin & Marsh, 2008a, 2008b; Martin, Nejad et al., 2012; Schulz & Heckhausen, 1996).

It is proposed that this study presents opportunities for a more comprehensive understanding of the human capacity to appropriately modulate psycho-behavioural functions. First, it seeks to make a clearer distinction between the concepts and experiences of 'change' and 'adversity' that researchers often conflate (Martin, Nejad et al., 2012, 2013). As will be discussed below, it is proposed that adaptability (that is relevant to uncertainty and novelty) is distinct from cognate constructs such as buoyancy, resilience and coping (that are relevant to adversity) (Martin et al., 2012, 2013; Putwain et al., 2012; Putwain & Daly, 2013). More specifically, other studies have found cognate factors such as buoyancy are distinct from, for example, coping (Putwain et al., 2012; Putwain & Daly, 2013); therefore, the current investigation may also infer from this that adaptability may also be distinct or an extension of such cognate factors. Second, it seeks to extend the behaviourally-focused APA definition of adaptability to also include cognitive and emotional responses to novelty and uncertainty. Indeed, this behavioural-cognitive-emotional approach to adaptability connects to emerging tripartite frameworks that also focus on these three dimensions of psycho-behavioural functioning (e.g., Fredricks, Blumenfeld, & Paris, 2004).

Third, given the rapid nature of change in the modern world, it is timely that we expand research and general understanding of young people's ability to deal with life changes and uncertainties (Martin, 2010). Finally, the research offers conceptual and measurement perspectives on adaptability that have not been explicitly integrated into the youth development literature. Taken together, the present study offers measurement, methodological, substantive and applied yields relevant to adolescents' responses to their changing and variable world.

2.1.2 Brief introduction to major elements of the literature review.

There is much important literature to review when scoping the nature of adaptability and its links to adolescent psychological well-being. In the following sub-sections, each major element is briefly introduced to assist in the more detailed reading later in the review of the relevant literature.

2.1.2.1 Adaptability.

Adaptability has been formally defined as appropriate behavioural adjustments and modifications to novel and uncertain circumstances and conditions (VandenBos, 2007). In addition, the current study's focus is to consider adaptability in terms of appropriate cognitive, behavioural and emotional adjustments in the face of uncertainty and novelty (Martin, Nejad et al., 2012). In the current investigation, cognitive adaptability refers to modification in thinking to deal with new and uncertain demands. Thus, it is argued in the present investigation that one of the resources individuals would regulate to deal with novelty and uncertainty is their cognitive repertoire. Behavioural adjustment refers to modifications in the nature, level and degree of behaviour to adaptively deal with new and changing situations and conditions (Heckhausen, 1999; Heckhausen & Schulz 1995; Heckhausen, Wrosch, & Schulz, 2010; Schulz & Heckhausen, 1996). Emotion regulation refers to the regulation of feelings and how these feelings are expressed (Gross & Muñoz, 1995). As a result, emotional adjustment is considered in terms of "emotional response-tendencies [that] may be modulated" (Gross, 1998, pp. 272-273; see also Pekrun, 2012; Pekrun & Stephens, 2009) to respond appropriately to environmental uncertainty and novelty.

2.1.2.2 Cognate conceptualising and constructs.

Adaptability is a recently developed construct that complements the previously developed body of work in the domain of coping, resilience, buoyancy, self-regulation and, to some extent, motivation and achievement goal theory (Martin, Nejad et al., 2012, 2013). It is also a relevant construct used in the positive psychology and evolutionary psychology domains (see full rationale below). Adaptability attempts to shed light on the internal process that individuals employ using their personal resources (via cognitive, behavioural and emotional capacities) to manage and deal with life uncertainties and novelties, leading to psychological

well-being. Consequently, in developing and understanding the adaptability construct, it is important to consider relevant theoretical traditions. Here, the relevant work is mapped out by briefly discussing salient frameworks and perspectives that have informed this research thinking and operationalisation, including: the life-span theory of control (encompassing life-span theory of control and life-span theory of developmental psychology), adversity-related conceptualising (e.g., resilience, buoyancy and coping), models of change (the Transtheoretical Model, TTM, and Adaptive Change Model, ACM), models of adaptation, evolutionary theorising, positive psychology (e.g., enabling and broaden-and-build approaches) and self-regulated learning (SRL).

2.2 Cognate Conceptual Background

2.2.1 Early theorists.

2.2.1.1 Freud, Piaget and Vygotsky.

Before describing ‘modern’ theorising and conceptualising, it is appropriate to consider some of the earlier work that contextualises recent and current thinking and perspectives relevant to adaptability. Freud (1961) postulated that human thought and emotion are manifested through unconscious and conscious faculties. He refers to the unconscious as *id* and the conscious as *ego*. He also postulated that there is another layer that facilitates and mediates communications between these two faculties, which he terms *superego*. He also believed that the *id* houses the basic human needs, wants, desires, instincts and wishes, as well as individuals’ core personality traits. Whereas *id* operates on a basic ‘animalistic’ level, *ego* operates in a more conservative manner. There is thus some tension between the two, giving rise to the need for a mediator or regulatory faculty such as the *superego* that can settle the conflicts between these two primary faculties (Freud, 1961, 1964). He further hypothesises another method that human beings use to settle their emotional and cognitive conflicts that can otherwise lead to ineffective behaviour, which he refers to as a *defence mechanism* (Freud, 1894, 1940). Defence mechanism and *superego*, together, form a regulatory executive function that provides a cognitive regulation repertoire that leads to behavioural and emotional coping and change, which is parallel to the adaptability hypothesised model of personal resource management and adjustment.

Piaget, on the other hand, suggests that cognitive development (change) takes place through the processes of *assimilation* and *accommodation*. “*Accommodation* ... refers to the adjustment of mental schemas to match information acquired through experience, in contrast to *assimilation*, which involves alteration of the experience to fit existing schemas” (VandenBos, 2007, p. 7). Assimilation and accommodation are forms of cognitive regulation that lead to cognitive, behavioural and emotional change (Piaget, 1962, 1970, 1976; Von Glasersfeld, 2002). In Piaget’s view, assimilation cannot exist without accommodation and *vice versa* (Block, 1982). Hence, in his opinion, this process leads to a state of *equilibration*¹ that Piaget refers to as cognitive regulation (Flavell, 1996). Further, Piaget referred to the product of this dynamic regulation of cognition as cognitive adaptation and proposed that “adaptation is something organisms have evolved to do” (Flavell, 1996, p. 200). Taken together, Piaget acknowledged a process of resource regulation (though, primarily cognitive regulation) to achieve cognitive adaptation and/or adaptive functioning, including cognitive, behavioural and emotional biological functioning (Flavell, 1996).

Vygotsky posited that learning (cognitive development and/or change) is very much a social matter and is informed by cognitive and behavioural regulation through social speech and experience achieved through *scaffolding*, *the zone of proximal development* and a process of *apprenticeship* and mediation (Ghefali, 2003; Vygotsky, 1978; Williams & Burden, 1997). He theorised that novice learners may learn more effectively if they are placed with a more knowledgeable and experienced person, if the task is within or just ahead of the learner’s developmental stage and if the task represents a challenge. Vygotsky also wrote about scaffolding as a means to facilitate learning by promoting individuals’ self-reliance.

Scaffolding involves cognitive and behavioural development (including regulating and modifying these resources relevant to past experiences and creating new ones) by being challenged slightly beyond one’s current ability. The main aim of this process is to teach and learn new cognitive and/or behavioural skills through the regulation and modification of existing cognitive and behavioural knowledge and experiences.

¹The process by which an individual uses assimilation and accommodation to restore or maintain a psychological equilibrium; that is, a cognitive state devoid of conflicting schemas (VandenBos, 2007).

Vygotsky (1978) also pointed out that learning can be facilitated and enhanced through attending to the Zone of Proximal Development (ZPD). He defined this zone as “the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (Vygotsky, 1978, p. 86). The zone of proximal development is a cognitive process that is influenced by one’s social environment. It addresses the construction of meaning and reality through a dialogue between an individual and his/her external environment by utilising internal abilities and through the assistance of a more knowledgeable significant person (Vygotsky, 1978).

Apprenticeship and mediation provide a novice learner with an opportunity to assess and re-assess his/her learning. It is in this process that the learner (taking on the role of an apprentice) receives the opportunity to enjoy the assistance of a facilitator (e.g., an educator) to shape and re-shape his/her thoughts, behaviour, and prior knowledge. This progressive and directional development is achieved when an instructor assists a learner to modify, regulate and/or change their cognitive and behavioural resources that are built as experiences through cultural interactions. Vygotsky argued that it is through such processes and the use of *cultural tools* such as language that individuals learn and regulate their current state of cognition and behaviour (Bodrova & Leong, 2001).

2.2.1.2 Early work on adaptability.

Another relatively ‘early’ theoretical and conceptual treatment of adaptability was provided by Motamedi (1977), who defined adaptability as “a social system’s ability to deal with its external task environment and remain environmentally relevant” (p. 481). Motamedi drew on Fromm (1941) to suggest there are two classes of adaptability: static and dynamic. By static, Fromm referred to an adaptation that leaves the whole character structure unchanged and results only in the adoption of new ‘habits’. By dynamic, Fromm referred to an adaptation that creates something new within its structure and arouses new drives and new anxieties (Motamedi, 1977).

In understanding how the present study builds on and extends this early work on adaptability by Motamedi, it is important to note a few points of differentiation and departure. First, Motamedi’s (1977) model provides a somewhat abstract conception of adaptability, lacking the necessary concreteness to operationalise the

construct in an empirical study. With this lack of operationalisation, no measurement approach is tied to Motamedi's construct. Second, his definition overly conflates constructs such as adaptability and 'copability'. Motamedi asserted that adaptability "refers to a social system's ability to deal with its external task environment and to remain environmentally relevant" (p. 481). He referred to "copability as a system's ability to deal with and maintain a viable internal environment" (p. 483). Third, Motamedi's construct is somewhat dated now, with very little alignment with current conceptions of adaptability, such as that of the APA: "the capacity to make appropriate responses to changed or changing situations; the ability to modify or adjust one's behaviour in meeting different circumstances or different people" (VandenBos, 2007, p. 17). Lastly, Motamedi seemed to view adaptability as also relevant to adversity (thus, more relevant to constructs such as resilience, as described below), whereas adaptability in the present investigation has been carefully distinguished from adversity-related constructs due to its focus on uncertainty and novelty, and not adversity (Martin et al., 2012, 2013). Taken together, although a useful first contribution to thinking about adaptability, the present study is deemed a timely extension of Motamedi's work and thus has the potential to make a meaningful contemporary contribution to thinking about how individuals deal with uncertainty and novelty in their lives.

2.2.1.3 Subsequent work on adaptability.

Kozlowski and colleagues (2001) have more recently looked at the adaptability concept, but from a business and training perspective. They argue that the dynamics and uncertainty associated with the external world of business create pressures and call for flexibility, innovation and adaptability. They define adaptability as "to make fit; implies a modification according to changing circumstances" (p. 2). Additionally, they put forward that decision-making (either team or dynamic decision-making) processes require cognitive and behavioural capabilities for effectiveness in the new and complex business environment. It is argued by Kozlowski and colleagues that the Adaptive Learning System (ALS), which is based on a self-regulatory model of learning, motivation and performance (Ames & Archer, 1988; Bandura, 1991; Karoly, 1993; Latham & Locke, 1991; Smith, Ford, & Kozlowski, 1997), is an appropriate approach to meet the demands of today's complex and uncertain business world. The ALS framework is designed to

improve the development of complex knowledge, adaptive capacities and learning strategies that are enmeshed in the performance context (Kozlowski, Toney, Mullins, Weissbein, Brown, & Bell, 2001). They argue that adaptability is founded on self-regulatory capacity and comprises two primary factors, cognitive and behavioural (2001). Further, Kozlowski et al. assert that self-regulation involves monitoring (a cognitive function) the differences between goals and current states and a process of self-evaluation that is guided and led by affective reactions. Thus, ALS is designed to selectively influence the self-regulatory process to affect learning and performance. Self-regulation, then, involves the interactions among cognitive, behavioural, and emotional components that are entwined. Consequently, ALS, along with individual differences, may influence proximal training outcomes of performance and learning. These processes influence distal outcomes of workplace retention and adaptation (Kozlowski et al., 2001).

Thus, Kozlowski et al.'s (2001) framework is very much a self-regulatory one. Kozlowski et al. present a comprehensive model of self-regulation that hypothesises three foci within their self-regulation system model: self-monitoring (a cognition focus), self-evaluation/reactions (an emotion component) and practice (a behaviour component). They conceptualise a two-factor self-regulation model, cognitive/behavioural and emotional factors. They conceptualise the emotional factor as self-evaluation that is 'past oriented' (p. 7). They believe that all three factors are interlinked. They also place significant emphasis on self-efficacy as an important trait in promoting adaptability. Further, they hypothesise that behaviour and cognition are inseparable and that cognition leads to behaviour. They also claim that the timing of self-monitoring (the domain-specific component representing cognition in Kozlowski et al.'s self-regulation model), the sequencing of the training, and the complexity of the material to be learned determines the effectiveness of self-monitoring (cognition).

The current research is informed by such hypotheses and extends them to provide a more comprehensive theory and construct of adaptability. Kozlowski and colleagues' (2001) adaptability conceptualisation is more domain-specific and attempts to explain this concept within the business world. They base this concept on the self-regulation model and suggest that adaptability has three foci, including cognition, behaviour, and emotion; however, they also postulate that cognitive and behavioural factors are inseparable and for behavioural and emotional adaptability to

happen, cognitive adaptability needs to happen first. The current study, on the other hand, suggests that while cognitive and behavioural factors significantly align, they are separable factors and the researcher may operationalise them separately if necessary; though a higher-order factor comprising cognition, behaviour, and emotion is defensible (Martin, Nejad et al., 2012, 2013).

2.2.2 Life-span theory and life-span theory of control.

2.2.2.1 *Life-span theory.*

The life-span theory proposes that development is a malleable, multidirectional and multidimensional process of psycho-behavioural change throughout an individual's life course (Baltes, 1987; Staudinger, Marsiske & Baltes, 1993). Baltes (1987) asserts that development in the course of life is characterised by increments, declines or maintenance in individuals' 'adaptive stock'. These two central concepts embedded in the life-span theory are relevant to the study and conceptualisation of the hypothesised adaptability model in that the course of psycho-behavioural growth throughout life is, on the one hand, an ongoing, malleable and changing process and, on the other hand, involves fixed (trait-like) components (either within or across domains) that drive this dynamic process. In a similar vein, adaptability also presents dynamic concepts in that it hypothesises that individuals are equipped with personal resources that are both fixed and malleable, each affecting individuals' capacity to successfully deal with change, uncertainty, variability and novelty (see Figure 2.1).

Thus, there are some notable alignments between life-span theory and conceptualising of adaptability. The personal resource adjustment central to life-span theory is similar to the adjustments and modifications relevant to adaptability (Staudinger et al., 1993). Additionally, the varying and flexible cognitive components inherent in the life-span theory of developmental psychology are aligned with the varying psycho-behavioural nature of adaptability model conceptualisation (Martin, Nejad et al., 2012).

Importantly, however, it is proposed that adaptability is distinct from concepts and processes under life-span theory. Specifically, adaptability is proposed to be broader in its scope. Whereas life-span theory of psychological change is primarily concerned with cognitive and behavioural change, adaptability is believed to also involve an emotional dimension. Hence, in the present study, it is

hypothesised that adaptability comprises cognitive, behavioural and emotional dimensions that affect well-being outcomes.

The plasticity or malleability concept implies that variability inherent in the life-span theory promotes change that can potentially lead to changes in adaptive capacity. Plasticity, as conceptualised in the adaptability framework, reflects the capacity for flexibility when faced with change and uncertainty. Staudinger et al. (1993) argue that individuals' psycho-behavioural resources can be increased or activated; hence, behavioural plasticity can change and lead to new ways of dealing with everyday uncertainty and novelty. Staudinger et al. (1993) argue that individuals tend to maintain successful strategies and resource development patterns, and to regulate or discard strategies and patterns that are deemed unsuccessful in dealing with life challenges. In a related way, adaptability is proposed to involve the selective modification and adjustment of personal resources relevant to uncertain and novel situations and circumstances with which the individual is faced.

As noted earlier and put forward in this study, another aspect of life-span theory aligning with adaptability concerns the multidirectionality and multidimensionality of development (Heckhausen, Dixon, & Baltes, 1989; Staudinger et al., 1993). According to Baltes (1987), human behaviour development throughout their life course is characterised by: (a) lifelong growth and change, (b) behavioural growth that is multidimensional and multidirectional, (c) processes relevant to growth and decline (gains and losses), (d) plasticity, and (e) multidisciplinary (Baltes, 1987; Heckhausen et al., 1989). Of interest to the current study are the plasticity, multidimensionality and multidirectionality characteristics of life-span theory. Baltes (1987) asserts that the process of human development is not linear, since developmental changes can be characterised as having the capacity to either increase or decrease in various dimensions and directions over the course of an individual's life.

It is suggested that adaptability involves resource adjustments that are multidirectional and multidimensional to assist individuals to successfully navigate novel and uncertain circumstances (Martin, Nejad et al., 2012). It is also proposed that inherent in the adaptability theorising and framework are the concepts of multidimensionality and multidirectionality (Martin, Nejad et al., 2012). Adaptability is thus defined as the capacity to adjust and modify personal resources in the face of uncertain and novel life circumstances (Martin, Nejad et al., 2012, 2013).

Taken together, the life-span theory shares some conceptual similarities with the proposed adaptability framework. They both argue that cognitive plasticity is an essential component for successfully navigating developmental variability and they are both multidirectional and multidimensional constructs (though the dimensional scope of adaptability may be wider). However, adaptability also emphasises emotional adjustments that are central to managing and dealing with life uncertainty and novel circumstances. With regards to behaviour, the life-span theory of developmental psychology tends to see behavioural change and regulation as an outcome of cognitive regulation, whereas adaptability tends to position behavioural, cognitive and emotional regulation as correlated and co-occurring constructs.

2.2.2.2 Life-span theory of control.

The dialogue between an individual's psycho-behavioural resources and his/her environment can present individuals with new and uncertain circumstances. Theorists have offered solutions to assist individuals and professionals to understand their variable and uncertain life conditions. One subset of broader life-span theorising is that relating to the life-span theory of control. The life-span theory of control attends to the purposeful and beneficial modification and adjustment of goals to the opportunities and threats in one's ecosystem (Heckhausen, 1999; Heckhausen & Schulz 1995; Heckhausen et al., 2010; Schulz & Heckhausen, 1996; Wrosch, Schulz, & Heckhausen, 2002). Accordingly, control is described in terms of major (primary) control, which describes the behavioural element of goal pursuit, and minor (secondary) control that explains the cognitive component of goal pursuit. Compensatory primary control involves reassessing and re-evaluating goals. Compensatory secondary control involves regulating ambitions and hopes and adjusting one's outlook. Both are hypothesised to be part of the processes involved in adaptive modifications and adjustments (Tomasik et al., 2010).

Notwithstanding this congruence, the compensatory dimension is distinct from adaptability in two ways (see Martin, Nejad et al., 2012). First, the life-span control theory lacks an explicit focus on emotional adjustment, one of the three hypothesised components of adaptability. Second, the life-span approach is very concerned with goal disengagement and/or the development of new goals, whereas adaptability often attends to situations and circumstances from which the individual cannot disengage or cannot pursue a markedly different path (see Martin, Nejad et

al., 2012). Third, the life-span theory of control views behaviour very much as an outcome informed and predicted by cognitive regulation. As described above, in the adaptability model, behaviour operates alongside cognition and emotion in affecting well-being.

A fundamental supposition of control theories is that individuals have a desire and/or inclination to produce behaviour-event circumstances enabling them to exert primary control behaviour over their environment (Heckhausen & Schulz, 1995). Accordingly, developmental functions tend to be very much focused on the optimisation of primary control. Importantly, the key function of secondary control is to support and facilitate the primary control functions (Heckhausen & Schulz, 1995).

Life-span theory of control argues that successful primary and secondary control regulation takes place to optimise developmental functions. Similar to adaptability, this occurs to the extent that the individual is equipped with an adaptive capacity (Heckhausen et al., 2010). It is believed that an important feature of this adaptive capacity is the regulation of motivation (Heckhausen et al. 2010). Hence, this approach to development is concerned with the regulation of motivation aimed at dealing with life challenges. It functions through selective and compensatory strategies that involve cognitive and behavioural faculties that predict successful developmental outcomes (Heckhausen & Schulz, 1995). This theory is relevant to adaptability in that compensatory control comprises alternative courses of action (compensatory primary control) and reassessing and re-evaluating goals, regulating ambitions and hopes and adjusting outlook (compensatory secondary control) (Tomasik et al., 2010).

2.2.3 Adversity factors: coping, buoyancy, and resilience.

The present study also differentiates between uncertainty and novelty on the one hand and difficulty, setback and adversity on the other. It is argued that adaptability addresses uncertainty and novelty throughout an individual's life-span, whereas factors such as resilience, coping and buoyancy deal with adversity, difficulty and setback. It is also important to note that many illnesses also present individuals with novelty and uncertainty as many adversities do; however, the distinction is informed by being 'everyday' novelty and uncertainty. Additionally, that adaptability (similar to buoyancy) is a proactive process whereas coping and

resilience are more of reactionary responses to ‘chronic’ adverse and challenging life situations.

Resilience addresses the successful and positive resolution of individuals’ personal resources, despite ‘acute’ and ‘chronic’ adverse, challenging or threatening circumstances (Howard & Johnson, 2000) that are deemed ‘major assaults’ on the developmental process (e.g., Garmezy, 1981; Lindstroem, 2001; Luthar & Cicchetti, 2000; Masten, 2001; Werner, 2000). Buoyancy, as a construct, has been developed to address people’s responses to common and ‘daily’ challenges (Martin & Marsh, 2009). Coping is relevant to adversity in terms of cognitive and behavioural regulation that facilitates attempts to deal with specific demands that are deemed beyond the individual’s resources (Martin, Nejad et al., 2012; see also Frydenberg, 2008; Lazarus & Folkman, 1984).

2.2.3.1 Coping.

Coping refers to the capacity to apply cognition and emotion to deal with specific external and/or internal demands that are judged as difficult, challenging or exceeding an individual's personal resources (Folkman et al., 1986; Hawkins, McKenzie, & Frydenberg, 2006). There are three key features to coping:

1. Coping is oriented to stressful situations. In the current study it is acknowledged that stress may refer to negative or positive situations and states, however, the primary attention of the present study is given to the negative orientation of stress;
2. Coping is informed by a specific situation and a particular individual’s appraisal. Hence, every coping method is determined and/or formed by how a person thinks about a particular situation and how a particular situation presents itself;
3. Although coping is outcome-oriented and not limited to successful outcomes or processes; it may also lead to problematic processes (e.g., avoidance) in an attempt to cope (Folkman et al., 1986).

Various studies have found cognate factors such as buoyancy distinct from coping (Putwain et al., 2012; Putwain & Daly, 2013) and the present research may infer from this that adaptability is also distinct, or an extension of such cognate factors. Adaptability is also considered somewhat different from coping in that it considers a tripartite approach comprising adjustment of cognition, behaviour, and

emotion (coping has primarily tended to focus on regulation of cognition and behaviour). Adaptability is also distinct in that it is not merely problem-oriented: there can be quite positive changes (e.g., promotion to a higher group, a school leadership opportunity) that require adaptability, rather than coping. Finally, as noted above, coping has closer alignments to adversity-related themes, whereas adaptability has closer alignments to themes of uncertainty and novelty.

2.2.3.2 Buoyancy.

Buoyancy is another cognate construct that is aligned to adaptability. In recent years, the study of buoyancy has focused on the academic setting and aimed at addressing ‘everyday’ adversity (as distinct from the substantial adversity relevant to resilience). Academic buoyancy is defined as students’ capacity to effectively and successfully manage academic setbacks and challenges that are characteristic of the ‘everyday’ course of school life (e.g., challenging deadlines, challenging work, low test result, test demands and anxiety, study stress) (Martin & Marsh, 2008a, 2008b). Accordingly, buoyancy has been developed to address common and ‘daily’ challenges (Martin & Marsh, 2009). From an applied perspective, then, academic buoyancy is applicable when managing case-specific poor performance; it is pertinent when managing low-level threats; it is relevant when managing fluctuations in engagement and motivation and it is relevant when individuals need to manage minor academic challenges (Martin & Marsh, 2008a, 2008b). Moreover, buoyant ability that assists individuals to proactively deal with everyday setback and challenges may be informed by one’s sense of self-efficacy. Self-efficacy is defined as people’s perceived beliefs of their capabilities to produce given achievement (Bandura, 1977).

Further, while it is argued in the present study that buoyancy and adaptability are related and this includes their proactive approach to dealing with situations that are equipped to manage. The primary difference between the two constructs rests in what they address. Adaptability is aimed at addressing everyday novelty and uncertainty, whereas, buoyancy is aimed at addressing everyday adversity (Putwain et al., 2012; Putwain & Daly, 2013). As with resilience, buoyancy is often aimed at ‘getting through’ or ‘getting by’, whereas adaptability is specifically about successful and effective responses to phenomena. However, as it is suggested, other studies have found cognate factors such as buoyancy are distinct from, for example, coping

(Putwain et al., 2012; Putwain & Daly, 2013), the present research might also infer that adaptability is also distinct or an extension of such cognate factors (Martin, Nejad et al., 2012). Adaptability, thus, may be considered a proactive, ‘on the front foot’ and ‘forward-looking’ strategy in dealing with such varying and changing life circumstances. Taken together, buoyancy and adaptability are distinctive in their definition and also map onto different phenomena in young people’s lives. Notwithstanding this, it is proposed that buoyancy is associated with adaptability. Hence, a measure of buoyancy is included in modelling to determine variance in adaptability that is independent of buoyancy.

2.2.3.3 Resilience.

Resilience is defined as “the process and outcome of successfully adapting to difficult or challenging life experiences, especially through mental, emotional and behavioural flexibility, and adjustment to external and internal demands” (VandenBos, 2007, p. 792). Additionally, resilience refers to an active process, including positive regulation and adaptation within the context of considerable adversity (Luthar, Cicchetti, & Becker, 2000). Although adaptability is clearly related to resilience, there are important distinctions proposed between the two.

One distinction may be that adaptability is something of a precursor to resilience. As indicated in the above definition of resilience, the capacity to be resilient requires some level of adjustment to cognitive, behavioural and emotional resources to positively and successfully manage life adversity or developmental threats (Luthar et al., 2000; VandenBos, 2007). Insofar as this is the case, adaptability may be considered something of a predictive factor within the resilience process. Another distinction relates to the fact that resilience is relevant to ‘acute’ and ‘chronic’ adversity and threats that are deemed major attacks on the developmental process (Martin & Marsh, 2009). This suggests that resilience will not be called upon if the given circumstance is not appraised as threatening to one’s developmental health and well-being. Adaptability, on the other hand, is somewhat agnostic on the negative and positive valence of the change, uncertainty, novelty and variability that individuals are faced with. Whereas resilience is centrally concerned with substantial adversity, adaptability is concerned with both positive and negative change that does not constitute a threat or major risk (Martin, Nejad et al., 2012). In addition, it is important to consider that resilience primarily tends to be aimed at

‘getting through’ or ‘getting by’ in situations of adversity, threat and risk. In contrast, adaptability focuses more on constructive adjustment leading to adaptive outcomes and well-being (not simply ‘getting through’ or ‘getting by’). Thus, adaptability is more positively oriented. As defined (and embedded in each of its items—see Chapter 4), it refers to successful responses to change (Martin, Nejad et al., 2012); however, it is important to recognise and acknowledge the relationship between adaptability and the relevant cognate factors e.g., buoyancy. The interaction between adaptability and buoyancy, for example, would possibly create a united force and an array of possible enhanced responses against substantial adversities.

Notwithstanding these distinctions, resilience is a relevant construct when considering adaptability. Resilience and adaptability both recognise and refute ‘deficit-focused’ approaches to development (Masten, 2001). They are both premised on the view that individuals can purposefully adjust their personal resources in a bid to deal with external conditions, as well as with change and challenge. These two constructs also share motivational drives in achieving adaptive outcomes by modifying and adjusting psycho-behavioural resources aimed at achieving a positive and successful adaptive outcome in dealing with adversity or change in life (Martin, Nejad et al., 2012, 2013).

2.2.3.4 Summary of adversity factors.

The conceptual associations that exist between adaptability and adversity factors suggest the need to control for variance that may be shared between adaptability and these adversity constructs. For the purposes of the present study, buoyancy is included with adaptability throughout all modelling. Buoyancy was selected over resilience because resilience is activated when one deals with chronic and acute adversity (Martin & Marsh, 2009; Putwain et al., 2012; Putwain & Daly, 2013), whereas chronic and acute adversities and challenges tend to be relevant to a minority of adolescents. Buoyancy, however, is relevant to a wider range of individuals, as most individuals experience everyday adversity concerning life circumstances (Martin & Marsh, 2009). In being applicable to a wider range of adolescents, buoyancy is more aligned to the adaptability concept that is also potentially applicable to a wide range of youth. Buoyancy was selected over coping because buoyancy is operationally defined as a one-dimensional factor (Martin & Marsh, 2009; Putwain et al., 2012; Putwain & Daly, 2013), thus providing a simpler

basis for modelling. Coping, on the other hand, tends to be a multidimensional construct (Folkman et al., 1986; Frydenberg, 2008; Hawkins, McKenzie, & Frydenberg, 2006) and thus introduces unnecessary complexity in the modelling.

2.2.4 Evolutionary and human behavioural ecology models.

Evolutionary psychology attempts to explain human development in terms of the psychological mechanisms that are needed to survive the challenges of the environment (Cosmides & Tooby, 1987; Tooby & Cosmides, 1992). From an evolutionary psychology perspective, the mind comprises psychological adaptations and learning that promote survival through problem solving (Buss, 2009; Geary, 2008; Sweller, 2004). Evolutionary psychology is an:

approach to psychological inquiry that views human cognition and behaviour in a broadly Darwinian context of adaptation to evolving physical and social environments and new intellectual challenges. It differs from socio-biology mainly in its emphasis on the effects of natural selection on information processing and the structure of the human mind. (VandenBos, 2007, p. 349)

Buss (1995), as well as Quine (1981) and Symons (1987), believes that “all observable behaviours are influenced by underlying evolving psychological mechanisms and no behaviour can be produced without them” (Buss, 1995, p.1). Further, it is postulated that the way to produce complex physiological and psychological mechanisms is through natural selection.

Evolutionary psychology supports the fact that the world presents organisms with challenge, change and uncertainty and that these organisms employ various resources that are available to them to adapt to such varying, changing and uncertain circumstances. Evolutionary psychology hypothesises that human beings use complex cognitive and behavioural change processes to achieve desired behaviour. It also posits that the process of adaptation takes a considerable amount of time (Buss, 1995, 2009).

One important point that deserves mentioning about the evolutionary psychology approach is that it sees adaptation occurring slowly, thus posing a challenge for human adaptability in that the world changes faster than the brain and that behavioural change is required to adapt to it (Cosmides & Tooby, 1987). Given this argument, a more functional line of evolutionary work has developed in the form of human behavioural ecology (HBE) (Barrett, Dunbar, & Lycett, 2002; Burghardt,

2009). HBE argues for relatively quick changes in behaviour through interaction with the environment during adaptation phases (Smith, 2000). HBE, then, is regarded as more pragmatic and tied to readily observable changes in human functioning (Caro & Borgerhoff Mulder, 1987). Indeed, it is this practical tenet of evolutionary theorising that lines up well with how the current study approaches adaptability: responsive and fairly immediate modification in the face of novel, uncertain and variable stimuli. Taken together, the evolutionary approach and view of human psychology and behaviour recognises the changing world to which individuals must adapt and theorises the factors and processes relevant to this. The present study aims to locate and explore such concepts in the psycho-educational domain.

Adaptability theorising is in line with core evolutionary psychology and HBE hypotheses that argue the need for organisms to respond to uncertainty, change and novel circumstances in which they must adapt in order to survive. Whereas evolutionary psychology and HBE might look at the process of change and adaptation in organisms, adaptability is not so concerned about changing the person per se (though it does not rule such change out). Rather, it focuses on the adjustments in cognition, behaviour, and emotion that may need only be temporary (or permanent) to deal with changing, uncertain, varying and novel circumstances. Thus, the adaptability framework accepts that substantial change of the person is difficult, but that more minor and circumstantial adjustments may help individuals through changing, new and uncertain situations. While evolutionary psychology and (to a lesser extent) HBE posit that adaptation is a process of progression, adaptability is suggested as a situation-specific response that may be activated relatively quickly and temporarily. It is also the case that evolutionary psychology and HBE tend to focus on behaviour and adjustments of mind in a bid for survival, whereas adaptability also includes specific attention to emotion and its adjustments to manage and deal with life's novel and uncertain situations.

2.2.5 Positive psychology.

Positive psychology has prospered and proliferated in the past decade. It is an overarching term that includes the study of positive traits and emotions and enabling contexts (Seligman & Csikszentmihalyi, 2000; Seligman, Steen, Park, & Peterson, 2005). It seeks to put human suffering, life-span challenges and disorders in a perspective that provides a deeper and more holistic and positive understanding of

such conditions. It is an attempt towards a view and understanding of human experiences that not only includes an understanding of both suffering and happiness but also the interaction between opposing positive and negative factors (e.g., positive and negative emotions) (Seligman et al., 2005). At the same time it seeks to offer interventions that reduce or eliminate maladaptive (negative) emotions and boost or increase positive emotions (Seligman et al., 2005). Positive psychology is concerned with four significant topics:

1. More robust psychological traits such as interests, talents and strengths of character;
2. Positive experiences such as happiness and flow;
3. Positive institutions such as schools and families;
4. Positive relationships among individuals such as family members, friends and co-workers (Peterson, 2009).

Positive psychology literature and recent research has indicated six virtues (wisdom and knowledge, courage, humanity, justice, temperance and transcendence). Under these virtues are 24 character strengths (e.g., open-mindedness, authenticity, kindness, gratitude, fairness and self-regulation) that potentially promote a higher degree of life satisfaction and human flourishing (Peterson & Seligman, 2004; Seligman et al., 2005). However, it is interesting to note that adaptability is not explicitly mentioned in such work. The present study is thus an opportunity to ascertain whether adaptability should in fact be considered in future studies and taxonomies within positive psychology.

The study of positive human emotions is embedded within the positive psychology perspective (Fredrickson, 2001). These positive emotions then have the potential to broaden individuals' cognitive-behavioural stock, and, as a result, enable individuals to build robust and more resilient personal resources including, *inter alia*, intellectual, physical, social and psychological repertoires (Fredrickson, 2001). Similarly, Bandura (2001) argues that individuals are adaptively positioned and equipped to deal with new and changing life circumstances. Bandura (2001; see also Benight & Bandura, 2004) proposes that this can take place through modifications of cognition, behaviour, and emotion, modifications akin to those cited in the adaptability approach. Adaptability, similar to the role of positive emotion in positive psychology theorising, seeks to enable and equip individuals with the capacity to broaden their cognitive-behavioural and emotional repertoires that can then serve to

build personal resources. Consistent with this proposition, the process of promoting, enabling, broadening and building positive emotions and more adaptive personal resources and minimising or eradicating maladaptive (or negative) emotions can potentially lead to subjective well-being (Diener, Sandvik, & Pavot, 1991). Further, the capacity to self-regulate motivation, emotion and behaviour through self-influence and self-reflection can enhance individuals' functioning and their meaning and purpose in life (Bandura, 1999, 2001).

While 'broaden-and-build' aspects of positive psychology are founded on notions that align with adaptability, positive psychology and its sub-theories tend to significantly rely on the development and maintenance of emotional resources that influence and predict thought-action repertoire in attempts to achieve well-being (Fredrickson & Joiner, 2002). Adaptability extends this view and asserts that psychological well-being outcomes are predicted by cognitive and behavioural factors. It is also suggested that positive psychology is predicted by these same factors (see Seligman et al., 2005). Thus, adaptability does not rely exclusively on emotional regulation. Further, adaptability is purposefully focused on situations of uncertainty and novelty, whereas positive psychology (and branches of it such as 'broaden-and-build' approaches) is more broadly (and sometimes nebulously) oriented. Thus, although positive psychology and its sub-theoretical perspectives are relevant to core elements of adaptability, there are aspects of psycho-behavioural functioning that are built into adaptability that are suggested to explain unique variance in well-being.

2.2.6 Models of change and adaptation.

Theories and models of change and adaptation are also relevant to the adaptability conceptualisation. For example, the Transtheoretical Model (TTM) seeks to explain change in individuals' health- and non-health-related activities (Parker, Martin, Martinez, Marsh, & Jackson, 2010a, 2010b; Prochaska & Velicer, 1997). Pre-contemplation, contemplation, preparation, action and maintenance are used to identify the stage of change an individual is experiencing (Martin, Nejad et al., 2012; Parker et al., 2010a, 2010b; Prochaska & Velicer, 1997). These stages are also used to assist the individual to move to the next stage or sustain adaptive behaviour (Parker et al., 2010a, 2010b; Prochaska & Velicer, 1997). Similarly, the Adaptive Change Model (ACM) (Bowles, 2010), a recent work on change models,

also incorporates various concepts and processes relevant to change in individuals' lives. Models focusing on adaptation (more than change) are also relevant (e.g., Diener, Lucas, & Scallan, 2006). Each is described in the following, along with their alignments with and divergences from adaptability.

2.2.6.1 Transtheoretical Model (TTM).

TTM is a model that comprises five stages delineating the process of change in people's health-related behaviour. It hypothesises that change and relevant effective intervention is temporal (change occurs over time) and occurs in different stages. Additionally, multiple outcomes can be affected at each of the various stages (VandenBos, 2007). TTM is a model of intention aimed at developing healthy behaviour change (Prochaska, Redding, Harlow, Rossi, & Velicer, 1994; Velicer, Prochaska, Fava, Norman, & Redding, 1998). It refers to the required motivational readiness to enact progressive, continuous and categorical approaches to healthy behaviour change. The process of change based on this model involves adjusting problem behaviour or attaining a positive behaviour through ten cognitive and behavioural activities across five stages (Velicer et al., 1998). These five stages are: pre-contemplation (where individuals are not inclined or are resistant to take an action to bring about necessary behaviour change), contemplation (where people intentionally decide to resolve the problem behaviour), preparation (where a plan of action is formulated), action (where individuals make an effort to modify and change the problem behaviour over the course of about six months) and maintenance (where individuals seek to maintain the positive gains they attain during the action phase and prevent relapse) (Patten, Vollman, & Thurston, 2000; Prochaska, DiClemente, & Norcross, 1992). Although these stages are generally linear, individuals can regress (relapse; a significant threat under TTM) to an earlier stage. However, after renewing their commitment to behaviour change and motivation (intent) they can move forward in a bid to change their less effective or unhealthy behaviour. In doing so, individuals weigh up their choices (a process of decisional balance) and the pros and cons of changing a problematic and health-threatening behaviour (Velicer et al., 1998) to a healthier one.

Taken together, TTM is a problem-oriented model of behaviour change that is focused on individuals' health-related practices and behaviour. It is a temporal and stage-based outlook relevant to change that is operationalised as a progressive,

continuous and categorical view of cognitive and emotional change. TTM's stage progression is significantly associated with cognitive and emotional changes that result in behaviour change (Parker et al., 2010b). Adaptability shares a number of contextual and conceptual aspects with TTM. They both focus on cognitive and emotion modification and adjustment to bring about change. They both recognise a progressive as well as regressive process of adaptation. They both identify general ability and awareness and the realisation of the need for modifying unwanted or undesirable or maladaptive behaviour as the instigating component for change in individuals.

Adaptability, however, is distinct from TTM in that it comprises behaviour as one of the three components of change, and not so much as an outcome as is the case under TTM. TTM has tended to focus on changing the person (relevant to health issues), whereas adaptability is not so much about changing the person or her or his behaviour in a substantial way; rather, it refers to adjustments in cognition, behaviour, and emotion that may need only be temporary to deal with uncertain, varying and novel circumstances. The adaptability framework accepts the reality that substantial change is difficult but that more low-level adjustments can be made to help individuals through change, transition and new and uncertain situations. Further, the process of change within TTM looks at changing the person's behaviour on an ongoing (or permanent) basis. Adaptability, on the other hand, is interested in an ongoing adjustment and modification of personal resources (cognition, behaviour, and emotion) in a bid to manage uncertain and novel circumstances and tasks (Martin, Nejad et al., 2012, 2013).

Finally, while the TTM focus is to bring about desirable behaviour change and reduce relapse, adaptability does not dismiss the fact that regression or inaction could also be regarded as an adaptive behaviour and/or outcome. For example, inaction can be conceptualised as an effortful control, which is defined as a capacity to hold back a potentially maladaptive primary response and execute an adaptive secondary response (Obradovic, 2010) in a bid to manage an otherwise uncertain, new and changing circumstance. This is accomplished by modifying cognitive, behavioural and emotional reactions, such as, for example, delaying speech or a behavioural response, to deal most effectively with a novel situation.

2.2.6.2 Adaptive Change Model (ACM).

The ACM (Bowles, 2010) is a more recently developed model of change. It is a model describing and explaining the achievement of desired behavioural change in individuals' future activities and contexts. Individuals come to realise that their current behaviour is ineffective and unwanted and then, through application of strategic processes, they reduce or eliminate unwanted or undesirable behaviour and increase desired behaviour (Bowles, 2010). Bowles asserts that for change to occur, individuals need to become aware of the unwanted behaviour (or be open to opportunity) and then must visualise a desired behaviour, develop a plan leading to action, and eventually reach a closure that constitutes change. Bowles points out that "planned action should be timetabled, achieved, practiced and habituated to ensure the successful completion of any given stage"(p. 217). Consequently, the ACM is an action and end-result oriented approach that has behaviour change doctrine as the main motivational vehicle.

Adaptability is a concept that is aligned with ACM, but extends it in important ways. Whereas ACM looks at changing behaviour on a more ongoing (or permanent) basis, adaptability modifies it on a more situational basis. As with the TTM, ACM looks at changing the person more substantially, whereas adaptability is not so much about changing the person; rather, it attends to adjustments in cognition, behaviour, and emotion that may need to be merely transient to manage uncertainty, variability and new and changing situations. The adaptability approach recognises that significant change is difficult and that more low-level modulation and change is more realistic and possible to assist individuals through transition, uncertainty and novelty.

2.2.6.3 Models of adaptation.

Other lines of research have studied models of adaptation and how individuals adapt to negative and positive life conditions. The adaptation theory of well-being is a leading theory in this area (Diener, Lucas, & Scallan, 2006). This theory is founded on the different ways people respond and adapt to changing and uncertain situations. Early theorising suggests this ability to adapt was fixed. In subsequent revisions, however, Diener and colleagues recognise that the ability to adapt is unique and distinct to every individual and that individuals possess different ways to express it. Subsequent to this, Diener and his colleagues further recognise

that such theorising also must accommodate when and why adaptation does and does not happen. Two particular aspects of this revision are relevant to the current research. The first is that individuals can be dissimilar in their selection of the strategies they utilise to adapt. In the current investigation this individuality is theorised to take place by means of the changes individuals make to their cognitive, behavioural, and emotional resources (i.e., adaptability) in the face of uncertainty and novelty. The second is that dispositional and personal factors, (e.g., personality) influence individuals' adaptation. Accordingly, in the current study, dispositional constructs (personality and implicit theories) are investigated and modelled to predict adaptability.

2.2.7 Self-regulated learning.

Self-regulated learning frameworks encompass monitoring, directing and controlling of actions towards learning goals, building expertise and developing skills (Boekaerts & Corno, 2005; Paris & Paris, 2001; VandenBos, 2007; Zimmerman, 1990, 2002). Self-regulation has been defined as:

The control of one's own behaviour through self-monitoring of the conditions that evoke desired and undesired behaviour, structuring the personal environment to facilitate desired behaviour and circumvent situations that tend to elicit undesired behaviour, self-evaluation and self-administration of punishments and rewards, or some combination of these. (VandenBos, 2007, pp. 832-833)

Thus, self-regulation is an adaptive (primarily) human attribute that enables individuals to seek and attain volitional control over their thoughts, impulses, feelings and task performances (Baumeister, Gailliot, DeWall, & Oaten, 2006). In fact, Baumeister et al. conclude that self-regulation is an adaptive and energy- and strength-based capacity that can be improved and modified by effort and volition. Emotions may also encourage diverse forms of regulation including students' self-regulation of learning (e.g., Pekrun, Goetz, Frenzel, Barchfeld, & Perry 2011).

Recent and relevant research on self-regulation involves that of Cleary and Zimmerman (2004), referred to as academic self-regulation, and that of Hadwin, Winne, Stockley, Nesbit, and Woszczyna (2001), referred to as Self-Regulated Learning (SRL). Cleary and Zimmerman (2004) emphasise that self-regulation is a multifaceted construct that incorporates motivational and self-process theories and

strategies. They believe self-regulation aims at reaching specific goals; hence, individuals employ it, along with goal setting and strategic planning for optimal performance. Cleary and Zimmerman (2004) define self-regulation as “self-generated thoughts, feelings and behaviours that are planned and cyclically adapted based on performance feedback to attain self-set goals” (p. 538). According to Cleary and Zimmerman, the cyclical model of self-regulation consists of pre-cognition (involving pre-action endeavours), performance control (involving events that happen while target action takes place) and self-reflection (which takes place after performance). Based on this model, the pre-cognition activities influence performance control and self-reflection and the cyclical process is complete when self-reflection influences pre-cognition for future performance (learning) endeavours (Zimmerman, 1989, 2000). According to this self-regulation model, academic performance and related activities (e.g., learning) are goal-oriented and strategically planned. Thus, students’ learning experience and motivation can be enhanced through the regulation of cognition.

Hadwin and Winne (2001) formulated their SRL model hypothesising that strategic planners (i.e., students who plan their study and schoolwork) possess four attributes: (a) they approach their task critically, (b) they set goals and plans based on their assessment in the previous phase, (c) they are aware of cognitive alternatives and hence various actions available to them and, (d) based on their analysis and their available cognitive inventory, they make decisions as to how they must adapt their efforts and resources to the demands of academic life.

Hadwin and Winne (2001) also hypothesise that strategic learners move through four phases, which are based on their abovementioned attributes, to develop more effective behaviour. In the course of the first phase, learners gather information concerning the task and what is required of them as well as what resources are required to be deployed. This stage involves motivation for the task at hand, the assessment of the level and quantity of their self-efficacy and background information about their environment relevant to the task. The next phase involves setting short-term goals and planning about how to go about and complete the task at hand. During this stage, several plans may be formulated, which are based on the learner’s inventory of specific behaviour, cognitive resources and motivational efforts. The following phase involves action in which learners enact the plans and strategies they evaluated as adaptive behaviour (e.g., study tactics based on their

available resources). The last stage is the adaptation stage in which learners assess their performance based on their choice of tactics and strategies and determine how they might adjust their resources to fit the demand. This process is a recursive cognitive process that ends with adaptation of behaviour that expresses itself in the choice of behaviour based on selected goals and strategic planning.

Gross (2002) looks at a more domain-specific aspect of self-regulation: emotional regulation. Gross asserts “one of life’s great challenges is successfully regulating emotions” (p. 281). Gross argues that emotions are invoked (sometimes automatically and sometimes intentionally and purposefully) when something of significance to individuals is at stake. He defines emotion regulation as the course of action by which individuals decide which emotions they should have, when they should have them and how they experience and exhibit them. Further, he asserts that emotion regulation is a multifaceted process comprising: (a) regulation of emotion and regulation by emotion, (b) emotion regulation in self and emotion regulation in others, and (c) conscious and non-conscious emotion regulation (Gross, 1999). Gross (2002) also points out that emotion regulation involves changes in emotion ‘dynamics’, specifically: the timing of emotion, its quality, the degree of emotion, its duration and the balancing of emotion with the domains relevant to behavioural, experiential and physiological functioning.

Gross’s process model of emotion regulation (2002) proposes that emotion can be regulated in five points: (a) situation selection, (b) situation modification, (c) setting up attention, (d) modification and change in cognition, and (e) modification of physiological or behavioural responses. It is noteworthy to state that the fifth point is response focused, hence behavioural change is considered an outcome that is achieved through the responses individuals provide after an emotion is already underway (e.g., putting on a ‘poker face’ to avoid expressing anxiety when one is confronted with an uncomfortable situation), whereas the other four points are antecedent focused.

Emotion regulation, as an element of self-regulation, is attained through cognitive assessment as well as physiological triggers; therefore, it is believed that there could be a process in emotion regulation that is also part of cognitive regulation (Pekrun et al., 2002). Furthermore, Pekrun et al. (2011) have argued that while there is a distinction between students’ achievement emotions and general emotions, in the academic environment students’ achievement emotions are correlated with their

value and control judgement, motivation, self-regulation of learning, use of learning strategies and academic performance. They also point out that the internal structure of achievement emotions comprises affective, motivational, cognitive, and physiological components. Consequently, it may be inferred that Pekrun and colleagues (2011) have primarily supported the fact that cognitive evaluation and regulation play a role in self-regulated learning and emotional regulation.

Adaptability, as stated in the preceding sections, is the capacity as well as the process of modifying and adjusting personal resources in the face of new and uncertain circumstances. SRL refers to a sequential, multi-phased, and cyclical self-generated adjustment of thoughts and emotions that may lead to a behavioural adjustment that is informed and motivated by the set goals and strategic planning in order to perform a task (Cleary, et al., 2012; Cleary & Chen, 2009; Zimmerman, 1990). Hence, self-regulation and SRL frameworks that support resource adjustment would logically align with adaptability theorising, by postulating adaptation as a significant part of SRL. It is also important to note the distinction between adaptation and adaptability as it is hypothesised in the present study. Adaptation primarily refers to biological traits that sustain or enhance survival capacity of an organism. This may also include traits that assist an organism to manage environmental change, variability, new, and uncertain conditions. Furthermore, there are, however, important distinctions between the models of self-regulation model and adaptability to note. Models of self-regulation have tended to emphasise cognition and behaviour (Hadwin & Winne, 2001; Pintrich, 1995; Zimmerman, 1990), with relatively less attention to the regulation of emotion, whereas more recent approaches have accommodated emotion regulation (Baumeister et al., 2006; Gross & Muñoz, 1995; Pekrun et al., 2011). Adaptability emphasises all three in one framework as a basis for its functioning.

Self-regulation involves examining, controlling, altering, and organising thought and behaviour in multi-phased cyclical approach (Baumeister et al., 2006; Gross & Muñoz, 1995; Hadwin & Winne, 2001; Pintrich, 1995; Zimmerman, 1990), whereas adaptability is more focused on their adjustment and modifications. Additionally, the self-regulatory framework focuses more on the control of one's resources and does not so much focus on the types of tasks these resources are intended to affect. On the other hand, adaptability is very much interested in the nature of the task before individuals, focusing on tasks involving variability, novelty

and uncertainty. Specifically, the adaptability approach clearly identifies qualitative differences in the environmental demands placed on the individual, one of which is that involving change, uncertainty, variability and novelty. Further, whereas self-regulatory models tend to focus broadly on learning tasks and academic demands, the adaptability construct is focused squarely on change and purposeful adjustments and modifications to deal with change. Lastly, whereas self-regulatory models of learning see the adaptation phase as an oftentimes final one, emanating from reflection and evaluation, this study hypothesises adaptability and adaptation as a primary, active and purposeful strategy that is something of an antecedent to outcomes.

Taken together, although adaptability and self-regulation are cognate factors, as they seek to explain the process of resource allocation, deployment, regulation, modification and adjustment, there are important distinctions in terms of the task demands they are designed to address, where they occur in the process of development and the relative emphasis given to cognition, behaviour, and emotion.

2.2.8 Summary of cognate conceptual background section.

Putting together the diverse theorising summarised in this section, it is evident that adaptability as a concept draws on and aligns with numerous contentions, research lines and operational frameworks that each shed light on human development and functioning. The first is the life-span theory of control, which posits that individuals purposefully modify and adjust their desired and set goals relevant to threats or opportunities in their ecosystem (Heckhausen et al., 2010). Thus, the life course is viewed as a malleable, multidirectional and multidimensional process of psycho-behavioural change aimed at optimal development and functioning through the exercise of control.

Theorising and conceptual frameworks around adversity are also relevant to adaptability. Factors such as coping, buoyancy and resilience are suggested as factors cognate to adaptability, which are aimed at helping individuals deal with and manage life adversities and challenges. In particular, buoyancy is discussed as a relevant adversity factor to include in the modelling of adaptability. Given that adaptability is aimed at addressing everyday novel and uncertain life circumstances, buoyancy, which is about responding to everyday challenges (Putwain et al., 2012; Putwain & Daly, 2013), is considered an important factor to include in analyses to understand its distinctiveness from adaptability.

Positive psychology, and more specifically, enabling and broaden-and build outlooks, are also relevant. Positive psychology is an overarching conceptual framework that embraces positive traits, emotions and enabling relationships and institutions (Seligman et al., 2009; Seligman et al., 2005). It seeks to understand human suffering, life challenges and human disorders from positive and strength-based (rather than deficit-based) perspectives. Adaptability, similar to the role of positive cognition, behaviour, and emotion in positive psychology, seeks to enable and arm individuals with the capacity to adjust their cognitive-behavioural and emotional repertoires with a view to managing novelty and uncertainty.

TTM, ACM and models of adaptation are also important to accommodate, particularly as they pertain to behavioural change and adaptation. Broadly, these models of change propose that individuals can implement cognitive and/or emotional change to bring about behavioural change, which then assists them to deal with life challenges. Adaptability shares a number of contextual and conceptual aspects with these change models, including the focus on cognitive and emotional modification and adjustments and the recognition that adaptation is a process that may involve both progression and regression. However, distinct from change models (that see behaviour change as the outcome), adaptability considers behaviour as one of three components of change, not solely an outcome of cognitive and/or emotional modification. Further, unlike the models of change, adaptability is not driven by the imperative of permanent behavioural change, or major and ongoing change to one's life. Rather, it is mainly interested in situation-specific adjustment and modification of personal resources in a bid to manage uncertain and novel life circumstances as they arise.

Models of adaptation consider adaptation as an overarching mechanism for change directed at attaining well-being. The Diener et al. (1991, 2006) and Diener, Kesebir and Tov (2009) models point out two significant aspects of human adaptation that are relevant in the current conceptualisation of adaptability and its processes. First, individuals can be dissimilar in their selection of strategies used to adapt. In the present investigation, this is considered in terms of the inter-individual differences in cognitive, behavioural and emotional modification and adjustment in the face of novel and uncertain circumstances. Second, dispositional and personal factors (e.g., personality traits) influence individuals' adaptation and this brings into consideration the need to include dispositional predictors (e.g., personality), thus

intra-individual factors, of adaptability. Indeed, these predictors (and consequences) of adaptability will be discussed in the following sections.

Self-regulation (including SRL) is another relevant construct. Self-regulation is focused on attaining goals through self-generated thoughts, feelings and behaviours that are planned and cyclically adapted depending on the task, the context and performance feedback. Hence, models of self-regulation are primarily concerned with the control and organisation of cognitive and behavioural resources and less so on emotional or emotional regulation (but see Gross, 2002; Pekrun, 2012). On the other hand, adaptability is concerned with the modification and adjustment of all three resources (cognitive, emotional and behavioural) in a bid to deal and manage uncertain and novel circumstances.

Evolutionary psychology and HBE models are also cognate frameworks that provide conceptually relevant background to the adaptability model. From the evolutionary psychology standpoint, the human mind engages in psychological adaptation and learning through problem solving (Buss, 2009; Geary, 2008; Sweller, 2004). Evolutionary psychology conducts psychological inquiry into human cognition and behaviour as it seeks to adjust to changes in physical and social environments as well as new intellectual challenges over time. HBE, a more functional and pragmatic line of evolutionary framework (Barrett, Dunbar, & Lycett, 2002; Burghardt, 2009; Caro & Borgerhoff Mulder, 1987), argues in favour of relatively more rapid changes in behaviour through interaction with the environment (Smith, 2000).

Adaptability theorising is in line with central tenets of evolutionary psychology and HBE theorising in that organisms must adapt to new and uncertain life circumstances in order to survive. Adaptability, however, is more concerned with the process of change and adaptation in organisms than about changing the person as per evolutionary perspectives (nonetheless it does not discount such change). Thus, it stresses the personal resource adjustment and regulation that may be temporary in nature to manage novel and uncertain circumstances. Further, while evolutionary psychology and (to a lesser degree) HBE hypothesise that the process of adaptation is a progressive one, adaptability posits that its process can be rather rapid, temporary and situation-specific in response to a changing and/or uncertain situation. Lastly, adaptability tends to focus on the regulation and adjustment of cognitive, behavioural and emotional resources in a bid to manage uncertain and novel situations, whereas

evolutionary psychology and HBE tend to focus on behaviour and the adjustment of cognition in a bid for survival.

2.3 Proposed Model to Investigate Adaptability

The current approach to investigating adaptability is informed by Buss and Cantor's (1989) work and subsequent applications of their approach in the educational context (Martin, Marsh, & Debus, 2001a, 2001b, 2003). Their framework is one in which individuals' dispositions (or characteristic orientations) affect the strategies they employ to deal with demands and challenges in their environment and throughout the life-span. In turn, these strategies affect developmental outcomes. As discussed below, this perspective on human functioning can offer important information and understanding about the relationship between personality (and other characteristics), adaptability and well-being (e.g., general self-esteem and life satisfaction) outcomes (Kyl-Heiku & Buss, 1996). Harnessing this operational perspective also sheds light on the process by which traits and dispositions can be adaptively expressed to explain and resolve uncertainty and successfully approach novelty. Essentially then, this operational framework sheds light on how individuals respond to various 'background' triggers and the effects of these responses (Cantor, 1990).

The present study explores a model in which characteristic and dispositional orientations assume the form of personality and implicit beliefs about intelligence, strategies are represented in the form of adaptability, and well-being is represented in the form of psychological well-being (self-esteem, sense of meaning and purpose, life satisfaction and emotional instability) constructs. Moreover, the present investigation also includes salient personal factors in the form of socio-demographic and prior achievement factors. It also includes buoyancy alongside adaptability in order to examine and substantiate the relative contributions of both adaptability (addressing novelty and uncertainty) and buoyancy (addressing adversity). Figure 2.2 shows the hypothesised model adapted under the Buss and Cantor (1989) model.

Socio-demographics, prior achievement, personality and implicit theories of intelligence are included in the adaptability model in recognition that there are individual and distinct processes relevant to adaptability and that it is important to account for numerous factors that are capable of representing this individuality. Research attributes this inter-individual distinctiveness to differences in intra-

personal and social resources, personality, beliefs about abilities, as well as to events in one's macro and micro environment (e.g., Ackerman, 2003; Barac & Bialystok, 2012; Baumeister et al., 2006; Ferrer & McArdle, 2004; Goldberg, Sweeney, Merenda, & Hughes, 1998; LePine, Colquitt, & Erez, 2000; Molden & Dweck, 2006; Ochsner & Gross, 2005; Schwartz, 1982).

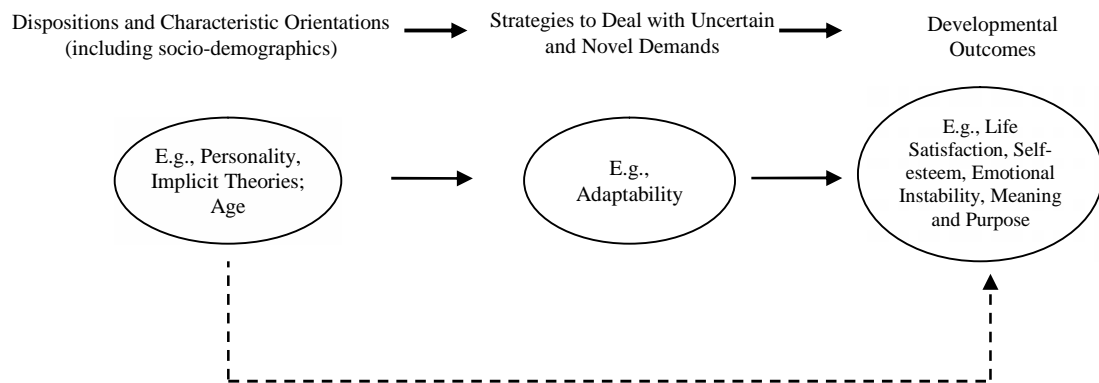
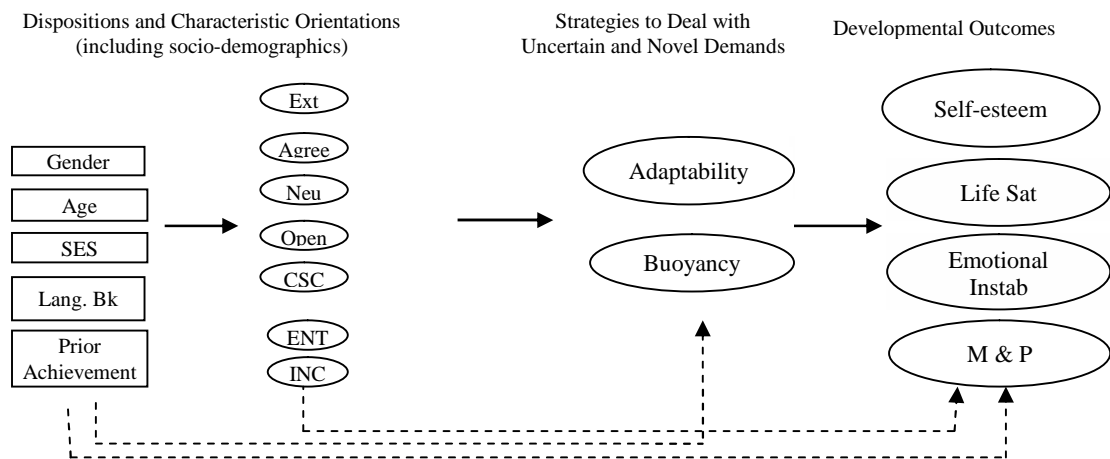


Figure 2.2: Application of Buss and Cantor (1989) to hypothesised adaptability process.
 Note. Dashed paths are not central to the study's substantive focus but are included to account for all variance in the model and to better estimate unique effects attributable to factors of central interest.

Another important aspect of this proposed framework is the longitudinal nature of its component processes. Factors play out over time and will influence each other over the course of significant developmental or contextual phases. In the present study, a longitudinal design is important for modelling the hypothesised adaptability process. A period of one full year is deemed suitable as this spans an entire year of school for the adolescent sample. Indeed, assessing factors over this period allows the current investigation to adjust for prior variance in psychological well-being and thereby assess how adaptability predicts these outcomes beyond prior variance in these outcomes (Martin, Nejad et al., 2012). Further, by partialling out prior variance in outcomes, the effects of adaptability can be deemed to be predictive of gains or declines in psychological well-being. That is, in controlling for prior variance, adaptability then predicts the residual in psychological well-being, with positive residuals and predictive parameters indicative of gains in psychological well-being and negative residuals and predictive parameters indicative of declines in psychological well-being.

In sum, the conjectured model is presented in Figure 2.3 and, as shown, personality and implicit theories predict adaptability; buoyancy is placed together with adaptability as a cognate correlate to control; adaptability (and buoyancy) predicts psychological well-being (as do personality and implicit theories) and socio-demographic and prior achievement covariates predict all factors throughout the model.



SES = Socio-economic Status; Lang. Bk = Language Background; Ext = Extraversion; Agree = Agreeableness; Neu = Neuroticism; Open = Openness; CSC = Conscientiousness; ENT = Entity; INC = Incremental; Life Sat = Life Satisfaction (also known as Satisfaction With Life); Emotional Instab = Emotional Instability; M & P = Meaning and Purpose.

Figure 2.3. Hypothesised adaptability model

Note. Dashed paths are not central to the study's substantive focus but are included to account for all variance in the model and to better estimate unique effects attributable to factors of central interest.

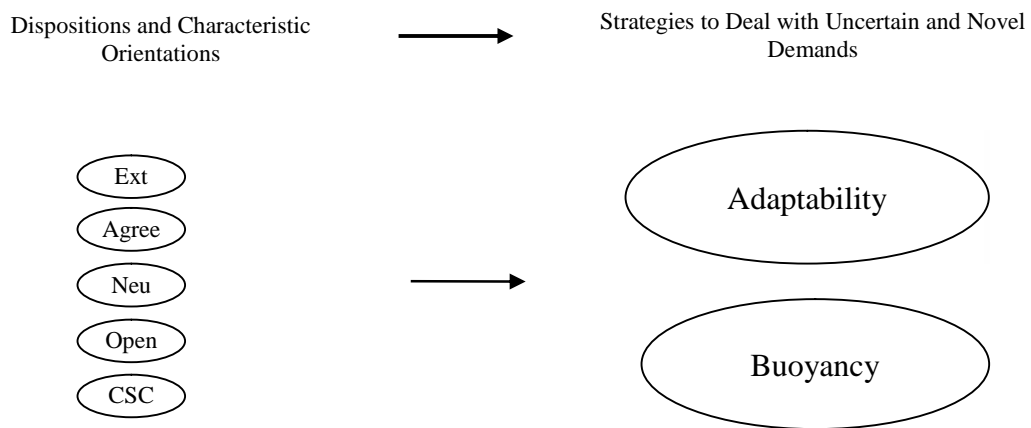
Having detailed the proposed process relevant to adaptability, the present review now considers more closely the substantive predictors of adaptability. As described, these are personality and implicit theories of intelligence.

2.3.1.1 Personality.

Much of the personality literature and theorising involves factors such as extraversion, neuroticism, agreeableness, conscientiousness and openness (McCrae & Costa, 1985) as the significant components to measure, assess and investigate. Of relevance to the present study, the work of de Raad and Schouwenburg (1996) shows that particular personality factors such as extraversion, conscientiousness and openness are important factors in the positive and adaptive adjustment of individuals' personal resources (see also Baumeister et al., 2006; Busato, Prins, Elshout, & Hamaker, 1998; Wrosch, Scheier, Miller, Schulz, & Carver, 2003). Notwithstanding this, there has been

some debate as to which personality factors may be most relevant to adaptation. For example, McCrae and Costa (1997) argued and suggested that openness may successfully assist the cognitive and emotional adjustment that one requires to adapt to life difficulties and uncertainties. Others propose conscientiousness may be more relevant to adaptive self-regulation (Baumeister et al., 2006). Further, Martin, Nejad et al. (2012), in their recent conceptualisation and testing, found adaptability correlated with openness, extraversion, agreeableness, conscientiousness and neuroticism (the latter, negatively). Hence, there is a correlational link between adaptability and personality constructs. Thus, in terms of the model presented by Buss and Cantor (1989) that guides the present operationalisation (see Figure 2.4.), personality is included as a dispositional and characteristic orientation predicting young people's cognitive, behavioural and emotional adjustment in the form of adaptability.

Learning more about why and how a person becomes an 'individual' with their idiosyncratic person-specific characteristics has been of interest to scholars for many centuries (Widiger & Frances, 1985). Scholars from many disciplines have sought to identify factors that are influential in the makeup and development of personality. Consequently, there is a large volume of research relevant to personality factors spanning over 100 years.



Ext = Extraversion; Agree = Agreeableness; Neu = Neuroticism; Open = Openness; CSC = Conscientiousness.

Figure 2.4: Inclusion of personality in the hypothesised model.

Raymond Cattell (1946) proposed a two-tiered personality construct that comprises 16 primary and eight secondary personality factors. Eysenck (1990), on the other hand, proposed a three-trait construct (extraversion, neuroticism and psychoticism) and hypothesised that this model would be sufficient to portray personality.

The Big-Five model of personality that is used in the present study is informed by the work of McCrae and Costa (1997). This model is a relatively more recent undertaking concerning personality and the five-factor theory and tends to include an explanatory account of the role of the Big-Five personality factors in human development and activity. It comprises a number of suggestions relevant to the origins, nature and developmental aspects of personality traits and the relationships these factors have with the other personality variables. It is built on factor analyses and has a hierarchical structure in that the five factors result from lower-order facets (McCrae & Costa, 1996).

McCrae and Costa's (1996, 1997) Big-Five model suggests a broad five-factor dimension of personality that comprises openness, conscientiousness, extraversion, agreeableness and neuroticism. This model outlines how basic biological traits such as personality promote adaptations within individuals that include adapting cognition, modifying behaviour and adjusting emotions. McCrae and Löckenhoff (2010), after investigating personality and self-regulatory constructs, identified that neuroticism (negatively) and conscientiousness (positively) relate to control. They suggested that conscientiousness includes self-control, effective decision-making and persistence, whereas neuroticism includes ineffective self-management and inadequate and/or inefficient impulse control. Consequently, personality represents a potential link and relevance to the current proposed adaptability process model and thus a worthwhile construct to investigate.

Openness refers to the inclination to hold a wide array of interests, as well as insight and creativity, as distinct from intellectual conformity. It is described by words such as 'creativity', 'intellectual capacity' and 'complexity', as opposed to 'straight forward', 'realistic' and 'practical' (McCrae & Costa, 1987).

Conscientiousness is concerned with the drive to achieve and complete goals and is set apart by the degree of a person's cautiousness, preparation and self-control. It is described by words such as 'ordered', 'methodical' and 'tidy', distinct from 'messy', 'unproductive' and 'disorderly' (Nettle, 2006). *Extraversion* refers to the degree to which a person takes interest in others and events, distinct from being self-involved and more interested in one's own 'inner life'. Extraversion is described by words such as 'sociable', 'active' and 'chatty', as opposed to words such as 'withdrawn', 'aloof' or 'calm' (Costa & McCrae, 1980). *Agreeableness* refers to the extent to which an individual feels part of a larger community and is concerned with

interpersonal relationships. This feature is described by words such as 'understanding', 'warm' and 'accommodating', as opposed to 'selfish', 'unkind' and 'discourteous' (Graziano, Jensen-Campbell, & Finch, 1997). *Neuroticism* refers to the capacity for emotional responses when one faces personal and life circumstances. Individuals scoring high on this factor are described as 'anxious', 'edgy' and 'temperamental'. On the other hand, individuals scoring low on this factor are often depicted as 'peaceful', 'balanced' and 'kind' (Costa & McCrae, 1980).

As noted above, the five personality characteristics conscientiousness, neuroticism, agreeableness, openness to experience and extraversion may hold particular relevance to adaptability (LePine et al., 2000). It is postulated that to be adaptable, one requires the capacity to be open to new experiences (open), flexible (agreeable) when faced with new and changing circumstances and take interest in or be oriented to external stimuli in order to successfully adapt to them (extraversion).

Additionally, Hoyle (2010) notices the logical relationship between key features of personality and regulatory processes and factors. For example, Hoyle suggests that conscientiousness might play a significant role, because conscientiousness is concerned with the ways individuals purposefully manage and adjust their cognition and behaviour. In contrast, individuals with low levels of conscientiousness are not able to effectively control behaviour (Costa & McCrae, 1992). Moreover, de Raad and Schouwenburg (1996) find that extraversion, conscientiousness and openness are significant factors in the positive development and adaptive adjustment of one's personal resources.

In sum, drawing on personality theory and research, it appears reasonable to postulate that personality might play a significant role in predicting adaptability. Further, alongside the role of personality predicting adaptability, the study design also enables tests of the extent to which it predicts buoyancy and psychological well-being (see Lounsbury, Park, Sundstrom, Williamson, & Pemberton, 2004). Thus, for example, predictive parameters from personality to buoyancy can be juxtaposed with parallel parameters to adaptability and, in so doing, yield a set of dispositional predictors that are differentially related to adaptability relative to cognate factors such as buoyancy.

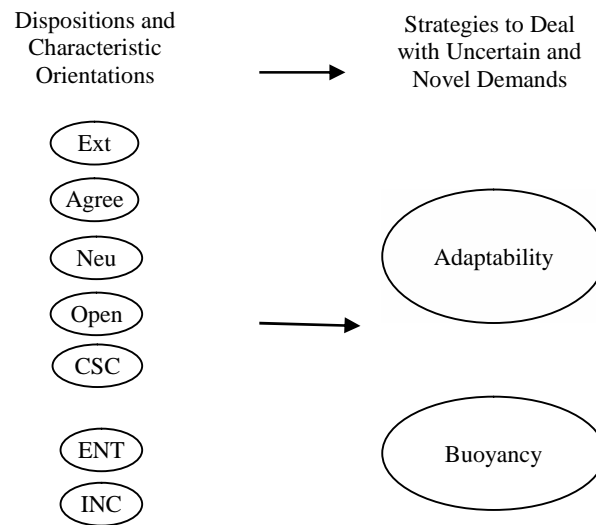
2.3.1.2 Implicit theories of ability.

Implicit theories of ability refer to the beliefs individuals hold about their intelligence and the extent to which they perceive their ability as unchanging and permanent (an 'entity' view) or something that is impressionable and plastic (an 'incremental' view) (Dweck, 2000; Dweck & Leggett, 1988; Smith, 2005). Given these two perspectives on beliefs about intelligence, it may be suggested that individuals with an entity belief see their capacity to change or adjust to uncertain and novel circumstances as somewhat rigid or inflexible. Specifically, those with this perspective may perceive that they are unable to change and/or adjust their cognition, behaviour, and emotion as they face varying, uncertain and novel situations. On the other hand, those who hold an incremental view may see their capacity to change or adjust to uncertain and novel circumstances as relatively malleable. Specifically, such people may perceive that they have the capacity to make cognitive, behavioural and/or emotional changes to effectively manage varying, changing, novel and uncertain circumstances. These individuals may be described as adaptable. Importantly, however, at this stage, this is an empirical question and so the present study includes entity and incremental views as dispositional presage factors of adaptability in the hypothesised model.

Further, in more recent applications of implicit theories, Yeager and Dweck (2012) suggest that entity and incremental views might also predict responses to challenge and adversity stimuli. Specifically, a belief that intelligence can be developed or that personality traits and features can be changed leads to resilience in social settings (including academic ones). They show that these beliefs may potentially influence and shape individuals' attributions, goals and learning strategies (especially in academic settings) to affect outcomes. Other studies also show that holding such beliefs (implicit theories) might influence how individuals (e.g., students) would manage academic related adversities such as school transition (Blackwell, Trzesniewski, & Dweck, 2007). Hence, along these conceptual lines, it may be claimed that adaptability is also predicted and shaped by individuals' implicit theories.

The present study adopts a two-factor (incremental and entity factors) model based on previous studies showing them to be two separate factors that result in different effects on goals and strategies (Cury, Elliot, Da Fonseca, & Moller, 2006). Dweck, Chiu and Hong (1995) observed that 15% of their sample reported a mix of

incremental and entity beliefs, suggesting two factors. In their discussion of implicit theories, Dweck et al. also reported that “people need not have one sweeping theory that cuts across all human attributes ... our research shows that although some people do have one very generalised theory, others have different theories of different attributes” (p. 269). Thus, there can be some variability from situation to situation and respondents endorsing both factors may very well fall into this category. Figure 2.5 represents the relationship between implicit theories and adaptability.



Ext = Extraversion; Agree = Agreeableness; Neu = Neuroticism; Open = Openness; CSC = Conscientiousness; ENT = Entity; INC = Incremental.

Figure 2.5: Inclusion of implicit theories in the hypothesised model.

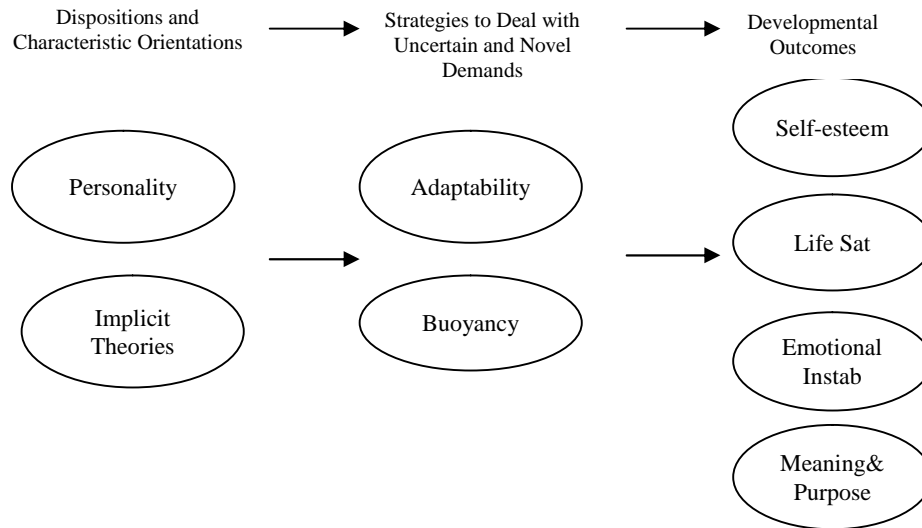
2.3.1.3 Psychological well-being outcomes.

Figure 2.6 shows that psychological well-being hypothetically follows adaptability in the proposed process. In the present investigation, psychological well-being is categorised into positive and negative outcomes. Positive outcomes include general self-esteem, life satisfaction and meaning and purpose. Negative psychological well-being is represented by emotional instability.

2.3.1.3.1 Positive psychological well-being.

The recent research relevant to life-span theory, positive psychology and self-regulation point to the importance of assessing positive psychological well-being as a major outcome following hypothesised processes inherent in the relevant theories and perspectives. Broadly, psychological well-being is considered in terms of

subjective satisfaction and subjective well-being. In this research, these are operationalised by way of general self-esteem, life satisfaction and meaning and purpose.



Life Sat = Life Satisfaction (also referred to as Satisfaction With Life); Emotional Instab = Emotional Instability.

Figure 2.6: Inclusion of psychological well-being in the hypothesised model.

General self-esteem reflects individuals' overall evaluation of their self-worth. It is an evaluation of oneself and one's attitude towards the self. Branden (1994) defines self-esteem as the feeling and/or believing that one has of her/his ability, how competent one is to deal and manage basic life challenges and whether one is deserving of happiness. According to Branden, self-esteem is the combination or total of self-confidence (a feeling of personal capacity) and self-respect (a feeling of personal worth). Hence, self-esteem is defined as:

The degree to which the qualities and characteristics contained in one's self-concept are perceived to be positive. It reflects a person's physical self-image, view of her or his accomplishments and capabilities and values and perceived success in living up to them, as well as the ways in which others view and respond to that person. The more positive the cumulative perception of these qualities and characteristics, the higher one's self-esteem. A high reasonable degree of self-esteem is considered an important ingredient of

mental health, whereas low self-esteem and feelings of worthlessness are common depressive symptoms. (VandenBos, 2007, p. 830)

Self-esteem is treated as a significant outcome because of its close relationship with psychological well-being (Marsh, 1989) and achievement (Marsh, 2007).

Satisfaction with life refers to individuals' perceived satisfaction based on a conscious judgment of life conditions relative to their aspirations or ideals (Pavot & Diener, 1993, 2008). Research has associated life satisfaction with broadened cognitive capacity and resources (Fredrickson, 2001) and this is aligned with elements of the hypothesised adaptability framework. Life-span control research also argues and finds that goal re-engagement and alternative approaches to unattainable goals should be associated with reduced psychological distress and facilitate subjective well-being and satisfaction (Wrosch & Scheier, 2003). Specifically, effective regulation should result in goal realisation and fewer failure experiences, leading to higher satisfaction (Wrosch & Scheier, 2003). Accordingly, it is predicted that the enhanced capacity to modulate cognitive, behavioural, and emotional resources to deal with novelty, change and uncertainty is likely to be associated with life satisfaction.

Meaning and purpose refers to the perception individuals have as to whether they are living a worthwhile, goal-directed and meaningful life (Petersen & Roy, 1985). Petersen and Roy suggest that "people whose lives lack meaning and purpose experience psychic discomfort, which is characterised by feelings of emptiness or a lack of direction. They have difficulty making sense out of their existence and question the significance of being who or what they are" (p. 50). Further, Reker, Peacock, and Wong (1987) propose that meaning and purpose refer to what individuals do or believe to make sense of their existence and the events occurring in their lives and the achievement and fulfilment of set goals.

Additionally, according to life-span control theory, it is through a sense of control, which individuals gain from successfully regulating cognition and behaviour that people lay down the foundation for enhanced sense of purpose (Wrosch & Scheier, 2003). Further, it seems that engaging in alternative paths and goals is an important feature of successful human development that provides high levels of purpose in life (Wrosch & Scheier). This is consistent with extant models of psychological well-being and flourishing (e.g., Diener et al., 2009; Ryff & Keyes,

1995; Seligman, 2002; Steger, Kashdan, Sullivan, & Lorentz, 2008). Measuring a sense of purpose and meaning is also of particular relevance to the present sample, which comprises adolescents. According to Erikson (1968), adolescence is the stage when one's developmental task is to search for and begin to establish life purpose. Inadequate completion of this task leads to role confusion and a sense of uncertainty of one's future, potentially foiling or placing strain on subsequent adaptability.

It is proposed that each of these positive psychological well-being factors share links to adaptability and its hypothesised processes. As detailed throughout this review, it is posited that individuals constructively regulate and modify their personal resources to deal with uncertainty and novelty. Following from this, it is further hypothesised that adaptability, along these same lines, should constructively and adaptively influence intra-psychic well-being outcomes (Diener et al., 2006). For example, based on life-span theory, people's sense of purpose is improved as they achieve a sense of control through constructively modifying cognition, behaviour, and emotion (Pekrun, 2009; Wrosch & Scheier, 2003). Additionally, the enhanced ability to regulate cognitive, emotional and behavioural resources is also expected to be associated with well-being factors such as *satisfaction with life*. Effective and purposeful regulation may potentially assist individuals to reach their set goals and this encourages achievement perceptions while also reducing thoughts and beliefs about failure. Together, these enhance satisfaction with the status of one's life. Moreover, several studies have linked individuals' capacity to adjust their personal resources and psycho-behavioural action with life satisfaction (Fredrickson, 2001), as well as with a sense of meaning and purpose (Martin, Nejad et al., 2012). These effects may also promote an elevated sense of self-esteem and perceived self-worth (Martin, Nejad et al., 2012; Wrosch & Scheier, 2003). Consequently, it is postulated that adaptability positively predicts these psychological well-being outcomes and the present study seeks to determine the extent to which this is the case.

2.3.1.3.2 Negative psychological well-being.

Based on recent literature and studies relevant to life-span theory and positive psychology, mental health is considered part of psychological well-being frameworks. Life-span control studies argue that when faced with difficult and/or unattainable goals, individuals may experience poor mental health and psychological distress if they fail to effectively regulate psycho-behavioural functions (Baumeister,

Heatheron, & Tice, 1994; Wrosch et al., 2003). Further, Seligman et al. (2009) suggest that, although people live a more comfortable life now compared to 50 years ago, the prevalence of depression among youth is on the rise. Therefore, Seligman et al. (2009) suggest that well-being (as a vehicle to combat poor health such as depression) should be taught in schools: “as an antidote to depression, as a vehicle for increasing life satisfaction and as an aid to better learning and more creative thinking” (p. 295). They believe poor mental health (e.g., depression and anxiety) can potentially hinder school achievement and lead to less happy adulthood as a result of limited access to better lifestyles. The present study investigates and assesses poor mental health via an *emotional instability* construct. Emotional instability refers to individuals’ anxiety, emotional uncertainty and moodiness (Marsh, 2007). Of interest to the present study is the role of adaptability in predicting students’ emotional instability. It is hypothesised that there will be a negative association between the two factors.

2.3.1.4 Achievement and socio-demographic covariates.

The focus of the current research is on the adaptability construct, its dispositional predictors and its psychological well-being outcomes. However, alongside and through this process, it is vital to include additional factors (covariates) in order to control for these, so as to most effectively ascertain unique variance attributable to adaptability. In the present study, covariates take the form of socio-demographics and prior achievement. Specifically, the current investigation includes age, gender, language background and socio-economic status (socio-demographic factors) and prior achievement.

Werner (1993) argues that children’s environments significantly influence their developmental pathways, including their cognitive, behavioural and emotional development. Other seminal developmentalists such as Piaget, Vygotsky, and Bronfenbrenner also assert that cognitive, socio-emotional and behavioural developmental domains are interconnected and interdependent (Block, 1982; Bodrova & Leong, 2001; Bronfenbrenner & Ceci, 1994). They further argue that these constructs have mutual and reciprocal relationships with the environment in which the individual resides. Thus, there are long-standing conceptual bases underpinning the importance of, including relevant background factors in research on cognitive, emotional and behavioural development and regulation. These background

factors are located as 'exogenous' variables in the model, predicting: personality, implicit theories, adaptability, buoyancy and psychological well-being. In so doing, the variance shared with them is purged from the model, thereby enabling identification of unique effects attributable to the substantive constructs. In addition, by including these socio-demographic and achievement factors, the study is able to identify their influence in their own right.

2.3.1.4.1 Age.

For the purposes of the present study, age is discussed insofar as it relates to adaptability and similar factors. Thus, while recognising the association between age and other factors in the model, such as personality (e.g., Allemand, Zimprich, & Hendriks, 2008; Denissen, Geenen, van Aken, Gosling, & Potter, 2008; Donnellan & Lucas, 2008; McCrae et al., 1999, 2000; Roberts, Walton, & Viechtbauer, 2006; Soto, John, Gosling, & Potter, 2011; Srivastava, John, Gosling, & Potter, 2003; Terracciano, McCrae, Brant, & Costa, 2005), discussion is confined to the central construct in the study, adaptability. GarciaColl and colleagues (1996) show age as a positive factor influencing children's adaptive and regulatory capacity to manage life variability and changes. Further, Frydenberg and Lewis's (1993) study of coping in adolescence shows that age (or year-level differences) can influence strategies, such as thinking and emotional regulation (e.g., tension-reduction and wishful thinking). Additionally, research into emotional intelligence and the regulation of affect by Mayer and Salovey (1995) show that emotion regulation and development correlates positively with age, such that as people age, they develop greater capacity to regulate emotion. Similarly, Gross (1998) and Carstensen (1995) argue that affect adjustment and regulation improves with age. Taken together, the aforementioned studies along with other research relevant to age, emotion and cognition regulation also provide the rationale to postulate that age is a factor to control for when assessing adaptability in the process model.

2.3.1.4.2 Gender.

Alongside its association with model components such as personality (e.g., Soto et al., 2011), gender is also connected to factors relevant to the regulation of personal resources that align with adaptability. Recent work (e.g., Ackerman, 2003; Ferrer & McArdle, 2004; Martin, 2007, 2009) finds that gender predicts the

development and regulation of cognitive, behavioural and emotional resources. The Frydenberg and Lewis (1993) and Hawkins and colleagues (2006) studies of coping during adolescence find gender differences in coping strategies. For example, girls utilise tension-reduction and wishful thinking coping strategies more than boys. Further, girls are found to be significantly lower in academic buoyancy (Martin & Marsh, 2008a, 2008b, 2009). To the extent that coping and buoyancy are factors cognate to adaptability, it may be reasonable to postulate that gender is a relevant covariate when studying adaptability.

2.3.1.4.3 Language background.

Language background is also relevant in defining and conceptualising how people think, behave and feel (Martin, Liem, Mok, & Xu, 2012; Organisation for Economic Co-operation and Development, 2006; Portes & MacLeod, 1996). Research shows that bilingualism in youth correlates with improved metacognitive abilities and cognitive capacity (Bialystok, 2001; Cummins, 1976; Diaz, 1983, 1985). For example, Martin (2002) finds that language background is significantly related to the capacity to regulate behaviour and thinking. Similarly, other research has determined students' language background as correlated with the capacity to regulate and adjust cognition and behaviour (Bialystok, 2001; Cummins, 1976; Diaz, 1983, 1985). In another line of research, Borman and Overman (2004) find that students from ethnic minority groups, when faced with a greater number of obstacles in their academic and non-academic pathway, are less resilient. Given the conceptual links between resilience and adaptability (see Section 2.2.3), it may be reasonable to infer from the Borman and Overman study a possible role for language background in adaptability. Indeed, research has also confirmed the role of language background in personality development, self-esteem and self-efficacy (Wang, Haertel, & Walberg, 1994), factors that are also in the hypothesised adaptability model. In light of these studies, there are sufficient grounds to point to the relevance of language background in the modulation of one's cognitive, behavioural and emotional repertoire. This is therefore suggestive of a relationship between adjustment-oriented factors (in the form of adaptability) and students' language background. Accordingly, language background is also considered and controlled for in the present investigation.

2.3.1.4.4 *Socio-economic Status (SES).*

Socio-economic status (SES) may also predict psycho-behavioural resources (cognition, behaviour, and emotion) and how these resources are adjusted and modified (Moffitt, Caspi, Rutter, & Silva, 2001; NICHD Early Child Care Research Network, 2004; Raffaelli, Crockett, & Shen, 2005). It has been shown that SES (e.g., students' family income and where they live) can influence cognitive and behavioural responses and capacities and, subsequently, impact on well-being outcomes (Entwisle, Alexander, & Olson, 2005; Gilliam, 2005; Miech, Essex, & Goldsmith, 2001; Raver, 2004; Werner, 1993). Recent research has identified SES as correlated with the capacity to regulate and modify cognition, behaviour, and emotion (Moffitt et al., 2001; NICHD Early Child Care Research Network, 2004; Raffaelli et al., 2005). This work is suggestive of a significant relationship between adjustment-oriented factors (in the form of adaptability) and students' SES. In a related vein, Luthar and Cicchetti (2000) assess the role of resilience in mental health and social policies and find that children from low SES families are at greater risk of social disadvantages, ill health and reduced opportunities than those from higher SES families. Again, given the alignments between adaptability and adversity-related constructs such as resilience (see Section 2.2.3), this signals the importance of considering the role of students' SES in the modulation of their cognitive, behavioural and emotional repertoire. Accordingly, alongside other socio-demographic covariates, SES is also considered and controlled for in the present investigation.

2.3.1.4.5 *Prior achievement.*

There is sufficient evidence to indicate the importance of considering the role of students' prior *academic achievement* in the modulation of their cognitive, behavioural and emotional repertoire. Research has identified academic achievement as correlated with the capacity to regulate and modify cognition, behaviour, and emotion (Eisenberg et al., 2005; Olson, Sameroff, Kerr, Lopez, & Wellman, 2005; Raver, Smith-Donald, Hayes, & Jones, 2005; Rhoades, Greenberg, & Domitrovich, 2009). Indeed, a long line of self-regulation research has pointed to the association between achievement and planning, task management, self-organisation, and persistence among adolescents (e.g., Hattie, 2009; Martin, 2007; Zimmerman, 2002). As previously suggested, emotion regulation is also found to be a positive correlate

of academic/school achievement and success (Bandura, 2001; Duncan et al., 2007; Graziano, Reavis, Keane, & Calkins, 2007; Gumora & Arsenio, 2002; Thompson, 1991).

In relation to factors akin to adaptability, Benard (1991) defines ability (including intelligence and cognitive capacity) as students' academic capacity to perform academic tasks, including tasks such as problem solving that might be deemed similar to what is required to successfully navigate novelty and uncertainty. Busato, Prins, Elshout, and Hamaker, (2000) argued that intellectual ability and achievement motivation were associated positively with academic success (achievement). Furthermore, Duncan (1982) argued that intelligence alone accounts for approximately 16% of achievement. Research is therefore suggestive of a relationship between adjustment-oriented factors (e.g., adaptability) and students' prior achievement. Accordingly, alongside socio-demographic covariates, prior academic achievement is included in the present investigation.

2.3.1.4.6 Summary of covariates.

Taken together, age, gender, SES, language background, and prior achievement may all share variance with substantive factors in the model that are important to control when seeking to understand the unique effects of adaptability. Given the potential influence of socio-demographics and prior achievement through the model, it is deemed appropriate to model their presence relative to personality, implicit theories, adaptability, buoyancy and well-being outcomes. Importantly, in so doing, analyses not only control for their variance, but also enable insights into the predictive role of socio-demographics and prior achievement themselves. Figure 2.7 depicts all such paths.

2.4 Substantive Methodological Components

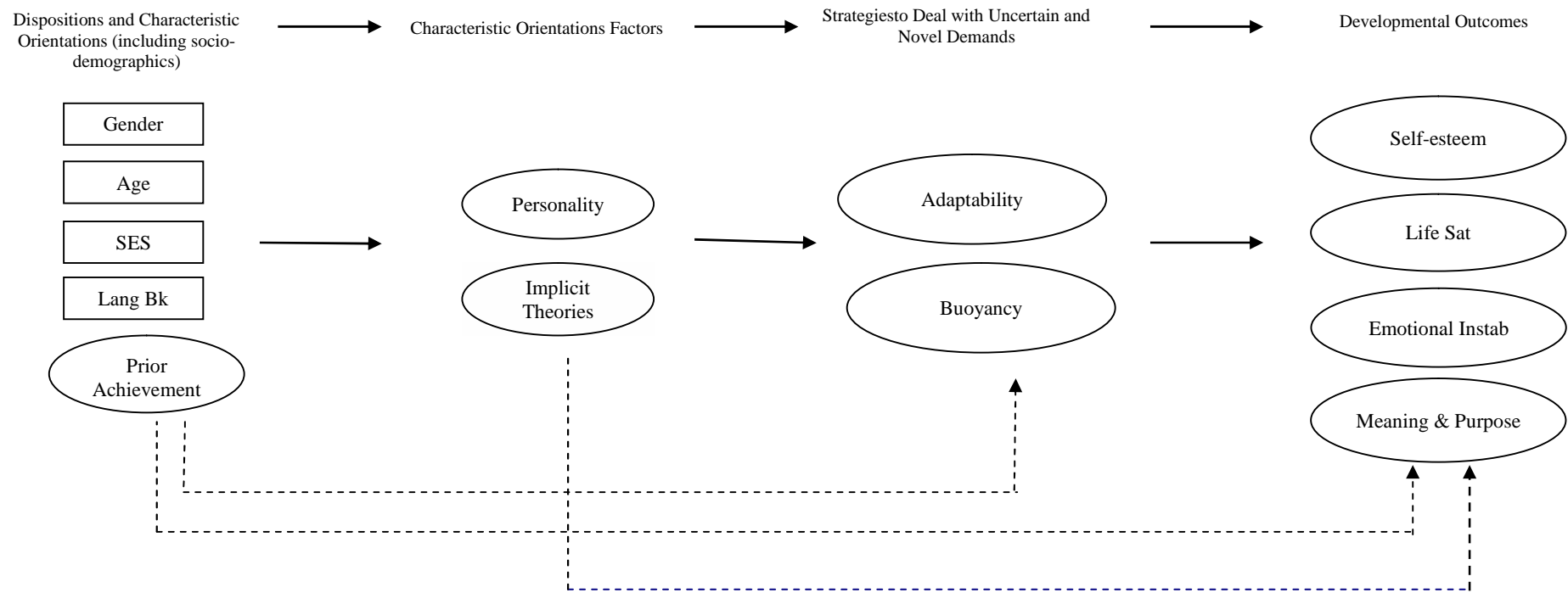
A significant array of literature has contributed to the development of the adaptability construct and its postulated scope (LePine, Colquitt, & Erez, 2000; Motamedi, 1977; O'Rourke, 2005; Smit & Wandel, 2006; Walker, Holling, Carpenter, & Kinzing, 2004; Wulach, 1977). The current study looks at how factors such as personality and implicit theories of ability predict adaptability and, in turn, how adaptability predicts psychological well-being outcomes. In doing so, the present study has reviewed relevant theory, research and constructs such as life-span

theory of control, theories of change, self-regulation, buoyancy, coping, resilience, evolutionary psychology and positive psychology literature and frameworks.

While recognising that theory and previous research are a significant part of the conceptualisation and contextualisation of a new construct, the present investigation recognises that the methods that seek to integrate and analyse the relevant components of this process are also important. The choice of methodology defines, directs and determines the type of data that are collected and how they can be processed, analysed and then reported (Brewer & Hunter, 2006). The nexus between the conceptual and the methodological components of research has been referred to as the 'substantive-methodological-synergy' (Marsh & Hau, 2007).

Marsh and Hau (2007) assert that substantive-methodological research brings together strong conceptual and methodological components to generate a more robust study than a study prioritising one element over the other. Thus, Marsh and Hau report:

1. Some of the best methodological research is based on the development of creative methodological solutions to problems that stem from substantive research;
2. New methodologies provide important new approaches to current substantive issues;
3. Methodological-substantive synergies are particularly important in applied areas like educational psychology where single infallible indicators are typically not available (p. 151).



SES = Socio-economic Status; Lang Bk = Language Background; Life Sat = Life Satisfaction (also referred to as Satisfaction With Life); Emotional Instab = Emotional Instability.

Figure 2.7: Inclusion of socio-demographic and prior achievement covariates in the hypothesised model.
 Note. Dashed paths are not central to the study’s substantive focus but are included to account for all variance in the model and to better estimate unique effects attributable to factors of central interest.

The literature review focused on the conceptual dimensions of the present investigation. As noted, however, there are important methodological elements underpinning this study that lend rigour to its implementation and shed more informative light on the substantive concerns under focus. Accordingly, this study is proposed as a substantive-methodological synergy following from Marsh and Hau (2007).

In the present study, various data analytic methods are utilised to progress the substantive and methodological components relevant to adaptability. These include construct validation and the use of multivariate components and procedures to most appropriately examine the effect of adaptability. Multivariate components encompass latent variable modelling, multigroup invariance testing, multiple measurements, multiple outcomes and predictors, multiple indicators, multiple-time points and confirmatory factor analysis (CFA), as well as structural equation modelling (SEM). Through integrating multifaceted theoretical dimensions with multivariate analytic approaches, this study is argued to provide significant reliable and valid understanding pertaining to young people's adaptability, both as a measured construct and as a factor in an important process of psychological well-being.

There are various statistical methods employed in this study to test the validity and reliability of measures and hypothesised processes. Emphasis is given to multidimensional and multivariate approaches. These include factor analysis (exploratory factor analysis [EFA] and CFA), discriminant and convergent validity, criterion-related validity, SEM and exploratory structural equation modelling (ESEM). Each of these statistical methods and procedures, as relevant to addressing central substantive research questions and hypotheses, are described briefly in the following section (technical detail is presented in Chapter 4).

2.4.1 CFA and SEM.

In the past 20 years, CFA and SEM statistical techniques have become among the most accepted and widely used methods for assessing and analysing multivariate datasets (Kenny & Kashy, 1992; Tomarken & Waller, 2005). Although a detailed description of these methods is provided in the methodology chapter (see Chapter 4), it is important to briefly mention that these statistical methods permit investigators to study multidimensional data by nominating *a priori* the expected factor structure in order to study the relationship between constructs, beyond the known limitations of

purely *ad hoc* and exploratory methodologies (Kline, 1998; Martens & Haase, 2006; Quintana & Maxwell, 1999). The researcher can use SEM to assess an entire theoretical model in one analysis. Further, these statistical methods permit researchers to conceptualise and model factors as latent variables (estimated via the measurement component of the model). Once the measurement model is appropriately estimated, SEM processes provide grounds for the estimation of relations among latent and/or observed constructs (i.e., the structural model) (Muthén, 2002; Ullman, 2006).

A sound latent variable model requires the use of well-defined multiple indicators for each latent factor. The investigator is then able to establish validity of the measurement component through CFA before employing more complex models of relations between latent variables in the SEM process (Marsh, Hau, Balla, & Grayson, 1998). Hence, it is important to establish that the factor structure beneath an instrument generalises to the sample used in the study (Marsh & Hau, 2007). The chief substantive purpose in latent variable models is to assess *a priori* hypothesised assumptions with respect to the structural element of the latent variable model (Tomarken & Waller, 2005). The SEM process is, then, employed to evaluate hypothetical relations between the latent variables in the adaptability model (i.e., the structural model). These structural relations are directed by not only substantive concerns, but also by the nature of the data (i.e., statistical and methodological considerations). Consequently, the current study can be seen as a substantive-methodological synergistic undertaking in that appropriate multivariate methods are employed to answer central substantive research questions that support not only measurement assumptions but also substantive ones.

2.4.2 Longitudinal design for multidimensional data.

A longitudinal design is an important methodological inclusion that has implications for the substantive conclusions that can be drawn from the present investigation. The critical feature of longitudinal research is that the same methods are used to obtain the same measurements and the same measurements are based on the same sample in two or more time phases (Goldstein, 1979; Jöreskog, 1979; MacCallum & Austin, 2000; Menard, 1991; Quintana & Maxwell, 1999). In order to appropriately assess the complex nature of and relations with the adaptability construct, the present study tests relationships between adaptability and hypothesised

predictors and consequent factors using a longitudinal design in which the same students are tested in two time phases, one year apart. Indeed, consistent with Marsh and Hau's (2007) contentions regarding substantive-methodological synergies, Robinson, Schmidt, and Teti (2005) suggested that conceptualisation, methodology and data analyses within longitudinal studies are closely intertwined.

Longitudinal design offers an opportunity to evaluate postulated models over more than one time phase, control for 'pre-test' variance, account for the correlation of error terms (thereby reducing bias in predictive structural parameters), test time-sensitive procedures and better estimate the direction of relations among variables (Khoo, West, Wu, & Kwok, 2006; MacCallum & Austin, 2000; Martin, 2011; Morris, Robinson, & Eisenberg, 2006). Morris et al. (2006) suggest that it is in the best interests of a study that when assessing the processes underlying a phenomenon, the researchers need to examine such processes across time (as a longitudinal design allows). The inherent limitations of cross-sectional designs to capture dynamic and/or complex multivariate processes has led to more widespread use of longitudinal designs in educational research (Rogosa, 1979). Accordingly, because the present investigation was interested in the predictive role of adaptability on psychological well-being as well as the influence of predictors on adaptability, the longitudinal design was chosen as the appropriate approach to assess such relationships.

In support of longitudinal design, Marsh, Byrne and Yeung (1999) suggest that longitudinal research should meet the following criteria:

1. Conceptualise and operationalise all latent factors via multiple indicators;
2. Test and evaluate the main factors in at least two separate time phases (i.e., a two-phase study), at least one year apart;
3. Use an adequately large and heterogeneous sample to warrant the use of CFA and to support the generalisability of results;
4. Provide correlations between residuals across time so that structural parameters across time are not biased.

As a result, all of the above mentioned recommendations are employed to appropriately test and assess the hypothesised adaptability model in the current study. In so doing, the present study is better able to estimate the unique effects of adaptability purged of prior variance in outcome factors. A detailed and technical discussion of these methodological elements is presented in Chapter 4.

2.4.3 'More is better' approach.

Informed by the above discussion, it is apparent that a multifaceted approach that accommodates the complexities relevant to studying the present issues is desirable. In this vein, the current research employs something of a 'more is better' approach by modelling multiple predictors, multiple outcome measures, multiple-time phases and multiple indicators for each construct. These inclusions lay the foundation for reliable and valid substantive conclusions, a cornerstone of substantive-methodological research (Marsh & Hau, 2007).

In relation to multiple predictors, the present study includes five personality factors (extraversion, openness, agreeableness, neuroticism and conscientiousness), two implicit theories factors (entity and incremental beliefs) and five covariates in the form of four socio-demographics (age, gender, SES and language background) and prior achievement. For the strategies in the model, the present study includes adaptability and buoyancy factors predicting multiple psychological well-being outcome measures (general self-esteem, satisfaction with life, emotional instability and meaning and purpose). Validating measurement and empirical findings is strengthened through conducting the research across multiple-time phases. It is through such design that factors are measured at different time waves (Campbell & Fiske, 1959), enabling controls for prior variance in factor counterparts (auto-regression; e.g., between Time 1 adaptability and Time 2 adaptability), leading to the capacity to declare significant effects as relatively unique and beyond prior measurement (Farrell, 1994).

Further, a longitudinal design enables sharper substantive interpretations and conclusions. For example, by including Time 1 life satisfaction (a psychological well-being outcome) as a predictor of Time 2 life satisfaction, other predictive factors (e.g., adaptability) can be considered predictive of residual variance in life satisfaction at Time 2 and thus predictive of gains or declines in life satisfaction (MacCallum & Austin, 2000; Martin, 2011). For a study of adaptability that is hypothesised to lead to shifts in well-being outcomes, this longitudinal design is fundamental to conclusions drawn. Thus, the inclusion of multiple-time phases produces stronger results. Again, sophisticated and appropriate research methodology has direct implications for the substantive conclusions that can be drawn—another demonstration of the desirability of substantive-methodological approaches to psycho-educational research (Marsh & Hau, 2007).

2.5 Chapter Summary

This chapter has presented an encompassing (with respect to the range of literature and research reviewed), yet nuanced (with respect to the nature of personal resource management and modification) review of recent research and theory relevant to how individuals respond to uncertain and novel circumstances and situations. The review has dealt with general and domain-specific constructs relevant to phenomena such as self-regulation, resilience, buoyancy and coping mechanisms—all factors and processes involved in diverse aspects of human development in a changing and uncertain world. In detailing and discussing these constructs, the review was also informed by relevant theories of change, life-span control, personality, evolutionary psychology and positive psychology—all theories that inform the change- and adaptation-based concepts underpinning the present investigation.

Having mapped out conceptual terrain relevant to the adaptability construct, the review then considered a possible process in which adaptability operates. It did so via Buss and Cantor's (1989; see also Martin et al., 2001) process of human functioning and development that identifies the role of dispositions and characteristic orientations in predicting strategies that individuals use to navigate their life tasks, that then affect important developmental outcomes. Harnessing these process ideas, the present study proposes personality and implicit theories as dispositional predictors, adaptability (and buoyancy) as strategies and psychological well-being (self-esteem, life satisfaction, meaning and purpose, emotional instability) as developmental outcomes, with socio-demographics and prior achievement employed as covariates through the process. In rounding out the review, recent ideas with regards to substantive-methodological synergies were identified with particular emphasis on how methodological aspects of the present study mesh with and enhance central substantive concerns relevant to adaptability.

Chapter 3: Hypotheses

3.1 Introduction

The present research seeks to empirically assess and examine a hypothesised adaptability model in which covariate factors (gender, age, SES, language background, prior achievement) and substantive presage factors (personality and implicit theory of ability) are posited to predict adaptability and buoyancy, which in turn are hypothesised to predict psychological well-being (self-esteem, satisfaction with life, emotional instability and meaning and purpose). Figure 2.7 shows the full adaptability model. The review of literature (see Chapter 2) presented the theories and constructs driving the research as well as the substantive-methodological synergies underpinning the proposed adaptability process model. Following from this conceptual, applied and methodological review, the current chapter outlines the central hypotheses relevant to this study.

The proposed adaptability process model is examined at two separate time points, one year apart. Thus, it comprises a cross-sectional design at both of the two time waves; then, it is a longitudinal design through connecting the two phases across time in the one analytic model. There are three fundamental and interconnected analytic components central to examining the assumptions of the present research. The first component is relevant to investigating the construct validity of the measurement model and instrumentation using cross-sectional and longitudinal designs and techniques. The second component is relevant to the cross-sectional assessment of the theorised adaptability process model at each time point (i.e., phase one [Time 1] and phase two [Time 2]). The third component examines the proposed adaptability process model longitudinally (using a matched Time 1 and Time 2 sample).

It is important to note that Time 1 and Time 2 instrumentations are identical. Hence, the present study generated a Time 1 data set and a Time 2 data set, as well as a matched Time 1 and Time 2 data set (i.e., only students with both Time 1 and Time 2 data included in analyses). It was therefore possible to determine the reliability and veracity of the separate scales within and across time. Notwithstanding the comprehensive detail on instrumentation provided in this chapter and Chapter 4, herein, a short and brief account of instrumentation is presented to provide an adequate context for the hypotheses.

Adaptability is assessed via the Adaptability Scale developed by Martin, Nejad et al. (2012). Personality is examined via measures of extraversion, agreeableness, neuroticism, conscientiousness and openness using the International English Big-Five Mini-Markers (Thompson, 2008). Implicit theory of ability is assessed through entity belief items and incremental belief items using Stipek and Gralinski's (1996) instrument (Effort-Related Scales). Psychological well-being outcomes are also assessed through existing instruments, including life satisfaction from the Satisfaction with Life Scale (SWLS, Diener, Emmons, Larsen, & Griffin, 1985), emotional instability² and self-esteem from the Self-description Questionnaire-II (SDQ-II, Marsh, 1992, 2007) and sense of meaning and purpose from the World Health Organisation Quality of Life Survey (WHOQOL Group, 1998; Saxena, Ommeren, Tang, & Armstrong, 2005).

To test the discriminant validity of adaptability, a measure of buoyancy using the Academic Buoyancy Scale (Martin & Marsh, 2006, 2008a, 2008b; Martin et al., 2010) is included as a cognate correlate. Inclusion of this factor in the adaptability model controls for variance that buoyancy might share with adaptability and thus enables better tests of the unique role of adaptability. Finally, to control for variance attributable to socio-demographics and prior achievement, five covariates were included: age, gender, SES, language background, and prior achievement.

3.2 Construct Validation of Cross-sectional and Longitudinal Instrumentation

The present study endeavours to show that each of the scales and instruments used in the study is valid for testing the links in the adaptability process model. In relation to this, the following cross-sectional and longitudinal construct validity hypotheses are developed:

- Hypothesis 1a: The instrumentation (including the Adaptability Scale) will comprise normally distributed and reliable (i.e., internally consistent) scales.
- Hypothesis 1b: Factor analysis will support the *a priori* hypothesised factor structure of the instrumentation (including the Adaptability Scale), as

²It is important to note that the terms 'emotional stability' and 'emotional instability' are sometimes used interchangeably (though, denoting opposite ends of the underlying dimension). For the purposes of the present study, emotional instability is used as this is the precise nature of the construct as reflected in the items that operationalise it.

verified by acceptable goodness-of-fit indices, configuration of factor loadings, variances, covariances and uniquenesses.

- Hypothesis 1c: There will be discriminant and convergent validity as indicated by higher correlations between conceptually related scales and lower or negative correlations between conceptually unrelated or inverse scales.

3.2.1 Cross-sectional evaluation of the hypothesised adaptability process model.

The objective of the second analytic component of the study is to test the relations hypothesised in the adaptability process model (see Figure 4.1). Integrative structural equation modelling (SEM) containing all instrumentation is conducted for both Time 1 data and Time 2 data. Appropriate methodological design and statistical techniques (see Chapter 4) are applied to empirically evaluate the adaptability process model and also to examine the stability of this process model for each cross-sectional dataset. Accordingly, the following hypotheses for both Time 1 and Time 2 are suggested. These hypotheses are relevant to the adaptability process seeking to establish the predictors of adaptability and the psychological well-being outcomes that follow from adaptability.

- Hypothesis 2a: After controlling for socio-demographics and prior achievement, it is hypothesised that personality factors and implicit theories of ability will predict adaptability. Specifically, extraversion, agreeableness, openness, conscientiousness and incremental beliefs will positively predict adaptability. Conversely, it is hypothesised that neuroticism and entity beliefs will negatively predict adaptability.
- Hypothesis 2b: After controlling for socio-demographics, prior achievement, personality and implicit beliefs, it is hypothesised that adaptability will positively predict psychological well-being outcomes in the form of general self-esteem, satisfaction with life and meaning and purpose. On the other hand, it is hypothesised that adaptability will negatively predict emotional instability.
- Hypothesis 2c: After controlling for socio-demographics, prior achievement, personality and implicit beliefs, it is hypothesised that adaptability will

significantly predict psychological well-being outcomes beyond variance attributable to buoyancy.

3.2.2 Longitudinal examination of the hypothesised adaptability process model.

The final analytic component of this research involves longitudinal assessment of the hypothesised adaptability process model (see Chapter 7 for a discussion of the longitudinal design). SEM connecting the two adaptability process models across time is conducted to examine the viability of the hypothesised relationships specified in the adaptability process model, controlling for prior variance in outcomes. Utilising appropriate statistical techniques, this component of the study estimates a longitudinal SEM to ascertain significant paths between corresponding factors at Time 1 and Time 2 (e.g., between Time 1 adaptability and Time 2 adaptability) as well as structural parameters at Time 2 after controlling for Time 1 variance. Three hypotheses are advanced. These are parallel to hypotheses 2a to 2c, but now include the critical control for prior variance in adaptability and outcome factors. Hence, hypotheses 3a to 3c seek to establish the effects of adaptability beyond the effects of auto-regression. Moreover, because outcome factors have been purged of prior variance, adaptability is essentially predicting residuals in outcome variables and thus the predictive role of adaptability can be interpreted as predictive of gains or declines in psychological well-being.

- Hypothesis 3a: After controlling for prior variance in adaptability and outcome factors, socio-demographics and prior achievement, it is hypothesised that personality factors and implicit theories of ability will predict adaptability. Specifically, extraversion, agreeableness, openness, conscientiousness and incremental beliefs will positively predict adaptability. Conversely, it is hypothesised that neuroticism and entity beliefs will negatively predict adaptability.
- Hypothesis 3b: After controlling for prior variance in adaptability, outcome factors, socio-demographics, prior achievement, personality and implicit beliefs, it is hypothesised that adaptability will positively predict psychological well-being outcomes in the form of general self-esteem, satisfaction with life and meaning and purpose. Conversely, it is hypothesised that adaptability will negatively predict emotional instability.

- Hypothesis 3c: After controlling for prior variance in adaptability, outcome factors, socio-demographics, prior achievement, personality and implicit beliefs, it is hypothesised that adaptability will significantly predict psychological well-being outcomes beyond variance attributable to buoyancy.

3.3 Chapter Summary

In light of the previous research and conceptualising presented in Chapter 2 and Chapter 3, numerous hypotheses are advanced in relation to adaptability and its proposed processes. The first set of hypotheses relates to construct validity and measurement issues central to the cross-sectional and longitudinal data sets. The second set of hypotheses relates to the cross-sectional testing of proposed processes specified in the adaptability model. Lastly, hypotheses are advanced regarding the relationships in the longitudinal adaptability process model. Taken together, these hypotheses attempt to establish links between presage factors, adaptability and psychological well-being in the high school setting, while controlling for prior variance in outcomes and adaptability, socio-demographics, prior achievement and cognate constructs such as buoyancy. The following chapter details the methodology employed to address the hypotheses proposed here.

Chapter 4: Methodology

4.1 Introduction

This chapter describes the procedures relevant to the newly developed adaptability construct and the work relevant to the cross-sectional and longitudinal analyses. This chapter also describes and discusses the methods used to explore and investigate the hypotheses put forward in the preceding chapter. In addition, it details a summary of the samples, scales, statistical analyses, data and information handling and processes used in the two phases in the cross-sectional and longitudinal studies. As noted earlier, the study design forms part of an ARC Discovery Project focusing on determinants and consequences of adaptability. Portions of this research project have been published in Martin, Nejad et al. (2012, 2013).

4.2 Time 1 Sample

A sample size of 2,731 students from nine Australian high schools participated in the first phase of the current study (hereafter referred to as Time 1). In this sample, 952 (34.9%) of the participants were students in junior high school – Year 7 with 343 (12.6%) participants and Year 8 with 609 (22.3%) participants, with an age range of approximately 11 to 15 years. A total of 1,109 (40.6%) of the respondents were students in middle high school – Year 9 with 572 (20.9%) participants and Year 10 with 537 (19.7%) participants, with an age range of approximately 13 to 17 years. The number of participants in Year 11 and 12 were 462 (16.9%) and 206 (7.5%) respectively, with an age range of approximately 14 to 19 years. Overall, the participants had an age range between 11 and 19 years with a mean age of 14.4 ($SD = 1.54$) years.

The sample comprised 1,535 (56.2%) female respondents and 1,186 (43.4%) male respondents. Ten participants (0.4%) did not provide gender data, two students (0.1%) did not supply information regarding their school grade (year) and 13 (0.5%) respondents did not provide data about their age. There were 47 (1.7%) Aboriginal participants and 406 (14.9%) non-English speaking background (NESB) participants. Participants were asked to provide information on their parents' or caregivers' educational background as part of their socio-demographic data. The number of mothers with a university degree was 1,020 (37.3%) and 521 (19.1%) had high school education (Year 12). The number of fathers with a university degree was

1,173 (43%) and 334 (12.2%) had high school education (Year 12). The number of parents/caregivers (mothers/females and fathers/males) who did not complete school was 28 (0.1%).

Schools were from various states in Australia. The participant schools were classified according to school size and school type (single-sex female or male, and co-educational). They were also classified based on their location in the region, either metropolitan or provincial. This classification was based on data from the *My School* website (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2011). The participating schools in this sample were comprehensive schools of mixed ability. All nine schools were non-government; four schools were co-educational; three schools were boys only and two schools were girls only; one school was provincial and eight schools were metropolitan.

The schools were generally higher in academic achievement than the national average (ACARA, 2011). They were also higher or equal to the national average in terms of their SES (ACARA, 2011). The classification for the participating schools was informed by ACARA and the individual schools' websites, which are based on information and data provided by the Index of Community Socio-educational Advantage (ICSEA) and the *My School* website. In the Australian educational system, both systems (government and non-government) of schooling follow the same or similar syllabus and examination procedures, however, some schools (independent schools or larger government schools) can propose and/or include a wider range of subjects inside and within the bounds of the syllabus.

4.3 Time 2 Sample

This study was a longitudinal study and was conducted in two phases: the first phase (Time 1) took place in term one of the school year and the second phase (Time 2) was administered at the same time in the following school year. This second administration also meant that the sample was refreshed with the new Year 7 (the first year of junior high school) cohort, and the Time 1 year 12 group had left school by Time 2. All the nine participating schools at Time 1 were able to participate at Time 2. These participating schools at Time 2 represented a mixed sample, which included 2,292 school students in junior high school; years 7 and 8: 714 (31.2%), approximately 11 to 15 years, middle high school; years 9 and 10: 1,066 (46.5%), approximately 13 to 16 years and senior high school; years 11 and 12: 512 (22.3%),

approximately 17 to 19 years from the same nine Australian high schools sampled at Time 1. There were 1,097 (47.9%) female students and 1,187 (51.8%) male students with an age range between 12 and 19 years with mean age of 14.4($SD = 1.55$) years. Eight participants (0.3%) did not provide gender data, all participants provided information regarding their school grade (Year) and 10 (0.4%) respondents did not provide data about their age.

In this sample, there were 57 (2.5%) Aboriginal participants and 357 (15.6%) NESB participants. Participants were also asked to provide information on their parents' or caregivers' educational background as part of their socio-demographic data. The number of mothers with a university degree was 856 (37%) and 406 (17.7%) had high school education (Year 12). The number of fathers with a university degree was 944 (41.2%) and 283 (12.3%) had high school education (Year 12). The number of the mothers and fathers who did not complete school was 38 (0.2%).

4.4 Matched Time 1 and Time 2 Sample

Often, longitudinal research designs are affected by various issues such as participants dropping out of the study (participant attrition), mismatched responses or the challenges of matching respondents over time. In the current research, these difficulties and challenges were present and typically due to: (a) students not writing their required details on the survey to enable matching across time, (b) illegible handwriting, (c) students being absent on the day of the survey, (d) data entry errors, (e) the inclusion of a new Year 7 cohort in junior high school at Time 2, and (f) the loss of the Year 12 cohort from the high school who had graduated at Time 1. Hence, just over 53% of the sample was matched and retained for the longitudinal analyses. This figure was deemed acceptable and defensible since one cohort had graduated when the second phase began and the new Year 7 cohort was introduced at Time 2. Consequently, the matched Time 1 and Time 2 sample comprises 969 high school students who completed the survey at both Time 1 and Time 2 (one year later). At Time 2: 127 (13.1%) respondents were from Year 8 (Year 7 in Time 1); 264 (27.2%) participants were from Year 9 (Year 8 in Time 1); 329 (34%) were from Year 10 (Year 9 in Time 1); 172 (17.8%) were from Year 11 (Year 10 in Time 1); and 77 (7.9%) were from Year 12 (Year 11 in Time 1). A total of 41.2% of the respondents in the matched sample were male and 58.8% were female. The mean age of

respondents in the matched Time 1 sample was 13.8 ($SD = 1.19$) years and the mean age in the matched Time 2 sample was 14.8 ($SD = 1.19$) years. The majority of respondents were 11- to 19-year-old students. Further, in this sample there were 29 (3%) Aboriginal participants and 275 (28.4%) NESB participants.

The unscheduled or uncontrollable loss of participants over time can influence the power and ultimately the findings of longitudinal analyses. Through careful selection of students and schools, large samples and attentive tracking of students, researchers can better protect against sample attrition across time waves (Goldstein, 1979; Robinson et al., 2005; Van Der Kamp & Bijleveld, 1998). The present study was conducted over two years and therefore it was known that at Time 2 there would be inclusion of a new Year 7 cohort and the loss of the Time 1 Year 12 cohort. In line with the above suggestions, to better prepare for this scheduled sample attrition, the present investigation: (a) ensured that a large sample was obtained from the outset (at Time 1 and Time 2) and (b) tracked participants via unique identification numbers.

4.5 Procedure

The research received the required clearance from the University of Sydney Human Research Ethics Committee. Schools were then invited to participate and were assured that their choice whether to participate in this research or not would not result in any disadvantage to them concerning their relationship with the University of Sydney or the researchers. The principals of each participating school were first contacted by telephone and then sent a subsequent e-mail providing the details of the study and what was required of her or his school and teaching staff. Once a school agreed to take part in the research, the principals were sent the surveys with a letter describing the procedure in more detail. Appendices D and E present the invitation, information and consent forms used in the study. Further, the participating students and their parents/guardians were also sent consent and information forms. These forms are provided in Appendices B, C, and F.

Only those students with a signed parent/guardian consent form were allowed to be involved in the survey. In the second year of the study, students were re-issued with the information statement and consent form to ensure that all students in each year of the study were fully informed about the study and had consented to participate. Surveys were delivered to each school in bundled sets for each class

along with a set of administration instructions for teachers. Teachers administered the survey to students during class time with 45 minutes allocated for students to complete it.

On the cover page, students provided the first two letters of their given name, the first two letters of their last name, their month of birth and the last two digits of their home or mobile phone number. This allowed the researcher to create a unique identification number used to match Time 1 and Time 2 data for longitudinal analyses. This approach also better ensured anonymity for participants. The rating scale was explained to students and an example item presented to them. Students were informed that they could ask their teacher to clarify questions or meanings. They were then asked to complete the survey and when finished, return the completed survey to the teacher at the end of class. The set of class surveys was then sealed in an envelope. The envelope was returned to the school office to be boxed and collected by the researchers or a courier to the researchers' offices.

4.6 Instrumentation

All instrumentation was compiled into a single survey package (see Appendix A and Appendix G). Scales in the package were designed to measure the target factor (adaptability), substantive predictors (presage factors) of this target factor (personality, implicit theories), outcome factors (general self-esteem, satisfaction with life, emotional instability and meaning and purpose) and covariates (socio-demographics, prior achievement and buoyancy).

4.6.1 Target factor: Adaptability.

The Adaptability Scale has been recently developed to measure the hypothesised adaptability construct and its relevant factors. Three factors of adaptability are evaluated in the present study: cognitive (e.g., 'I am able to adjust my thinking or expectations to assist me in a new situation if necessary'), behavioural (e.g., 'To assist me in a new situation, I am able to change the way I do things if necessary') and emotional (e.g., 'To help me through new or difficult situations, I am able to draw on positive feelings and emotions [e.g., enjoyment, satisfaction]'). Each factor included three items, producing a 9-item scale with $\alpha = .90$. As inferred from and informed by the definition of adaptability (see literature review), the adaptability items were required to reflect four criteria:

1. A response to novelty, change, variability and/or uncertainty;
2. Cognitive, behavioural, or emotional functions;
3. Regulation, modification, fine-tuning, reconsideration or a new way to access these three regulatory functions;
4. A positive purpose and/or an adaptive result.

Students rated each item on a 1 ('Strongly Disagree') to 7 ('Strongly Agree') scale. Descriptive, distributional and reliability statistics are provided in Table 5.4. Full statistical and psychometric properties are reported in the results chapters.

4.6.2 Substantive predictors (presage factors).

As described in the review of literature, in the proposed adaptability model, it is postulated that personality and implicit theories of intelligence are substantive predictors of adaptability.

4.6.2.1 Personality.

Controlling for personality is considered to be a significant part of a study about individuals' self-regulatory functioning. Perhaps it is not adaptability that predicts outcomes, but particular personality factors or personality 'types' that produce and generate positive and constructive outcomes. For example, openness and extraversion may explain outcomes better than adaptability. To account and test for this possibility, the International English Big-Five Mini-Markers (Thompson, 2008) was used to investigate the role of personality as a covariate in adaptability effects. Thompson adapts Saucier's (1994) Big-Five Mini-Markers to produce the International English Big-Five Mini-Markers with better factor structure, higher scale internal reliabilities and greater orthogonality than the original set of items. This instrument measures 40 personality adjective descriptors using a seven-point scale of *Very inaccurate* (1), *Moderately inaccurate* (2), *Slightly inaccurate* (3), *Neither inaccurate nor accurate* (4), *Slightly accurate* (5), *Moderately accurate* (6) and *Very accurate* (7).

Consistent with the Big-Five, the factors in this study are *Agreeableness*, *Conscientiousness*, *Extraversion*, *Neuroticism* and *Openness*. *Agreeableness* measured students' kindness and tendency to be compassionate and cooperative towards others. This comprised eight adjectives: four positively worded (e.g., 'kind') and four negatively worded (e.g., 'harsh'). *Conscientiousness* measured students'

tendency to be organised and show self-discipline and achievement orientation. This comprised eight adjectives: four positively worded (e.g., 'organised') and four negatively worded (e.g., 'disorganised'). *Extraversion* measured students' outgoing or energetic nature, their positive emotions and their tendency to seek stimulation from the company of others. This comprised eight adjectives: four positively worded (e.g., 'energetic') and four negatively worded (e.g., 'reserved'). *Neuroticism* measured students' tendency to worry, unpleasant emotions and sense of nervousness. This comprised eight adjectives: five positively worded (e.g., 'moody') and three negatively worded (e.g., 'unworried'). *Openness* (or intellect) measured students' 'openness' to diverse experiences, appreciation of art, adventure and curiosity. This comprised eight adjectives: six positively worded (e.g., 'philosophical') and two negatively worded (e.g., 'unimaginative') (Digman, 1990; Goldberg, 1993; McCrae & Costa, 2008; Poropat, 2009). At Time 1 and Time 2, the five factors were reliable (T1: Extraversion $\alpha = .83$, Openness $\alpha = .73$, Neuroticism $\alpha = .75$, Conscientiousness $\alpha = .84$ and Agreeableness $\alpha = .80$; T2: Extraversion $\alpha = .82$, Openness $\alpha = .74$, Neuroticism $\alpha = .75$, Conscientiousness $\alpha = .84$ and Agreeableness $\alpha = .80$), see Tables 5.4 and 6.2 for more details.

4.6.2.2 *Implicit theories.*

Dweck (Dweck et al., 1995; see also Blackwell et al., 2007) argues that implicit beliefs regarding intelligence may affect and influence behaviour. She asserts that there are two key approaches towards intelligence among people: '*incremental*' and '*entity*' views of intelligence. Individuals with an incremental outlook see intelligence as something that can change, particularly through the application or withdrawal of effort (e.g., 'A person who works really hard can be very smart'). In contrast, individuals with an entity outlook of intelligence see intelligence as something fixed and unchangeable (e.g., 'There isn't much some people can do to make themselves smarter'). Five items in the entity scale and five items from the incremental scale are from Stipek and Gralinski (1996). Items were rated on a 1 ('Strongly Disagree') to 7 ('Strongly Agree') scale. At Time 1, reliabilities were $\alpha = .85$ (incremental) and $\alpha = .81$ (entity). At Time 2, reliabilities were $\alpha = .85$ (incremental) and $\alpha = .80$ (entity).

4.6.3 Well-being outcome factors.

Well-being outcome measures included satisfaction with life (Diener et al., 1985), emotional instability, self-esteem (Marsh et al., 1999; Marsh, Ellis, Parada, Richards, & Heubeck, 2005) and meaning and purpose (WHOQOL, 1998).

4.6.3.1 Self-esteem.

Self-esteem is concerned with individuals' general assessment of their worth. It is an estimate of oneself and one's attitude towards the self. Self-esteem involves such beliefs such as; 'I am capable' and/or 'I am valuable' (e.g., "Overall, most things I do turn out well", "Overall, I have a lot to be proud of"). Self-esteem is defined as beliefs an individual holds about her or his ability and competence (Branden, 1994). Branden believes that self-esteem is the combination self-respect and self-confidence. Consequently, self-esteem is argued to be a significant psychological construct since researchers have hypothesised and established that it is an important predictor of relevant outcomes, such as academic achievement (Marsh, 1990). Further, self-esteem is also argued to be a significant outcome because of its close relation with psychological well-being (Marsh, 1989). Self-esteem in the present study was assessed through an existing instrument developed by Marsh (see the Self-description Questionnaire-II - SDQ-II, Marsh, 1992, 2007). The SDQ-II is a 102-item self-report scale intended to assess the self-concept of 12 to 18 year old adolescents, including physical appearance, physical ability, parent relations, peer relations (same-gender and opposite-gender), reading, mathematics, school in general, and a global perception of self (the self-esteem measure used in this study), in addition to emotional instability and honesty/trustworthiness. Items were rated on a 1 ('Strongly Disagree') to 7 ('Strongly Agree'). The present study demonstrated a sound reliability estimate (T1 and T2: $\alpha = .78$) as shown in Tables 5.4 and 6.2.

4.6.3.2 Satisfaction with life.

Satisfaction with life was assessed using the Satisfaction with Life Scale (Diener et al., 1985). It consists of five items and is a measure of a person's perceived quality of life. It is a component of subjective well-being and considered a measure of global life satisfaction (Diener et al., 1985). An example item is 'I am satisfied with my life' which students rated on a scale of 1 ('Disagree Strongly') to 7 ('Agree Strongly'). Internal consistency of the SWLS has previously shown to be

very good with a reliability of .85 (Pavot & Diener, 1993). The present study demonstrated a sound reliability estimate (T1 and T2: $\alpha = .78$) as shown in Tables 5.4 and 6.2.

4.6.3.3 Emotional instability.

*Emotional instability*³ is drawn from the SDQ-II (Marsh, 1992, 2007) and is described as a student's self-perception as being "calm and relaxed, emotionally stable and how much they worry" (Marsh et al., 2005, p. 102). These items were framed from the perspective of emotional instability (e.g., 'I worry about a lot of things'). Emotional instability consists of five items, each rated on a 1 ('Disagree Strongly') to 7 ('Agree Strongly') scale. Previous work has demonstrated sound reliability for emotional instability (Marsh et. al, 2005). In the present study, it was found to have sound reliability (T1: $\alpha = .83$ and T2: $\alpha = .84$), see Tables 5.4 and 6.2 for more details.

4.6.3.4 Meaning and purpose.

The *meaning and purpose* scale was adapted from WHOQOL (1998) and measured students' perception of personal beliefs and whether they gave meaning to their lives (e.g., 'I feel my life is meaningful'). The meaning and purpose scale consists of five items, rated on a 1 ('Disagree Strongly') to 7 ('Agree Strongly') continuum. The scale has previously shown strong reliability (WHOQOL, 1998). The present study also confirmed strong reliability (T1: $\alpha = .85$ and T2: $\alpha = .84$), see Tables 5.4 and 6.2 for further details.

4.6.4 Covariates.

As discussed in the review of literature, the present investigation includes numerous covariates. This has two advantages. First, it partials out their variance in models in order to better understand the unique effects of central factors (e.g., adaptability). Second, it allows an understanding of the relationship between these covariates and the central factors of interest. Covariates in this study included socio-demographic factors and prior achievement.

³As noted in a previous footnote, the terms 'emotional stability' and 'emotional instability' are sometimes used interchangeably (though, denoting opposite ends of the underlying dimension). For the purposes of the present study, emotional instability is used as this is the precise nature of the construct as reflected in the items that operationalise it.

4.6.4.1 Socio-demographics.

Socio-demographic characteristics included gender, age, language background, parent education and parent occupation. In *language* background, participants were asked if they spoke English (1) or another language (2 –Non-English-Speaking-background [NESB]) at home. *Gender* was coded (1) for females and (2) for males. *Age* was retained as a continuous variable. To obtain *parent education* and *parent occupation* indices, students were asked to report their mother's (or female caregiver's) and father's (or male caregiver's) educational and occupational status using an ordinal scale based on Australian Bureau of Statistics categories.

4.6.4.2 Prior achievement.

Prior achievement is another factor important to control for. In the present study, this was done using students' results in an annual nation-wide assessment of literacy and numeracy (National Assessment Program in Literacy and Numeracy [NAPLAN]). NAPLAN is administered by ACARA and is a nationally-standardised test in which students reported the scores they received for literacy and a score for numeracy. For the current study, an achievement factor was developed through literacy and numeracy scores using NAPLAN results for the years 2009-2010.

4.6.4.3 Buoyancy.

To test for the discriminant validity of adaptability, a measure of *buoyancy* was included alongside adaptability as a covariate. Various studies have found that cognate factors such as buoyancy, while conceptually close, may be distinct from coping (Putwain et al., 2012; Putwain & Daly, 2013). Hence, the present study might infer from this that adaptability is also distinct. Inclusion of buoyancy at this part of the model controls for any shared variance it might have with adaptability and thus better tests the unique role of adaptability. Buoyancy was measured using the Academic Buoyancy Scale (ABS) (Martin & Marsh, 2006, 2008a, 2008b; Martin et al., 2010). Buoyancy (e.g., 'I think I'm good at dealing with schoolwork pressures') refers to students' ability to effectively deal with setback, challenge, adversity and pressure (Putwain et al., 2012; Putwain & Daly, 2013). The ABS is assessed through four items, rated from 1 ('Strongly Disagree') to 7 ('Strongly Agree'). In the present study it has a reliability of $\alpha = .78$ at Time 1 and $\alpha = .75$ at Time 2.

4.7 Overview of Statistical Analyses

The process of data analysis in the present study included descriptive statistics, reliability analysis, EFA, CFA, multigroup invariance tests and SEM. The following describes each of these analyses. All statistical analyses were performed using SPSS for Windows version 18 (for descriptive, reliability and EFA) and *Mplus* 6.0 (Muthén & Muthén, 2007). As described below, missing data were imputed using LISREL 8.80 (Jöreskog & Sörbom, 2006).

Preliminary analyses screened for missing values, data entry errors (such as incorrect age and gender), outliers (univariate and multivariate) and assumptions of normality and linearity. Prior to latent variable modelling (SEM), it was important that initial analyses established the psychometric properties of instrumentation. Consequently, before addressing substantive hypotheses, factors were analysed for their distributional properties and reliability. Having established the measurement properties of the variable set, the structural parameters were tested using SEM.

4.7.1 Reliability analyses.

Reliability tests shed light on the extent to which an instrument or a set of items are internally consistent and the extent to which the set of items can be considered unidimensional (Anastasi & Urbina, 1997). In the present research, reliability analyses were conducted via Cronbach's Alpha using SPSS for Windows version 18. Reliability coefficients were computed for all multi-item scales at Time 1 and Time 2, as well as for the matched longitudinal sample. Reliability coefficients range between 0 and 1, with values of (approximately) .70 or above generally deemed to be indicative of an acceptable level of reliability (see Anastasi & Urbina, 1997; Hills, 2003; Sattler, 2008).

4.8 Central Models and Sub-models Analysis

Assumptions that individual items are the only contributing factor to causal latent variables and that they equally measure the latent variable is often made by the traditional statistical approach (Byrne, 2003; Rowe, 2002, 2006). However, this is not necessarily the case in psycho-educational or psycho-social research. There have been developments in the field of statistics that can estimate measurement error, account for various item loadings onto theorised latent variables and examine *a priori* associations among factors (Byrne, 2003; Schumacker & Lomax, 1996). The

described procedure comprises techniques such as factor analysis and SEM (Pearl, 2000). In the present study, factor analysis and SEM were employed to look at principal and core models as well as sub-models with cross-sectional and longitudinal data.

4.8.1 Factor analysis.

It is also essential to verify and substantiate the fundamental factor structure of multifactor instrumentation as a set. Accordingly, factor analysis was conducted prior to central modelling of interest.

Exploratory factor analysis (EFA). In the first instance, this entailed exploratory factor analysis (EFA) of the adaptability items. EFA is used to help determine the number of factors to describe and elucidate the correlations among a set of observed variables (or factor indicators). It is used to bring inter-correlated items together under more general, underlying factors and explains the variance in the indicators based on the latent factors (Habing, 2003). The EFA technique used in this stage of analyses was principal axis factoring (a method of factor extraction) with oblique rotation (which assumes correlations among factors) using SPSS for Windows version 18. Principal axis factoring is a factor analysis method where factors are based on a reduced correlation matrix using *a priori* communality estimates. That is, communalities are arranged in the diagonal of the correlation matrix and the extracted components are based on the common variance while specific and error variances are excluded. The number of positive eigenvalues determines the number of dimensions required to represent a range of scores without loss of substantial information. Consequently, eigenvalues help determine the number of factors to be extracted (Rietveld & Van Hout, 1993).

Confirmatory factor analysis (CFA). Following EFA of adaptability items and a suggested factor structure, CFA performed with *Mplus 6.0* (Muthén & Muthén, 2007) was used to confirm this structure. CFA is used to confirm the extent to which observed variables present a significant account of the unobserved latent factors they are hypothesised to reflect (Byrne, 2001). This statistical practice permits researchers to specify particular items that load onto particular factors, and then tests the extent to which the intended theoretically derived factor structure is reflected in the data/covariance matrix (Quintana & Maxwell, 1999). This is often referred to as the measurement component in the modelling process.

Hence, in the course of CFA, a researcher suggests a pattern of relationships between observed parameters and an *a priori* model (Byrne, 1998). This takes place with the assumption that the model fits the data, the solution is properly and appropriately defined, factor estimates are reliable and consistent with hypothesis and *a priori* models and the chi-square and individual indices of robustness and fit are satisfactory (Marsh, Balla, & McDonald, 1988; McDonald & Marsh, 1990). The CFA structure reflects the composition of hypothesised factor loadings, factor variances/covariances and error terms for each measured variable. Maximum likelihood (Kaplan, 2000) was the estimation procedure used. Research has shown that maximum likelihood is robust to violations of normality (Bollen, 1989; Boomsma, 1982; Hau & Marsh, 2004; Hoyle, 1995).

Exploratory structural equation modelling (ESEM). Particularly when using constructs such as personality, it has been recommended that ESEM is an appropriate approach to factor analysis (e.g., Lang, John, Lüdtke, Schupp, & Wagner, 2011; Marsh et al., 2010). In contrast to CFA's stringent requirement that item cross-loadings be fixed to zero, ESEM allows their estimation, meaning that latent factor inter-correlations for theoretically orthogonal personality dimensions may be substantially smaller than such correlations estimated using CFA. Thus, to test factor structure of the entire item set, ESEM was conducted using *Mplus 6.0* (Muthén & Muthén, 2007).

4.8.2 Estimating the fit of the hypothesised structure.

Goodness-of-fit indices are used to evaluate the acceptability of factor estimates for the observed covariances (Yuan, 2005). In the present investigation, the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), the χ^2 test statistic and an evaluation of parameter estimates were used to estimate and evaluate the model fit (Hoyle & Panter, 1995; Hu & Bentler, 1995; Marsh et al., 1988; Marsh, Hau, & Wen, 2004; Quintana & Maxwell, 1999; Vandenberg & Lance, 2000; Yuan, 2005). For RMSEA, a value at or less than .08 was used to demonstrate an acceptable fit and a value at or less than .05 was employed to indicate excellent fit (see MacCallum, Browne & Sugawara, 1996; Marsh, Balla, & Hau, 1996; Schumacker & Lomax, 1996; Yuan, 2005). The CFI value ranges from zero to one and the acceptable and excellent fit are indicated by values at or greater than 0.90 and 0.95 correspondingly (McDonald & Marsh, 1990).

Researchers occasionally introduce extra parameters to the model to improve the fit between the model and data. The CFI does not impose a negative consequence for having extra parameters in a model. On the other hand, the RMSEA does penalise extra parameters (Holmes-Smith, 2000; Vandenberg & Lance, 2000; Yuan, 2005).

4.8.3 Multiple-group factor invariance and CFA.

Researchers and investigators employ CFA and analyses of reliability to investigate and establish whether the measures that are proposed to support their instrumentation are statistically and psychometrically sound and whether those scales are well measured for their specific sample. To further establish this, a researcher also needs to inspect and assess the extent to which the factor structure is well measured for specific subgroups (e.g., males and females) within the larger sample.

While most researchers look at differences in means of subgroups (e.g., whether there are differences in mean scores between males and females), more detailed attention ought to be given to possible disparity and inconsistencies in factor structure (Liem & Martin, 2013b; Martin, 2004, 2007; Vandenberg & Lance, 2000). Tests of measurement invariance assess the consistency (or inconsistency) of measurement across groups of interest (e.g., between males and females). The aim of measurement invariance is to assess the degree of variance between the measurements employed concerning the groups. In other words, invariance testing complements CFA findings as it seeks to ensure that there is consistency and uniformity in the way attributes relate to the same set of observations in each group.

Marsh (1993) states that analyses with reference to factor invariance are important because it may not be permissible or valid to cluster data across subgroups unless there is sufficient support for the invariance of factor structure between the groups (see also Martin, 2004). Further, Tucker, Ozer, Lyubomirsky, and Boehm (2006) state that measured group differences should reflect real differences at the latent level. Consequently, researchers need to compare groups and subgroups and to do so they must establish measurement invariance. Measurement invariance is realised when parameters of the model are predominantly equivalent over groups.

Factor invariance assessment entails evaluating measurement invariance between the unconstrained model (e.g., the theorised model) and an unconstrained model where parameters are forced to be equal across groups (e.g., gender). Invariance testing is most efficiently dealt with using CFA in factor structure by evaluating whether the parameters

and variables vary according to the determined constraints (see Byrne & Shavelson, 1987; Hattie, 1992; Marsh, 1993). The fit indices of these models are evaluated and compared as consecutive components of a model (factor structure) are controlled. Moreover, because the chi-square difference test is extremely sensitive to sample size (Bentler & Bonett, 1980; Loehlin, 1998; Marsh et al., 1988; Browne, MacCallum, Kim, Andersen & Glaser, 2002), more attention is often placed on other goodness-of-fit indices in the forms of RMSEA and CFI indices. Following Byrne, Shavelson, & Muthén (1989) invariant factor loadings are seen as a minimal criterion for factor invariance (Byrne, 1998; Byrne et al., 1989; Marsh, 1993). A change of fit index of no more than 0.01 in CFI (Cheung & Rensvold, 2002) and .015 in RMSEA (Chen, 2007) signifies invariance across groups.

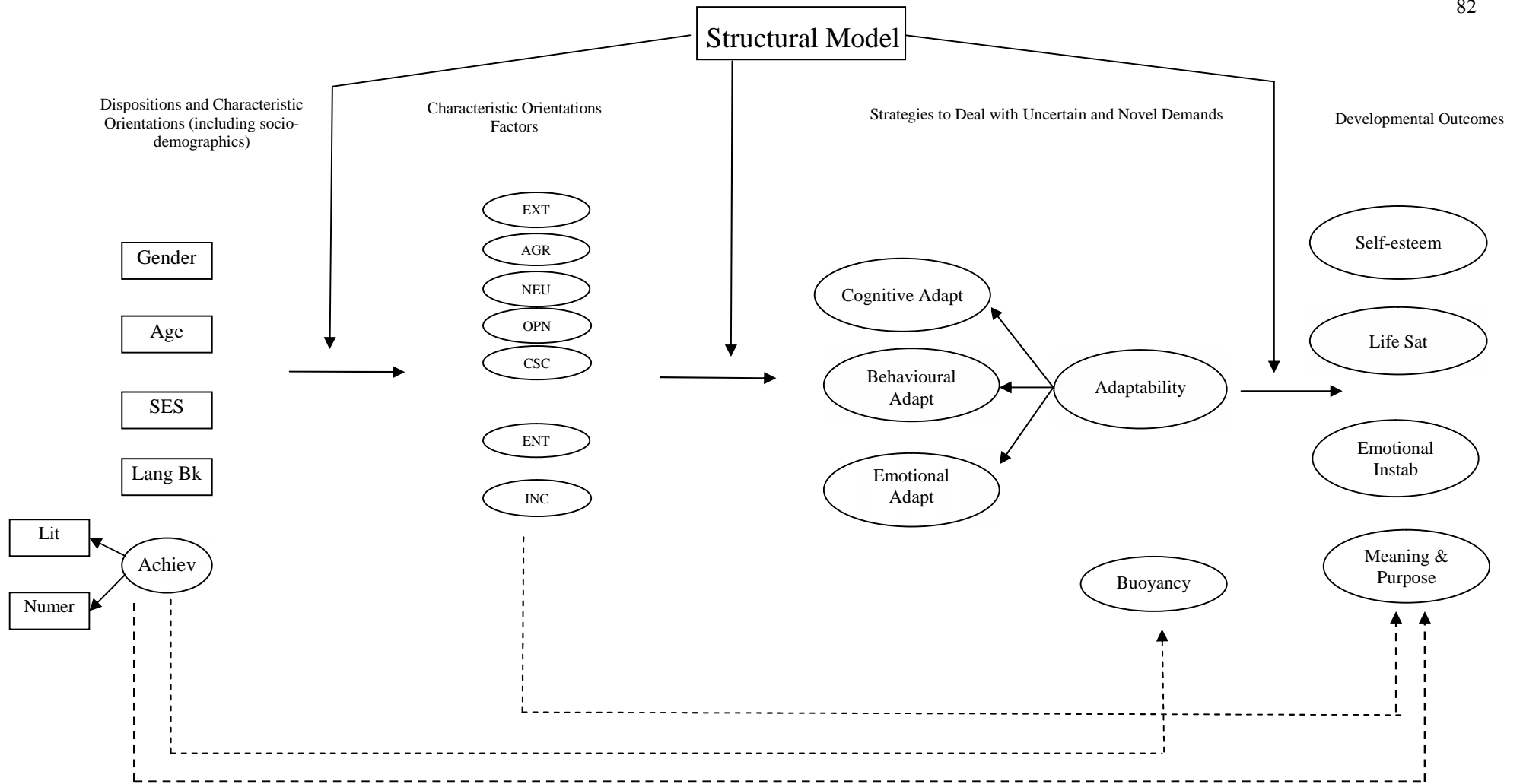
Five consecutively restricted models are tested over subgroups: males/females, English speaking background (ESB)/NESB, and junior and senior high school in the current study. The first model is completely free with no invariance constraints placed on parameters across subgroups. Following this model, each structure is more restrictive than the preceding one. Thus, the second model constrains the factor loadings; the third constrains factor loadings and uniquenesses; the fourth model constrains factor loadings and correlations/variances, and the fifth (the most restrictive and most stringent test of invariance) constrains all three sets of parameters –factor loadings, correlations/variances, and uniquenesses.

4.8.4 SEM.

SEM is the main statistical technique to measure and examine the multivariate relationships among predictors and outcome (and covariate) variables. SEM is a technique that estimates and assesses structural associations among latent factors produced in the CFA. Hence, CFA describes the measurement model of a hypothesised structure and SEM explains the testing and assessment of the substantive questions relevant to the structural associations among latent variables (Hoyle, 1995). Whereas the measurement model depicts associations between the latent (unobserved) variables and their indicators (observed items), the structural model outlines the potential inter-relations of dependent and independent variables (see Byrne, 1998; Kline, 1998; MacCallum & Austin, 2000). Figure 4.1 distinguishes between the measurement and structural properties of a model.

Indeed, adopting SEM provides an advantage in that it estimates latent variables without measurement variation (or unreliability), an advance on traditional regression analyses. SEM is also superior to traditional regression analysis in that it also enables tests of all relationships in one integrative analytic model (Chin, 1998; Kline, 1998; Quintana & Maxwell, 1999). Taken together, then, SEM assesses the structural associations among variables (including the latent variables), estimates parameters between observed items, as well as latent factors, and explains the measurement variance of complex models comprising multiple factors.

SEM was used in this study to assess and evaluate the predictive associations between personality, implicit theories, adaptability and well-being outcomes, controlling for socio-demographics, prior achievement and buoyancy (see Figure 4.1). SEM was performed using *Mplus 6.0* (Muthén & Muthén, 2007). As with the CFAs described above, the fit indices of central interest in this study are the CFI and RMSEA, with CFI values at or greater than 0.90 and 0.95, indicating acceptable and excellent fits respectively, and RMSEA values at or lower than 0.08 and 0.05, indicating acceptable and excellent fits. Similarly, as with the CFAs, the maximum likelihood method of estimation (Kaplan, 2000) was implemented.



SES = Socio-Economic Status, Lang Bk = Language Background, Achiev = Prior Achievement, Lit = Literacy, Numer = Numeracy, EXT = Extraversion; AGR = Agreeableness; NEU = Neuroticism; OPN = Openness; CSC = Conscientiousness; ENT = Entity; INC = Incremental; Adapt = Adaptability; Life Sat = Life Satisfaction; Emotional Instab = Emotional Instability.

Figure 4.1: Structural components of the hypothesised model.

Note. Dashed paths are not central to the study’s substantive focus but are included to account for all variance in the model and to better estimate unique effects attributable to factors of central interest.

4.8.5 Composite score and congeneric procedure.

Some issues may affect multivariate statistical analysis. For example, there can be problems when there are many parameters to estimate relative to the size of the sample, leading to instability in parameter estimates (Holmes-Smith & Rowe, 1994). The Time 1 sample comprised 2,731 and the Time 2 sample comprised 2,292 cases and the hypothesised model was relatively complex, comprising two different time phases (representing a longitudinal model). Hence, there were a significant number of observed variables and latent factors and items in Time 1 and Time 2 which made the number of parameters to be estimated rather large in number⁴ (Liem, Ginns, Martin, Stone, & Herrett, 2012). To overcome such an issue, composite score-based analyses are sometimes used (Holmes-Smith & Rowe, 1994; Rowe & Hill, 1998). This technique reduces the number of estimated parameters through the use of confirmatory one-factor congeneric models that produce a weighted composite score for each factor. This composite score replaces the multiple items used as indicators for the latent factor. Hence, composite scores can be particularly useful as they take into account item error and how much each item contributes to the latent factor (Rowe, 2002, 2006). Proportional factor score regression weights () generated from a congeneric model solution are employed to adjust the weight of each item before a composite score is calculated (Holmes-Smith & Rowe, 1994; Rowe & Hill, 1998). Factor score regression weights are significant because they take into account individual item measurement error and the unique or unequal contributions to the composite score. Furthermore, the number of parameters in composite score-based SEM can be further reduced as the factor loading () a measurement error variance () of each latent variable in the model are fixed with the values calculated using the weighted composite score reliability (or r_m – maximised reliability) of the factor of interest. That is, the factor loading can be calculated by calculating the square-root of and the measurement error variance can be calculated subtracting from 1 (see Holmes-Smith & Rowe, 1994; Rowe & Hill, 1998). Using *Mplus 6.0* (Muthén & Muthén, 2007), the current investigation employed syntax provided by Raykov (2009) to perform congeneric models. (Liem et al., 2012, p.16) Consequently, these composite scores were the basis of correlational and structural equation analyses.

⁴The number of parameters to be estimated in CFA or SEM can be computed using the following formula, $p(p + 1)/2$, where p = observed variables (see Byrne, 2010)

4.8.6 Correlated error (or correlated uniqueness) terms.

When identifying a longitudinal SEM model, it is recommended that researchers account for the correlation between parallel correlated error terms over time (see Marsh, 1990). According to Jöreskog (1979; see also Marsh, Roche, Pajares, & Miller, 1997), to achieve better estimates of relations among unobserved factors across time, correlations among error terms of parallel items (e.g., between Time 1 adaptability item one and Time 2 adaptability item one) must be included in the model. If correlated error terms are not included in longitudinal models, the relations between the latent constructs (i.e., parameter estimates) may be biased (Marsh & Hau, 1996; Marsh et al., 1997; Guay, Marsh, & Boivin, 2003). Therefore, from this perspective, the aims of longitudinal research cannot be effectively or appropriately addressed without also modelling correlated error terms. In the longitudinal CFAs and SEMs of the present study, the error terms of parallel items across time are correlated in order to achieve better estimates of structural paths in the model.

4.8.7 Handling of missing data.

A common issue that most large-scale psycho-educational research projects and studies will face is that of missing data and how to properly address it (Marsh & Hau, 2007). Missing data can be problematic when more than 5% of data points are missing (Graham & Hoffer, 2000). Analysts have conventionally used mean imputation, pairwise deletion or listwise deletion methods to address the issue of missing data (see Marsh & Hau, 2007 for discussion). These methods are, however, associated with considerable limitations, including unstable parameter estimates and the generation of inaccurate standard errors and confidence intervals (for discussion see Allison, 2003; Arbuckle, 1996; Brown, 1994; Enders, 2001; Gold & Bentler, 2000; Graham & Hoffer, 2000; Peugh & Enders, 2004; Tomarken & Waller, 2005). As a result, it is recommended that more reliable methods for handling missing data should be used. The expectation maximisation (EM) algorithm is an approach to missing data receiving more recent support (Schafer & Graham, 2002). It is an iterative optimisation process used to estimate unknown parameters given the available data (Dellaert, 2002). The EM algorithm is used with computations that involve probabilistic models (Do & Batzoglou, 2008). The EM algorithm rotates between the phases of estimating a probability distribution over completions of missing data given the existing model and then re-assesses and re-evaluates the

model parameters using these completions. The EM algorithm approach to handling missing data, similar to maximum likelihood, provides substitute values and proxy values that do not alter or modify the values of the covariance matrix. It envisages the missing value from the existing associations among other instances and observed cases that are present in the statistical model. The EM algorithm procedure uses an iterative procedure to estimate the means, the association and relationships of the variables with missing values and the covariance matrix (Schafer & Graham, 2002). In this study, the percentage of missing data was 4.79% at Time 1 and 3.15% at Time 2. Hence, the EM algorithm was considered an appropriate approach to handling missing data in the present investigation.

4.8.8 Hierarchical modelling and biased statistics.

The present study is not intended as a multilevel one (as there are not enough schools to justify formal multilevel modelling). However, it is clear that students are nested within schools. Without some adjustment to recognise this structure, there may be conflated units/levels of analysis and dependencies within groups and biased standard errors that can distort statistical significance levels (see Goldstein, 2003; Hox, 2010; Raudenbush & Bryk, 2002). To account for clustering of students within schools, all CFA and SEM analyses implemented the *Mplus* 'cluster' command using the 'complex' method. This procedure provides adjusted standard errors and so does not bias tests of statistical significance (Muthén & Muthén, 2007).

4.9 Chapter Summary

This chapter set out to describe the methodology used in the current research. A brief description of the overall purpose of the study relevant to current literature was offered. Also provided was a description of sample size, participants (schools and students), the research phases (Time 1 and Time 2) and data collection processes and procedures. The research instrumentation, including the newly developed adaptability instrument, was described and outlined along with the statistical procedures that involved details of factor analysis, SEM, missing data, multicollinearity and modification indices. The results and discussion derived from these analyses and procedures underpin the following chapters.

Chapter 5: Time 1, Cross-sectional Results

5.1 Introduction

This chapter comprises six stages of data analysis. The first stage conducts psychometric analyses of the Adaptability Scale. Pending satisfactory psychometric properties, the adaptability items are brought into the full set of items that are the bases of central analyses. The second stage is an examination of the properties of all central constructs (e.g., adaptability, self-esteem, life satisfaction) by assessing internal consistency (reliability) and distributional properties (e.g., skewness, kurtosis). The third stage of analyses examines measurement properties of the total set of scales using CFA. The fourth stage examines the invariance of measurement properties of the full item set as a function of key subgroups (e.g., gender, language background). The fifth stage derives correlations among all variables. The sixth and final stage of analyses in this chapter explores the substantive research model that examines the predictors and consequences of adaptability while controlling for various socio-demographic and prior achievement covariates. These analyses are based on Time 1 data. In the next chapter, analyses attempt replication of Time 1 findings with Time 2 data. Following this, longitudinal analyses are conducted to examine hypothesised structural parameters controlling for auto-regression (prior variance) in adaptability and outcome factors.

5.2 EFA of the Adaptability Scale

This study initially hypothesised three components of adaptability—cognitive, behavioural and emotional—that young people may regulate to deal with and manage novel, changing and uncertain in- and out-of-school life situations. To this end, EFA was employed to investigate the factor structure. Two EFA approaches were implemented. In the first (fully) exploratory analysis procedure, factors with eigenvalues greater than one (Hair, Anderson, Tatham, & Black, 1995; Tabachnick & Fidell, 2007) were extracted. Following this, a three-factor (cognitive, behavioural and emotional) solution (see Figure 5.2) was examined, in line with theorising described in the review of literature. The items were initially put through checks of Bartlett's test of sphericity that measures the extreme case of inter-correlation (also referred to as multicollinearity) that "tests the null hypothesis that the original correlation matrix is an identity matrix" (Field, 2000, p. 457). These analyses indicated no apparent issues. To cross-validate the final solution, multiple random

splits of the sample were conducted and then the comparability of factor solutions across these sub-samples was examined (see Tabachnick & Fidell, 2007).

In relation to analyses based on eigenvalues, nine items were analysed and it was clear that one primary factor emerged, explaining 56% variance (loading range = 0.60 to 0.76; loading mean = 0.70; loading median = 0.73). Figure 5.1 is the scree test, which depicts the eigenvalues of the correlation matrix that assists in determining the 'optimal' number of factors. Based on eigenvalues greater than 1.0, this scree plot confirms a primary factor explaining the bulk of variance in items.

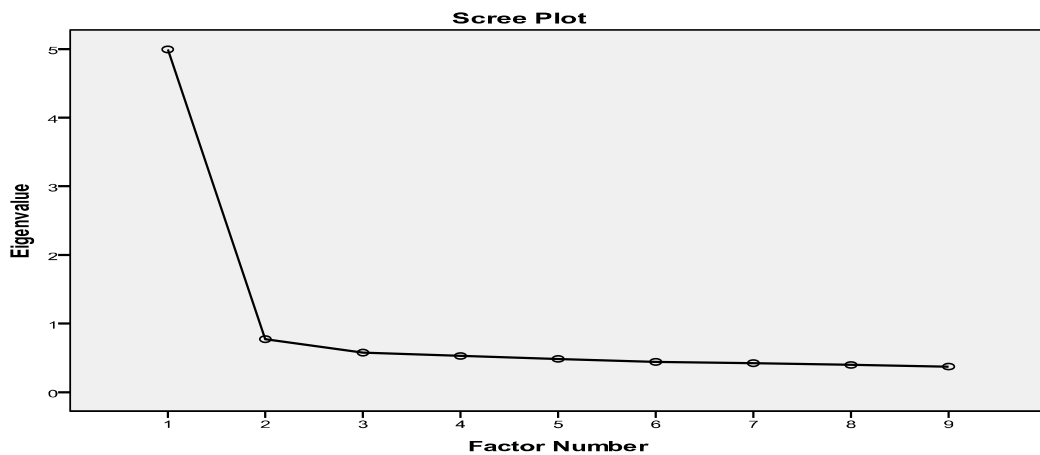


Figure 5.1: Scree plot of adaptability items.

Following this, a three-factor solution was explored to examine if adaptability can be represented by its cognitive, behavioural, and emotional dimensions. As is clear, in this solution there were no items with loadings greater than 0.30 on the third factor. Instead, items loaded on two factors with cognitive and behavioural items loading on the first factor and emotional items loading on the second factor. Accordingly, a two-factor solution was then examined using EFA. This again separated items into a cognitive-behavioural factor (loading range = 0.54 to 0.80; loading mean = 0.68; loading median = 0.67) and an emotional factor (loading range = 0.55 to 0.73; loading mean = 0.65; loading median = 0.64), jointly explaining 64% variance. Mean non-target loadings (i.e., mean cross-loadings) were .10 for the first factor (cognitive-behavioural) and 0.12 for the second factor (emotional). Thus, these items showed more substantial loadings on target factors than they did on non-target factors. All loadings are presented in Tables 5.1 and 5.2.

Table 5.1

Factor Loadings Based on the Three-factor Adaptability Solution

	Factor			Communality (h ²)
	1	2	3	
Adapt 1 (Cog.)	.66	.07	-.01	.50
Adapt 2 (Cog.)	.69	-.09	.18	.60
Adapt 3 (Cog.)	.77	.00	-.26	.67
Adapt 4 (Beh.)	.75	-.03	.24	.59
Adapt 5 (Beh.)	.69	.06	-.12	.56
Adapt 6 (Beh.)	.56	.19	-.10	.54
Adapt 7 (Emo.)	-.07	.76	.01	.49
Adapt 8 (Emo.)	.18	.60	.05	.57
Adapt 9 (Emo.)	.12	.63	-.04	.53
Kaiser-Meyer	.97			
Bartlett's Sphericity	11266.37			
Eigenvalues	4.99	0.77	0.58	
% variance	50.66	3.44	1.97	Total = 56.07

Note. See Appendix A for the adaptability items; Extraction method: Principal Axis Factoring; Rotation method: Oblimin with Kaiser normalisation; Cog. = Cognition; Beh. = Behaviour; Emo. = Emotion.

Next, to cross-validate the solutions, five sets of random sample splits (approximately half the sample in each split) were conducted in SPSS to derive five sets of bipartite sub-samples (yielding 10 sub-samples). Then, the three EFAs (eigenvalues > 1.0; a three-factor solution; a two-factor solution) were conducted for each of the 10 sub-samples. Findings showed that for all sub-samples: (a) one factor was extracted when using eigenvalues greater than 1.0; (b) the three-factor solution yielded inconsistent results; and (c) the same two cognitive-behavioural and emotional factors were extracted when specifying a two-factor solution.

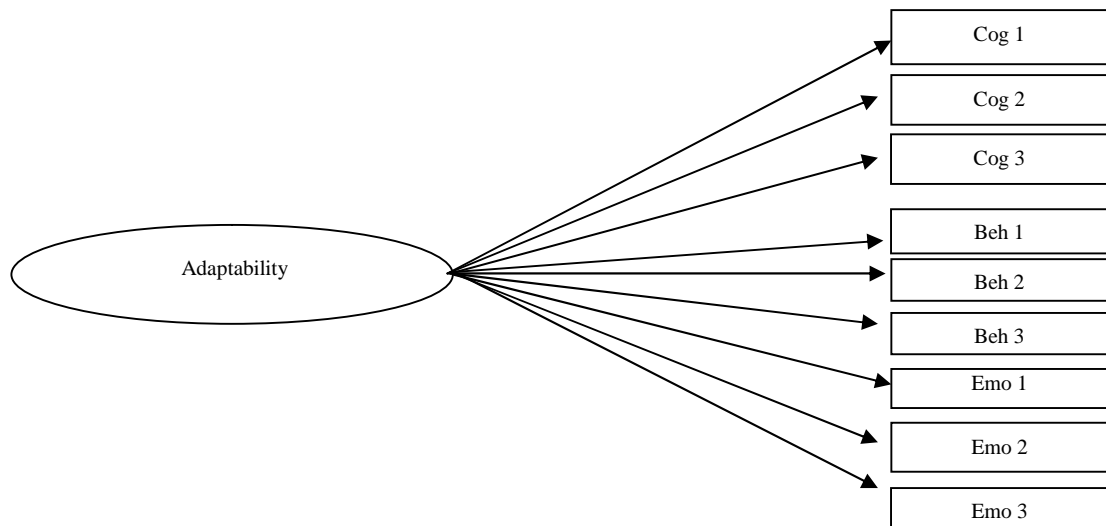
Table 5.2

Factor Loadings Based on the Two-factor Adaptability Solution

	Factor		Communality (h ²)
	1	2	
Adapt 1 (Cog.)	.64	.03	.51
Adapt 2 (Cog.)	.80	-.01	.57
Adapt 3 (Cog.)	.64	.14	.58
Adapt 4 (Beh.)	.80	-.11	.51
Adapt 5 (Beh.)	.65	.10	.55
Adapt 6 (Beh.)	.54	.22	.53
Adapt 7 (Emo.)	-.05	.73	.47
Adapt 8 (Emo.)	.22	.55	.55
Adapt 9 (Emo.)	.09	.66	.54
Kaiser-Meyer	.94		
Bartlett's Sphericity	11266.37		
Eigenvalues	4.99	.77	
% variance	50.37	3.20	Total = 53.57

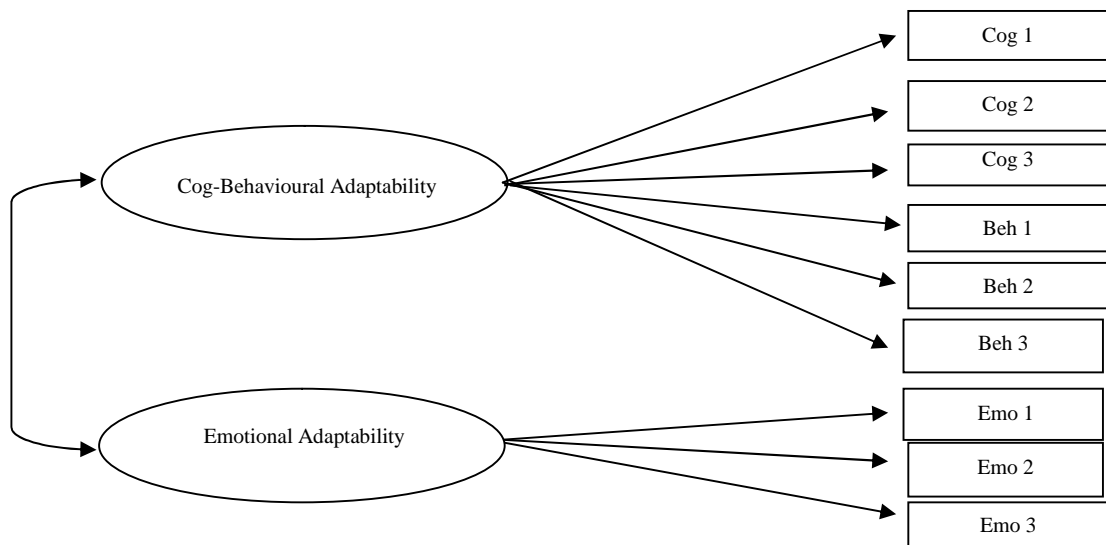
Note. See Appendix A for adaptability items; Extraction method: Principal Axis Factoring; Rotation method: Oblimin with Kaiser normalisation; Cog. = Cognition; Beh. = Behaviour; Emo. = Emotion.

Taken together, it seems one-factor (adaptability; see Figure 5.2) and two-factor (cognitive-behavioural adaptability and emotional adaptability; see Figure 5.3) models are viable to go forward with the confirmatory phase of factor analyses. Further, the joint operation of these two models suggests a third structure to test in CFAs. This was a higher-order model with an adaptability factor subsumed by a first-order cognitive-behavioural factor and a first-order emotional factor (see Figure 5.4).



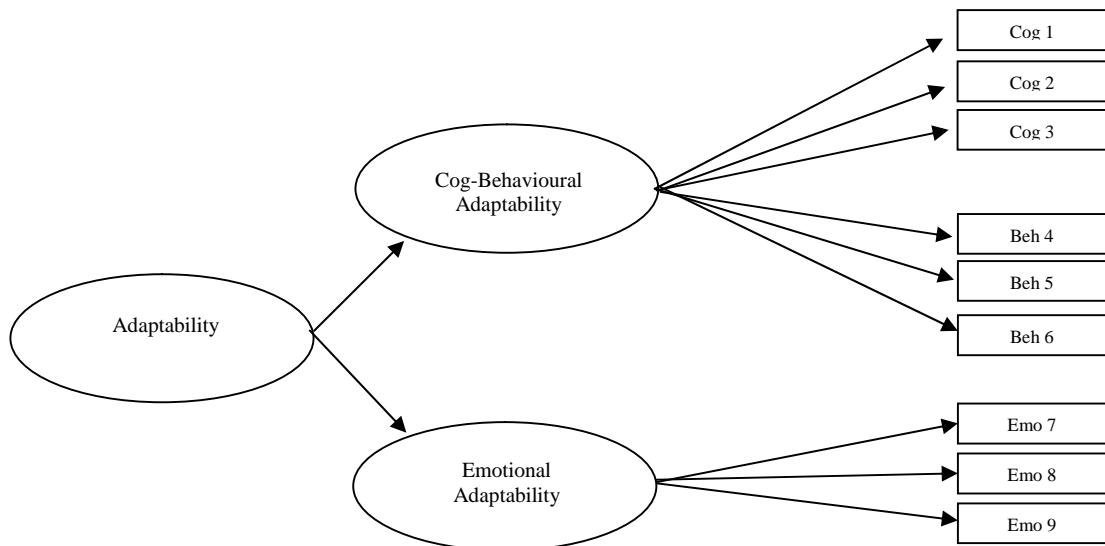
Cog = Cognitive, Beh = Behavioural, Emo = Emotional.

Figure 5.2: One-factor adaptability model (with component indicators).



Cog = Cognitive, Beh = Behavioural, Emo = Emotional.

Figure 5.3: Two-factor adaptability model (with component indicators).



Cog = Cognitive; Beh = Behaviour; Emo = Emotional.

Figure 5.4: Higher-order adaptability model (with component indicators).

5.3 CFA of the Adaptability Scale

The one-factor CFA (see Figure 5.2) yielded a good fit to the data ($\chi^2 = 462.88$, $df = 27$, NNFI = .98, CFI = .98, RMSEA = .08). Factor loading ranges and means are presented in Table 5.3. Hence, as shown in Table 5.3, the range of factor loadings for this one-factor model is acceptable (0.60 - 0.76 [mean = 0.71]). The two-factor CFA also yielded a good fit to the data ($\chi^2 = 232.46$, $df = 26$, NNFI = .99, CFI = .99, RMSEA = .05). Based on difference in χ^2

$$\left. \begin{array}{l} \chi^2 = 462.88 \quad df_1 = 27 \\ \chi^2 = 232.46 \quad df_2 = 26 \end{array} \right\} \left. \begin{array}{l} \chi^2 = 230.42 \\ df = 1 \end{array} \right\} p < .001$$

it is clear that the two-factor solution is a better fit than the one-factor model (see Table 5.3). Importantly, however, the correlation between the two factors is $r = 0.88$, which is high, suggesting a possible integration of the two solutions in the form of a model with a higher-order adaptability factor indicated by a first-order cognitive-behavioural factor and a first-order emotional factor. This higher-order model comprises the same parameters as the two-factor solution but in a different formation ($\chi^2 = 232.46$, $df = 26$, NNFI = .99, CFI = .99, RMSEA = .05). Given these results, subsequent analyses employed a higher-order model comprising two first-order (cognitive-behavioural and emotional) factors.

5.3.1 Descriptive statistics and reliability of adaptability.

Having identified viable adaptability factors, basic descriptive statistics for the scale were then examined. Descriptive analyses comprise a set of procedures assessing scale means and variances (standard deviation), analysis of distributional properties (skewness and kurtosis) and reliability coefficients. Findings are presented in Table 5.4. For the target higher-order model, variances are proportional to their scale. Also, for the higher-order model, the distributional properties approximate a normal distribution as indicated by relatively low skewness and kurtosis values. With focus on the higher-order model, findings in Table 5.4 indicate internal consistency, as indicated by high Cronbach's alpha.

5.3.2 Invariance across key groupings.

As was described in Chapter 4, another important test of psychometric properties involves ascertaining that the factor structure, correlations, variances and residuals are invariant across key subgroups (e.g., language background, gender). If different psychometric properties are evident for different subgroups, then it may not be defensible to pool data to conduct whole-sample analyses. In this study, three invariance tests were conducted: as a function of age (younger vs. older), gender (males vs. females) and language background (ESB vs. NESB).

Invariance tests are typically conducted using CFA to determine how and to what extent the constructs vary as a function of subgroup (see Byrne & Shavelson, 1987; Hattie, 1992; Marsh, 1993). This involves comparing various models in which elements of the factor structure are constrained. Model 1 (the baseline model) has all parameters free across subgroups. Model 2 constrains the factor loadings across subgroups. Model 3 constrains factor loadings and uniquenesses (error) across subgroups. Model 4 constrains factor loadings and factor correlations/variances. Finally, Model 5 constrains factor loadings, factor correlations/variances and uniquenesses (error) across subgroups. Table 5.5 shows results for analyses based on age (younger vs. older), gender (males vs. females) and language background (ESB vs. NESB).

The first invariance test examined the factor structure for younger (11–14 years; junior high) and older participants (15–19 years; senior high). Results indicated that when successive elements of the factor structure are held invariant across age groupings, the fit indices are highly comparable (Chen, 2007; Cheung &

Rensvold, 2002). Further, the application of recommended criteria for evidence of lack of invariance (i.e., no change > 0.01 in CFI, see Cheung & Rensvold, 2002 and no change > 0.015 in RMSEA, see Chen, 2007) indicates that there is relative invariance across all models. This suggests that the factor structure, factor loadings, uniquenesses and factor correlations are parallel for younger youth and older youth. The second multigroup CFA examined the higher and first-order factor structure for males and females. Results indicated that when successive elements of the factor structure are held invariant across gender, the fit indices are predominantly comparable. The third multigroup CFA examined the factor structure for ESB and NESB students. Results indicated that when successive elements of the factor structure are held invariant across language background groupings, the fit indices are highly comparable (Chen, 2007; Cheung & Rensvold, 2002). Taken together, these data suggest that in terms of the adaptability factors and the composition of and relationships among factors, there are no substantial differences as a function of age, gender and language background.

5.3.3 Summary of adaptability psychometric analyses.

Based on EFAs, CFAs and descriptive statistics, findings can be summarised as follows: (a) factor analyses suggested the best model reflected higher-order adaptability factor subsumed by a reliable first-order cognitive-behavioural factor and a reliable first-order emotional factor, (b) the component factors are approximately normally distributed and (c) multigroup CFA indicated invariance in factor structure as a function of age, gender and language background. Taken together, these findings are a basis for the inclusion of adaptability items in the broader set of analyses aimed at examining predictors and consequences of adaptability among young people.

Table 5.3

Time 1: Descriptive Statistics, Cronbach's Alphas and CFA Factor Loadings

	Mean	SD	Kurtosis	Skew	Cronbach's α	CFA Loadings Range (Mean)
One-factor Model						
Adaptability	4.94	.98	.20	-.22	.90	.60 to .76 (.71)
Two-factor Model						
Cognitive-behavioural Adaptability	5.01	.98	.29	-.25	.87	.69 to .77 (.73)
Emotional Adaptability	4.79	1.20	-.06	-.37	.76	.66 to .77 (.72)
Higher-order Model						
Higher-order factor						
Adaptability	4.94	.98	.20	-.22	.90	.89 to .99 (.94)
First-order factors						
Cognitive-behavioural Adaptability	5.01	.98	.29	-.25	.87	.69 to .77 (.73)
Emotional Adaptability	4.79	1.20	-.06	-.37	.76	.66 to .77 (.72)

5.3.4 Descriptive statistics and reliability of the full set of items and scales.

The first analysis of the full set of items and scales involves assessment of descriptive statistics. As described above, descriptive analyses comprise a set of procedures assessing scale means and variances (standard deviation), analysis of distributional properties and reliability coefficients. Findings are presented in Table 5.4. Variances are generally proportional to their scale and the distributional properties of all scales approximate a normal distribution as indicated by relatively low skewness and kurtosis values. Findings in Table 5.4 demonstrate internal consistency, as indicated by high Cronbach's alpha.

Table 5.4

Time 1: Descriptive Statistics, Distributional Properties, Cronbach's Alphas, ESEM Results and Summary of Factor Loadings of Key Factors in the Study (e.g., Adaptability, Personality, Buoyancy, and Well-being)

	Mean	Standard Deviation	Skewness	Kurtosis	Cronbach's	Mean Target Loading	Median Target Loading	Mean Non-target Loading	Median Non-target Loading
PERSONALITY FACTORS									
Extraversion	4.94	1.12	-.34	-.29	.83	.53	.53	.04	.03
Openness	5.07	.93	-.42	.26	.73	.39	.31	.04	.04
Neuroticism	3.75	1.05	-.01	.04	.75	.42	.38	.05	.04
Conscientiousness	4.78	1.17	-.23	-.40	.84	.51	.55	.03	.02
Agreeableness	5.61	.89	-.88	1.22	.80	.52	.54	.07	.04
IMPLICIT THEORY OF ABILITY									
Entity	2.87	1.32	.56	-.22	.81	.60	.60	.05	.04
Incremental	5.63	1.10	-.92	.82	.85	.63	.63	.05	.04
ADAPTABILITY FACTOR									
Adaptability	4.94	.98	-.25	.24	.90	.49	.52	.03	.03
COGNATE FACTOR									
Buoyancy	4.63	1.23	-.43	.01	.78	.62	.62	.06	.04
WELL-BEING OUTCOMES									
General Self-esteem	5.25	1.11	-.67	.51	.78	.45	.53	.07	.03
Satisfaction with Life	4.80	1.20	-.54	.11	.80	.57	.47	.05	.04
Emotional Instability	3.98	1.44	-.07	-.75	.83	.57	.59	.06	.03
Meaning and Purpose	4.84	1.42	-.58	.01	.85	.79	.81	.05	.04

5.3.5 Factor analysis.

Although reliability is an important criterion for factor and scale development, a stronger test is a test of factor dimensionality and integrity in the context of all other items in the instrumentation. As with the Adaptability Scale analyses, factor analysis is used to ascertain the extent to which items load onto their target factor and not on non-target factors. In the present study, two indicators are used to establish this: model fit and factor loadings. It is important to note that although the present study is not multilevel, it is the case that students are clustered within schools. When data are structured in this hierarchical way, there is a risk of conflating units/levels of analysis and biased standard errors as a result (see Goldstein, 2003; Hox, 2010; Raudenbush & Bryk, 2002). Here, adjustments for this clustering of students within schools were addressed by using the 'cluster' command in *Mplus* under the 'complex' method. This procedure adjusts standard errors and so does not bias tests of statistical significance (Muthén & Muthén, 2007).

Factor analysis for the full set of items at Time 1 involved Exploratory Structural Equation Modelling (ESEM). ESEM is the recommended appropriate approach to factor analysis, particularly when using constructs such as personality (e.g., Lang et al., 2011; Marsh et al., 2010). While CFA modelling in SEM provides more parsimonious measurement models and benefits in clearer definition of latent variables (Asparouhov & Muthén, 2009), the use of CFA in SEM may also present disadvantages. For example, the CFA approach requires the researcher to fix many or all cross-loadings at zero and this may not reflect the true factor structure. Further, the practice of fixing to zero loadings in CFA can produce distorted factors because the correlation between factors indicators representing different factors is forced to go through their main factors only, yielding over-estimated factor correlations and distorted structural relations (Asparouhov & Muthén, 2009). MacCallum, Roznowski, and Necowitz (1992) have challenged and assessed these issues critically, and Browne (2001) subsequently suggested to include an exploratory component that allows for a broader set of model alternatives.

ESEM provides access to all the usual SEM parameters as well as handling multiple-group analysis with intercept and mean structures (Asparouhov & Muthén, 2009). In contrast to CFA's stringent requirement that item cross-loadings be fixed to zero, ESEM allows their estimation. Accordingly, to test factor structure of the entire

item set, ESEM was conducted with *Mplus* using the standard criteria of goodness-of-fit indices at Time 1 (i.e., CFI > .90, RMSEA < .05). The *a priori* 13-factor ESEM was first considered; however, this 13-factor model did not appear to represent all 13 constructs as closely as possible. Subsequently, 14- and then 15-factor models were considered in the present study. Although each of the three solutions had merits, the final decision to pursue the 13-factor structure was based on: a) high mean target loadings, b) low mean off-target loadings, c) acceptable fit indices and d) predominantly (92.4%) higher loadings of each item on its target factor than on any other factor. Table 5.4 presents reliability, distributional and factor analytic results.

5.3.6 Invariance of the full set of items across key groupings.

As described in the factor analyses of the adaptability measure, another test of psychometrics involves ensuring that the factor structure, correlations, variances and residuals are invariant across key subgroups (e.g., language background, gender). If different psychometric properties are evident for different subgroups, then it may not be appropriate to pool data to conduct whole-sample analyses. As with adaptability analyses, three invariance tests were conducted: as a function of age (younger vs. older), gender (males vs. females) and language background (ESB vs. NESB).

Consistent with ESEM factor analyses, invariance tests are conducted here using ESEM to determine how and to what extent the constructs vary as a function of subgroup (see Byrne & Shavelson, 1987; Hattie, 1992; Marsh, 1993). Five models were examined to explore the effect of systematically constraining parameters in the factor structure. These five models are the same as those run with adaptability items above: Model 1 (the baseline model) has all parameters free across subgroups, Model 2 constrains the factor loadings across subgroups, Model 3 constrains factor loadings and uniquenesses (error) across subgroups, Model 4 constrains factor loadings and factor correlations/variances and Model 5 constrains factor loadings, factor correlations/variances and uniquenesses (error) across subgroups. Table 5.5 shows results for analyses based on age (younger vs. older), gender (males vs. females) and language background (ESB vs. NESB).

The first set of analyses involved multigroup ESEM as a function of gender. Model 1 provided a good fit to the data ($\chi^2 = 10401.698$, $df = 4132$, RMSEA = .033, CFI = .915). Subsequent analyses (see Table 5.5) indicate that when successive elements of the factor structure are held invariant across age groupings, the fit

indices are highly comparable (Chen, 2007; Cheung & Rensvold, 2002). Further, the application of recommended criteria for evidence of lack of invariance (i.e., no change $> .01$ in CFI, see Cheung & Rensvold, 2002 and no change $> .015$ in RMSEA, see Chen, 2007) indicates that there is relative invariance across all models. This suggests that the factor structure, factor loadings, uniquenesses and factor correlations are parallel for girls as they are for boys.

Table 5.5
Invariance Tests across (a) Males and Females, (b) Younger (11–14 years) and Older (15–19 years) and (c) ESB and NESB

	Chi-square	<i>df</i>	CFI	RMSEA
Model–Invariance Across Gender				
All parameters are free (no invariance)	10401.698	4132	.915	.033
LOADINGS (LOAD) are invariant	10906.392	5042	.921	.029
LOAD and CORRELATIONS (CORR) are invariant	13514.749	5147	.910	.035
LOAD and UNIQUENESSES (UNIQUE) are invariant	14153.879	5121	.903	.036
LOAD, CORR and UNIQUE are invariant	14501.586	5226	.900	.036
Model–Invariance Across Age				
All parameters are free (no invariance)	9686.663	4132	.924	.031
LOADINGS (LOAD) are invariant	12735.483	5042	.916	.033
LOAD and CORRELATIONS (CORR) are invariant	13514.749	5147	.915	.033
LOAD and UNIQUENESSES (UNIQUE) are invariant	12940.883	5121	.915	.033
LOAD, CORR and UNIQUE are invariant	13171.121	5226	.914	.033
Model–Invariance Across Language Background				
All parameters are free (no invariance)	10394.098	4132	.917	.033
LOADINGS (LOAD) are invariant	12988.869	5042	.914	.034
LOAD and CORRELATIONS (CORR) are invariant	13148.768	5147	.913	.034
LOAD and UNIQUENESSES (UNIQUE) are invariant	13225.290	5121	.912	.034
LOAD, CORR and UNIQUE are invariant	13384.073	5226	.912	.034

The next set of multigroup ESEMs assessed the factor structure for age (younger participants, 11–14 years, junior high vs. older participants, 15–19 years, senior high) in which all the parameters were set to be freely estimated. This model, also, provided a good fit to the data ($\chi^2 = 9686.663$, $df = 4132$, $RMSEA = .03$, $CFI = .92$). While the goodness-of-fit demonstrate an excellent fit between the data and the model, it is necessary to test for invariance between the two groupings (younger vs. older) when parameters are systematically constrained. Results are presented in Table 5.5, indicating that the fit indices are comparable (Chen, 2007; Cheung & Rensvold, 2002). Thus, factor solutions are comparable for younger and older high school students.

The final set of multigroup ESEMs assessed factor structure as a function of language background. This model also provided a good fit to the statistics ($\chi^2 = 10394.098$, $df = 4132$, $RMSEA = .03$, $CFI = .92$). Findings are presented in Table 5.5. While the unconstrained model fits the data well, it is important to test invariance between the two language background groupings (ESB and NESB). Again, this involves evaluating the comparative fit indices for four additional models in which consecutive components of the factor structure were constrained. Results in Table 5.5 indicate that in each consecutive and more stringent model, the fit indices are quite comparable (Chen, 2007; Cheung & Rensvold, 2002). These indicate that the factor structure is much the same for the two language background groupings in this study.

In sum, the fit indices supported the theorised prediction that factor solutions are comparable for boys and girls, across different age groupings and language background. These results provide justification for pooling data for whole-sample analyses.

5.3.7 Developing composite scores.

Based on these psychometric properties, Time 1 analyses were conducted using composite scores. In Chapter 4, it was described that problems may arise when there are many parameters to estimate relative to the size of the sample (Holmes-Smith & Rowe, 1994). Also discussed in Method, composite score-based analyses address this issue (Holmes-Smith & Rowe, 1994; Rowe & Hill, 1998). This approach reduces the number of estimated parameters through the use of confirmatory one-factor congeneric models that produce a weighted composite score for each factor.

This composite score replaces the multiple items used as indicators for the latent factor. Hence, composite scores can be particularly useful as they take into account item error and how much each item contributes to the latent factor (Rowe, 2002, 2006). These composite scores were the basis of correlation and regression analyses in central modelling.

5.3.8 Correlations among factors.

Correlation analysis provides a first insight into relationships between adaptability and its predictors and consequences. Correlations among factors are presented in Table 5.6. Because the present study is centrally concerned with the relationship between adaptability and its predictors and consequences, these correlations will be reported in detail; however, relationships among the entire set of factors and covariates are readily seen in Table 5.6. Composite scores were the basis of correlation analyses.

Correlations, in Table 5.6, show that adaptability is negatively correlated with age ($r = -.07, p < .05$), neuroticism ($r = -.34, p < .001$) and entity beliefs ($r = -.23, p < .001$). Further, the correlation matrix shows that adaptability is positively correlated with ability ($r = .27, p < .001$), extraversion ($r = .17, p < .001$), agreeableness ($r = .44, p < .001$), openness ($r = .34, p < .001$), conscientiousness ($r = .38, p < .001$) and incremental beliefs ($r = .40, p < .001$). Results also show that adaptability is positively correlated with self-esteem ($r = .62, p < .001$), life satisfaction ($r = .53, p < .001$) and meaning and purpose ($r = .48, p < .001$). Adaptability correlates negatively with emotional instability ($r = -.28, p < .001$).

In summary, based on the correlation results, there appears to be preliminary support for the hypothesised relationship between adaptability and its hypothesised predictors and consequences. Importantly, however, the true extent to which this is the case is more appropriately examined through analyses that control for shared variance among factors in the model. Then we can ascertain unique variance attributable to adaptability. This is done through SEM where in the one analytic model, predictive parameters between adaptability and its predictors and consequences are modelled while controlling for shared variance with buoyancy, socio-demographic covariates and the outcome factors. These SEM analyses are now the focus of this chapter.

5.3.9 SEM.

SEM in the present investigation included all outcomes in the one model (thereby controlling for shared variance among outcomes), adaptability and buoyancy (correlated, thereby controlling for shared variance between these two) predicting these outcome variables, personality and implicit theories (correlated) predicting adaptability while controlling for the role of socio-demographics and prior achievement on all factors in the model (thereby controlling for variance in the model attributable to gender, language background, SES, etc.). In line with other analyses, this SEM was based on composite scores and the hierarchical clustering of students within schools is accounted through the 'cluster' command in *Mplus*. The full hypothesised model is presented in Figure 2.7.

This multivariate model was estimated, yielding a perfect model fit to the data because it is a saturated 'fully forward' model in which all the possible paths from predictors to (predicted) outcomes were freed or estimated (CFI = 1.00, RMSEA = 0.00).

All standardised parameter estimates are presented in Table 5.7. All significant substantive parameter estimates at $p < .05$, $p < .01$, $p < .001$ are presented in Figure 5.5. Here, only significant adaptability parameters are reported; all covariate and non-significant adaptability effects are found in Table 5.7.

Adaptability is positively and significantly predicted by prior achievement (literacy and numeracy) ($\beta = .19, p < .001$), extraversion ($\beta = .05, p < .05$), agreeableness ($\beta = .15, p < .01$), openness ($\beta = .15, p < .001$), conscientiousness ($\beta = .14, p < .001$), entity beliefs ($\beta = .14, p < .001$) and incremental beliefs ($\beta = .35, p < .001$). Adaptability is negatively predicted by neuroticism ($\beta = -.24, p < .001$). Adaptability positively and significantly predicts general self-esteem ($\beta = .31, p < .001$), satisfaction with life ($\beta = .29, p < .001$) and meaning and purpose ($\beta = .39, p < .001$).

Table 5.6

Time 1: CFA Factor Correlations for Adaptability, Socio-demographics, Prior Achievement, Personality, Buoyancy and Well-

	PRESAGE FACTORS											KEYFACTORS		OUTCOMES					
	AGE	NESB	GENDER	SES	ACH	EXT	AGR	NEU	OPN	CSC	ENT	INC	ADAPT	BUOY	GEN	SAT	INSTAB	MP	
AGE	.05	.02	-.08	.10***	-.11***	-.08**	.17***	-.12***	-.07**	.13**	-.15***	-.07*	-.14**	-.13***	-.12***	.11***	.02		
NESB			-.02	-.07	.05	-.17***	-.02	.07*	-.02	.01	.00	.02	.02	.01	-.03	-.03	.08**	.11***	
MALES				-.12	-.01	-.12***	-.22***	-.14***	-.10**	-.04	.12*	-.02	.01	.16***	-.01	.01	-.16***	.02	
SES					.11**	.10**	-.01	.01	.04	-.03	-.04	-.01	.00	-.03	.03	.00	.02	-.11**	
ACH						-.00	.15***	-.05***	.17***	.15***	-.11**	.03	.27***	.13***	.39***	.13***	-.05***	.10**	
EXT							.22***	-.23***	.24***	.03	-.09***	.06	.17***	.18***	.14***	.21***	-.21***	.05	
AGR								-.24***	.45***	.48***	-.38***	.36***	.44***	.24***	.42***	.34***	-.09**	.30***	
NEU									-.11***	-.15***	.11**	-.06*	-.34***	-.51***	-.27***	-.31***	.72***	-.03	
OPN										.21	-.22***	.17***	.34***	.22***	.36***	.18***	-.11***	.22***	
CSC												-.22***	.28***	.38***	.25***	.42***	.35***	-.09***	.27***
ENT													-.23***	-.08**	-.18***	-.15***	.14***	-.15**	
INC														.40***	.23***	.34***	.37***	-.01	.32***
ADAPT															.61***	.62***	.53***	-.28***	.48***
BUOY																.45***	.43***	-.51***	.29***
GEN																.57***	-.21***	.32***	
SAT																	-.21***	.41***	
INSTAB																		.03	
MP																			

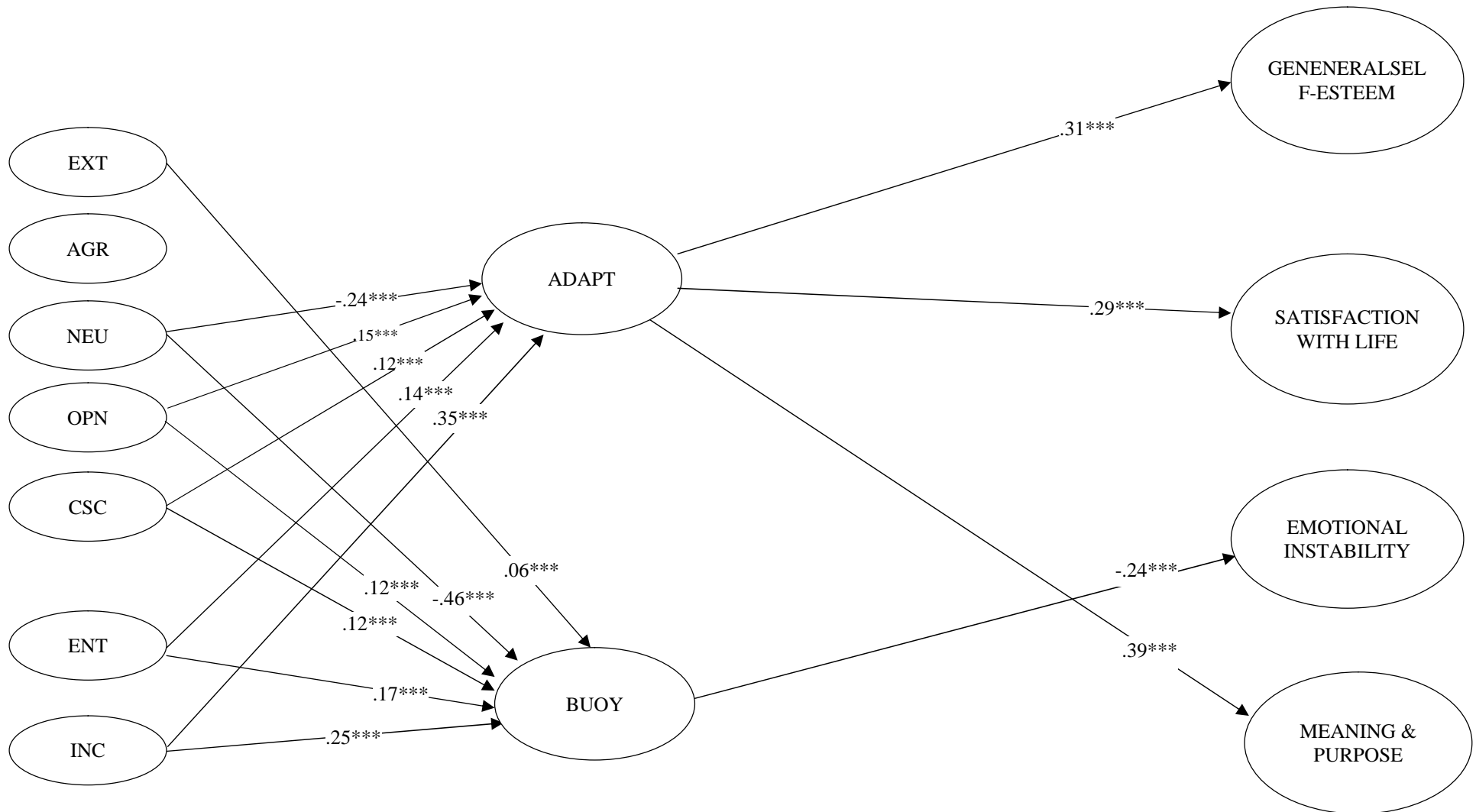
Note. NESB = Non-English Speaking Background, SES = Socio-economic Status, ACH = Prior Achievement, T1 = Time 1, EXT = Extraversion, AGR = Agreeableness, NEU = Neuroticism, OPN = Openness, CSC = Conscientiousness, ENT = Entity, INC = Incremental, ADAPT = Adaptability, BUOY = Buoyancy, GEN = General Self-esteem, SAT = Satisfaction with Life, INSTB = Emotional Instability, MP = Meaning and Purpose; * $p < .05$, ** $p < .01$, *** $p < .001$.

Buoyancy, as the selected cognate factor, was also included in this model. Results show that buoyancy positively and significantly predicts general self-esteem ($\beta = .09, p < .05$) and satisfaction with life ($\beta = .09, p < .01$). It negatively and significantly predicts emotional instability ($\beta = -.24, p < .001$). Comparing these significant effects and standardised beta parameters with those of adaptability, it is evident that the two explain unique variance and thus cannot be deemed as assessing the same construct.

In summary, multivariate modelling that comprised the appropriate controls for shared variance (among predictors, covariates and outcome variables) and adjustments for the clustering of students within schools provided support for the hypothesised links between adaptability and its predictors and consequences. Indeed, these effects appear to be different from those of buoyancy, providing preliminary support for discriminant validity.

5.4 Revisiting Hypotheses and Chapter Summary

The present results supported hypothesis 1a: that the instrumentation (including the Adaptability Scale) comprised normally distributed and reliable (i.e., internally consistent) scales. Factor analyses (hypothesis 1b) supported the hypothesised factor structure of the instrumentation (including the Adaptability Scale), as verified by acceptable goodness-of-fit indices, configuration of factor loadings, variances, covariances, and uniquenesses. Hypothesis 1c regarding discriminant and convergent validity was supported by higher correlations between conceptually related scales and lower or negative correlations between conceptually unrelated or inverse scales. Hypothesis 2a was supported in that personality factors (e.g., extraversion, agreeableness, openness, and conscientiousness) and incremental beliefs positively predicted adaptability. Conversely, neuroticism negatively predicted adaptability after controlling for socio-demographics and prior achievement. Consistent with hypothesis 2b, adaptability positively predicted psychological well-being outcomes and negatively predicted emotional instability after controlling for socio-demographics and prior achievement. Hypothesis 2c was supported in that adaptability significantly predicted psychological well-being outcomes beyond variance attributable to buoyancy after controlling for socio-demographics and prior achievement.



EXT = Extraversion; AGR = Agreeableness; NEU = Neuroticism; OPN = Openness; CSC = Conscientiousness; ENT = Entity; INC = Incremental, ADAPT = Adaptability, BUOY = Buoyancy; *** $p < .001$.

Figure 5.5: Time 1—standardised beta parameters significant at $p < .001$ (Table 5.7 provides all parameters).

Table 5.7

Time 1: SEM Results and Beta Coefficients for Personality, Implicit Theory, Adaptability, Buoyancy and Well-being

SOCIO-DEMOGRAPHICS	PERSONALITY					IMPLICIT THEORY		ADAPT	COGNATE FACTOR	WELL-BEING OUTCOMES			
	EXT	OPN	NEU	CSC	AGR	ENT	INC	ADAPT	BUOY	GEN	SAT	INSTAB	MEAN
Age	-.09***	-.14***	.18***	-.09***	-.09***	.14***	-.16***	.03	-.03	-.08***	-.03	-.03	.06*
NESB	-.17***	-.02	.06*	.00	-.04	.00	.03	.03	.04	-.05***	-.02	.03**	.09***
Gender	-.11***	-.10***	-.14***	-.05	-.23***	.12**	-.02	.03	.11**	-.02	-.00	-.04*	.04
SES	.07**	.00	.02	-.07*	-.07	.00	-.03	-.00	-.02	-.00	.00	.01	-.09***
ACHIEVEMENT	.01	.18***	-.07***	.17***	.17***	-.12***	.04	.19***	.09***	.26***	.02	.01	-.04
PREDICTORS													
PERSONALITY													
Extraversion (EXT)								.05*	.06***	.00	.11***	-.05*	.01
Agreeableness (AGR)								.15**	-.02	.06*	.06	.13***	.08**
Neuroticism (NEU)								-.24***	-.46***	-.04	-.10**	.60***	.17***
Openness (OPN)								.15***	.13***	.11***	-.05	-.03	.05*
Conscientiousness (CSC)								.14***	.12***	.15***	.13***	.00	.06**
IMPLICIT THEORY OF ABILITY													
Entity (ENT)								.14***	.17***	.12***	.14***	.19***	.04
Incremental (INC)								.35***	.25***	.16***	.24***	.14***	.14**
ADAPTABILITY FACTOR													
Adaptability (ADAPT)										.31***	.29***	.02	.39***
COGNATE FACTOR													
Buoyancy (BUOY)										.09*	.09**	-.24***	.07
PERCENTAGE VARIANCE:													
Explained (R ²)	6%	9%	6%	6%	4%	5%	3%	42%	38%	52%	38%*	58%	31%

Note 1. SES = Socio-economic Status, EXT = Extraversion, AGR = Agreeableness, NEU = Neuroticism, OPN = Openness, CSC = Conscientiousness, ENT = Entity, INC = Incremental, ADAPT = Adaptability, BUOY = Buoyancy, GEN = General Self-esteem, SAT = Satisfaction with Life, INSTAB = Emotional Instability, MP = Meaning and Purpose; * $p < .05$, ** $p < .01$, *** $p < .001$

Note 2. Gender (female = 1, male = 2); Language background (1 = English speaking background or ESB; 2 = Non-English speaking background or NESB).

Taken together, the six stages of analysis provided a good basis for addressing measurement and substantive hypotheses and research questions relevant to adaptability. The first stage of data analysis suggested an approach to operationalising the adaptability construct by way of higher and first-order psychometrics. Having identified an appropriate adaptability structure to take forward into central analyses, subsequent stages then incorporated all items and factors in analyses. The second stage of analyses demonstrated that all factors are reliable and approximately normally distributed. The third stage suggested that central measurement properties for the entire item and factor set were well supported by the data. The fourth stage established measurement invariance across key subgroups, thereby justifying pooled whole-sample modelling. The fifth (correlational) stage provided preliminary support for hypothesised relationships between adaptability and its predictors and consequences. The final phase explored the hypothesised substantive model with appropriate variance controls and confirmed the process of predictors on adaptability and adaptability on outcomes. The next chapter seeks to replicate these findings using Time 2 data. Then, the following chapter examines the longitudinal profile of adaptability.

Chapter 6: Time 2, Cross-sectional Results

6.1 Introduction

Following Time 1 data analysis, it is important to confirm the stability of the hypothesised model. Accordingly, the present chapter examines the model at Time 2 (one year later) among students in the same schools and year levels as in Time 1. The longitudinal model assessing the matched Time 1 and Time 2 data will follow this chapter. The present chapter aligns with the Time 1 analysis chapter and again examines the factor structure of and relationship between the covariate factors (e.g., gender, age, SES, language background, prior achievement), presage factors (personality factors, implicit theory of ability), adaptability and buoyancy and outcome factors (general self-esteem, emotional instability, life satisfaction and meaning and purpose).

Similar to Time 1, this chapter includes five stages of data analysis. The first stage conducts psychometric analyses of the adaptability measurement for the second time. If demonstrating satisfactory psychometric qualities, the adaptability items are then brought into the full set of items to form the bases of central analyses. The second stage is a preliminary assessment of the psychometric characteristics of central constructs (e.g., adaptability, self-esteem, life satisfaction) by assessing internal consistency (reliability) and distributional characteristics (e.g., skewness, kurtosis). The third stage of analyses evaluates measurement features of the total set of scales using ESEM. The fourth stage develops correlations among all variables. The fifth and final stage of analyses in this chapter explores the substantive research model that evaluates the predictors and consequences of adaptability while controlling for various socio-demographic and achievement covariates. The results provided in the current chapter are based on Time 2 data ($N = 2,293$ students from nine high schools, years 7 to 12).

6.2 Time 2 Descriptive and Reliability Statistics

6.2.1 Analysis of the Adaptability Scale.

Before conducting central modelling, it was considered important to again confirm the hypothesised adaptability construct. This involved CFA focused specifically on the adaptability items. The CFA of the Adaptability Scale based on a one-factor CFA (see Figure 5.2) produced a good fit to the data ($\chi^2 = 426.88$, $df = 27$,

NNFI = .98, CFI = .98, RMSEA = .08). Factor loading ranges and means are presented in Table 6.1. As shown in Table 6.1, the range of factor loadings for this one-factor model is acceptable (0.60 - 0.76 [mean 0.71]). It will be recalled that a two-factor model was also proposed, each comprised of cognitive-behavioural and emotional items. This two-factor CFA model also provided a good fit to the data ($\chi^2 = 231.46$, $df = 26$, NNFI = .99, CFI = .99, RMSEA = .05). The difference in χ^2

$$\left. \begin{array}{l} \chi^2_1 = 426.88 \quad df_1 = 27 \\ \chi^2_2 = 231.46 \quad df_2 = 26 \end{array} \right\} \left. \begin{array}{l} \chi^2 = 195.42 \\ df = 1 \end{array} \right\} p < .001$$

proved that the two-factor model was a better fit than the one-factor solution (see Table 6.1). Notably, the high correlation between the two factors ($r = 0.88$), may potentially lead to suppression and multicollinearity effect issues as the factors in a predictive solution is employed (Cohen, Cohen, West, & Aiken, 2003). This would possibly suggest the need for the integration of the two models in the form of a solution with a higher-order adaptability factor stipulated by first-order cognitive-behavioural and first-order emotional factors. The suggested higher-order solution consists of the same parameters as the two-factor model but in a different configuration that will not lead to a multicollinearity issue that the two-factor model was expected to ($\chi^2 = 231.46$, $df = 26$, NNFI = 0.99, CFI = .99, RMSEA = .05). Based on these findings and consistent with Time 1 data, subsequent modelling employed this higher-order adaptability model including one overarching factor with three (cognitive, behavioural and emotional) indicator factors.

Basic descriptive statistics for the Adaptability Scale were examined. Descriptive analyses comprise a set of procedures assessing scale means and variances (standard deviation), analysis of distributional properties (skewness and kurtosis) and reliability coefficients. Findings are presented in Table 6.2. For the target higher-order model, variances are proportional to their scale. Reliability findings suggest internal consistency, as indicated by Cronbach's alpha values over .70 (see Anastasi & Urbina, 1997; Nunnally & Bernstein, 1994; Sattler, 2008).

Consistent with Time 1 analyses of the Adaptability Scale, due to the high correlation between first-order components and to avoid collinearity and related suppression effects, the one adaptability construct with cognitive, behavioural and emotional indicator factors was proposed in this study. Factor analyses suggested the best model reflected a reliable and normally distributed higher-order adaptability

factor subsumed by component cognitive, behavioural and emotional factors. These findings form the foundation and rationale for the inclusion of adaptability items in the broader set of analyses aimed at examining predictors and consequences of adaptability among youth.

6.2.2 Descriptive statistics and reliability of full instrument.

The first analysis of the full set of Time 2 items and scales involves assessment of descriptive statistics. As described above, descriptive analyses consist of a set of measures evaluating scale means and variances (standard deviation), analysis of distributional properties and reliability coefficients. These findings are presented in Table 6.2. Variances are generally proportional to their scale and the distributional properties of all scales are near normal distribution as indicated by relatively low skewness and kurtosis values. Data in Table 6.2 show internal consistency, as indicated by a Cronbach's alpha greater than .70.

Table 6.1

Time 2: Descriptive Statistics, Cronbach's Alphas and CFA Factor Loadings

	Mean	SD	Kurtosis	Skew	Cronbach's α	CFA Loadings Range (Mean)
One-factor Model						
Adaptability	4.94	.98	.20	-.22	.90	.60 to .76 (.71)
Two-factor Model						
Cognitive-behavioural Adaptability	5.01	.98	.29	-.25	.87	.69 to .77 (.73)
Emotional Adaptability	4.79	1.20	-.06	-.37	.76	.66 to .77 (.72)
Higher-order Model						
Higher-order Factor						
Adaptability	4.94	.98	.20	-.22	.90	.89 to .99 (.94)
First-order Factors						
Cognitive-behavioural Adaptability	5.01	.98	.29	-.25	.87	.69 to .77 (.73)
Emotional Adaptability	4.79	1.20	-.06	-.37	.76	.66 to .77 (.72)

6.2.3 Factor analysis of full instrument.

Consistent with Time 1, factor analysis for the full set of items at Time 2 involved ESEM. As earlier described in further detail, particularly when using constructs such as personality, it has been recommended that ESEM is an appropriate approach to factor analysis (e.g., Lang et al., 2011; Marsh et al., 2010). While CFA in SEM offers advantages in clearer definition of latent variables and more parsimonious measurement models (Asparouhov & Muthén, 2009), the use of CFA in SEM also may have disadvantages. For example, the CFA approach requires the researcher to fix many or all cross-loadings at zero and this may not reflect the true factor structure. Further, the practice of fixing to zero loadings in CFA can produce distorted factors because the correlation between factor indicators representing different factors is forced to go through their main factors only, yielding potentially over-estimated factor correlations and distorted structural relations (Asparouhov & Muthén, 2009). A critique of such issues is put forward by MacCallum, Roznowski, and Necowitz (1992), and Browne (2001) subsequently suggests including an exploratory component that allows for a broader set of model alternatives. Accordingly, to test factor structure of the entire item set, ESEM was conducted with Mplus using the same criteria of goodness-of-fit indices at Time 2 (i.e., CFI > .90, RMSEA < .05). The *a priori* 13-factor ESEM was initially considered; however, for completeness, 14- and then 15-factor models were also assessed. Despite the fact that all three models had merit, according to: a) low mean off-target loadings, b) acceptable fit indices, c) high mean target loadings, and d) predominantly (85.4%) higher loadings of each item on its target factor than on any other factor, the 13-factor model was deemed a more appropriate structure. Distributional, reliability, and factor analytic results are presented in Table 6.2.

6.2.4 Developing composite scores.

Based on these psychometric properties, analyses followed Time 1 procedures by forming composite scores. As described in Chapter 4, there can be problems when there are many parameters to estimate relative to the size of the sample, leading to instability in parameter estimates (Holmes-Smith & Rowe, 1994). Also discussed in method, composite score-based analyses address this issue (Holmes-Smith & Rowe, 1994; Rowe & Hill, 1998). This approach reduces the number of estimated parameters through confirmatory one-factor congeneric models

that produce a weighted composite score for each factor. This composite score replaces the multiple items used as indicators for the latent factor. Hence, composite scores can be particularly useful as they take into account item error and how much each item contributes to the latent factor (Rowe, 2002, 2006). These composite scores were the basis of correlation and regression analyses in central modelling.

6.2.5 Correlations among factors.

Correlations among Time 2 factors are presented in Table 6.3. Consistent with Time 1, these correlations are among composite scores that have been purged of unreliability. Because the main focus of the current research is on the relationship between adaptability and its predictors and consequences, these correlations are reported here in detail. Findings demonstrate that adaptability is negatively correlated with age ($r = -.15, p < .001$), neuroticism ($r = -.33, p < .001$) and entity beliefs ($r = -.30, p < .001$). Further, adaptability is positively correlated with ability ($r = 0.23, p < .001$), extraversion ($r = .21, p < .001$), agreeableness ($r = .40, p < .001$), openness ($r = .30, p < .001$), conscientiousness ($r = .41, p < .001$) and incremental beliefs ($r = .42, p < .001$). Results also show that adaptability is positively correlated with self-esteem ($r = .64, p < .001$), life satisfaction ($r = .55, p < .001$) and meaning and purpose ($r = .49, p < .001$). Adaptability correlates negatively with emotional instability ($r = -.29, p < .001$). Thus, correlation analyses support the hypothesised relationships among adaptability and its hypothesised predictors and outcomes. Notably, however, the extent to which this is the case is more appropriately examined through analyses that control for shared variance among factors in the model. In doing so, the unique variance related to adaptability can be established. This is done through SEM where the parameters between adaptability and its predictors and consequences are modelled simultaneously (while controlling for shared variance with buoyancy and socio-demographic covariates).

Table 6.2

Time 2: Descriptive Statistics, Distributional Properties, Cronbach's Alphas, ESEM Results and Summary of Factor Loadings of Key Factors in the Study (e.g., Adaptability, Personality, Buoyancy, and Well-being)

	Mean	Standard Deviation	Skewness	Kurtosis	Cronbach's	MeanTarget Loading	Median Target Loading	Mean Non- target Loading	Median Non- target Loading
PERSONALITY									
Extraversion	4.97	1.09	-.34	-.24	.82	.46	.45	.05	.03
Openness	5.08	.94	-.38	.13	.74	.61	.59	.05	.04
Neuroticism	3.72	1.07	-.05	.13	.75	.40	.30	.05	.05
Conscientiousness	4.89	1.15	-.36	-.15	.84	.49	.52	.03	.03
Agreeableness	5.62	.93	-.93	1.12	.80	.49	.51	.07	.04
IMPLICIT THEORY OF ABILITY									
Entity	2.75	1.31	.53	-.36	.80	.56	.56	.06	.06
Incremental	5.74	1.09	-1.01	1.18	.85	.61	.64	.05	.04
ADAPTABILITY									
Adaptability	5.07	.98	-.27	.21	.90	.47	.48	.04	.03
COGNATE FACTOR									
Buoyancy	4.71	1.21	-.29	-.14	.75	.48	.47	.07	.04
WELL-BEING OUTCOMES									
General Self-esteem	5.29	1.08	-.67	.46	.75	.59	.60	.08	.06
Satisfaction with Life	4.91	1.16	-.53	.23	.78	.55	.50	.05	.04
Emotional Instability	3.91	1.46	-.03	-.71	.84	.46	.48	.07	.04
Meaning and Purpose	5.08	1.33	-.73	.48	.84	.77	.77	.05	.03

Table 6.3

Time 2: CFA Factor Correlations for Adaptability, Socio-demographics, Prior Achievement, Personality, Buoyancy and Well-being

	PRESAGE FACTORS												KEYFACTORS		OUTCOMES				
	AGE	NESB	GENDER	SES	ACH	EXT	AGR	NEU	OPN	CSC	ENT	INC	ADAPT	BUOY	GEN	SAT	INSTAB	MP	
AGE	.01		.05	-.01	.01	-.10***	-.16***	.16***	-.19***	-.12*	.17**	-.25***	-.15***	-.16**	-.17***	-.19***	.12***	-.09**	
NESB			-.01	-.05***	.02	-.16***	-.01	.03	-.01	.02	-.03*	.00	.04	.02	-.01	-.05*	.06***	.10***	
GENDER				-.30*	-.08	-.12*	-.29***	-.08	-.14***	-.10*	.18***	-.05	-.05	.09*	-.12***	-.04	-.10*	.03	
SES					.19***	.11**	.05	.05	.07	-.05	-.09*	-.01	.01	-.05	.04	.06***	.02	-.11*	
ACH						-.07**	.20***	-.06***	.17***	.18***	-.20***	.09*	.23***	.09*	.38***	.21***	-.02	.06	
EXT							.22***	-.26***	.23***	.03	-.07**	.10***	.21***	.21***	.20***	.25***	-.27***	.10***	
AGR								-.28***	.42***	.45***	-.41***	.39***	.40***	.20***	.41***	.37***	-.09**	.32***	
NEU									-.13***	-.15***	.16***	-.14***	-.33***	-.50***	-.25***	-.32***	.70***	-.11***	
OPN										.24***	-.21***	.21***	.30***	.21***	.33***	.23***	-.13***	.28***	
CSC											-.18***	.24***	.41***	.29***	.43***	.37***	-.09***	.28***	
ENT												-.64***	-.30***	-.09	-.23***	-.24***	.16***	-.17***	
INC													.42***	.24***	.39***	.40***	-.08*	.30***	
ADAPT														.62***	.64***	.55***	-.29***	.49***	
BUOY															.48***	.43***	-.56***	.26***	
GEN															.68***	-.25***		.38***	
SAT																	-.26***	.44***	
INSTAB																			-.04
MP																			

Note 1. SES = Socio-economic Status, ACH = Prior Achievement, EXT = Extraversion, AGR = Agreeableness, NEU = Neuroticism, OPN = Openness, CSC = Conscientiousness, ENT = Entity, INC = Incremental, ADAPT = Adaptability, BUOY = Buoyancy, GEN = General Self-esteem, SAT = Satisfaction with Life, INSTAB = Emotional Instability, MP = Meaning and Purpose; * $p < .05$, ** $p < .01$, *** $p < .001$.

Note 2. Gender (female = 1, male = 2); Language Background (1 = English speaking background or ESB; 2 = Non-English speaking background or NESB).

6.2.6 SEM.

The preliminary correlation analyses presented above support the hypothesised relationships between adaptability and predictors and consequences. However, the true nature of the unique role of adaptability cannot be established since correlations do not control for shared variance with other factors. The SEM analyses, in line with other central analyses, were based on composite scores. Also, as described in method, the hierarchical clustering of students within schools is accounted for through the ‘cluster’ command in *Mplus*. The full hypothesised model is presented in Figure 2.7. This multivariate model was estimated, producing a perfect model fit to the data because it is a saturated fully forward model (CFI = 1.00, RMSEA = 0.00). All standardised parameter estimates are presented in Table 6.4. All significant substantive parameter estimates at $p < .05$, $p < .01$, $p < .001$ are presented in Figure 6.1. In the following section, only significant adaptability parameters are reported—all covariate and non-significant adaptability effects are found in Table 6.4.

Adaptability is positively and significantly predicted by academic ability (literacy and numeracy) ($\beta = .11, p < .001$), extraversion ($\beta = .11, p < .001$), conscientiousness ($\beta = .27, p < .001$), openness ($\beta = .13, p < .05$) and incremental beliefs ($\beta = .33, p < .001$). Adaptability is negatively predicted by neuroticism ($\beta = -.27, p < .001$). Adaptability positively and significantly predicts general self-esteem ($\beta = .36, p < .001$), satisfaction with life ($\beta = .26, p < .001$) and meaning and purpose ($\beta = .40, p < .001$).

Buoyancy, as the selected cognate factor to control for, was also included in this model. Results show that buoyancy positively and significantly predicts general self-esteem ($\beta = .15, p < .001$) and satisfaction with life ($\beta = .09, p < .001$). It negatively and significantly predicts emotional instability ($\beta = -.31, p < .001$). Comparing these significant effects and standardised beta parameters with those of adaptability, it is evident that the two explain unique variance and thus cannot be deemed as assessing the same construct.

In summary, multivariate modelling that comprised the appropriate controls for shared variance (among predictors, covariates and outcome variables) and adjustments for the clustering of students within schools provided support for the hypothesised links between adaptability and its predictors and consequences. Indeed,

these effects appear to be different from those of buoyancy, providing preliminary support for discriminant validity.

6.2.7 Common significant paths across Time 1 and Time 2.

Figure 6.1 represented the significant standardised beta paths relevant to adaptability and its cognate, covariates and outcome parameters across Time 2 only.

Figure 6.2 represents the significant common standardised beta paths relevant to adaptability across Time 1 and Time 2. The salient points are as follows.

Neuroticism, conscientiousness and incremental factors significantly ($p < .001$) predict adaptability. Extraversion, conscientiousness, neuroticism, entity and incremental factors significantly ($p < .001$) predict buoyancy in both time phases. Adaptability also significantly ($p < .001$) predicts general self-esteem, satisfaction with life and meaning and purpose. Buoyancy significantly ($p < .001$) predicts emotional instability in both phases.

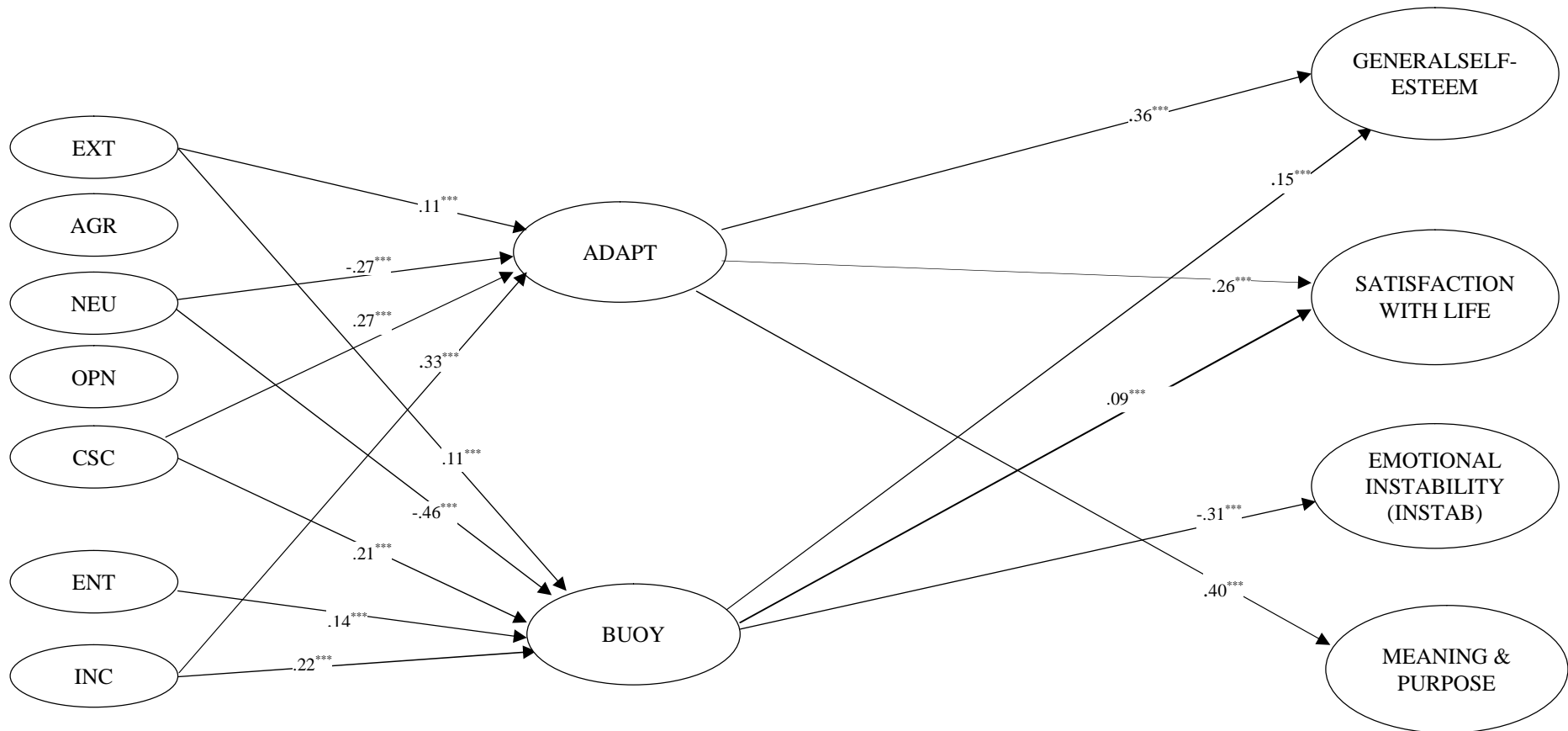
There are also factors that are common across the three models at other levels of statistical significance: agreeableness and entity significantly ($p < .01$) predict adaptability in Time 1 only and openness significantly ($p < .05$) predicts buoyancy in Time 2 only. Further, extraversion predicts adaptability at $p < .05$ in Time 1, whereas in Time 2 it predicts adaptability at $p < .001$. Similarly, openness predicts adaptability at $p < .001$ in Time 1 and at $p < .05$ in Time 2. Buoyancy, on the other hand, predicts general self-esteem at $p < .05$ in Time 1 but at $p < .001$ in Time 2; and it predicts satisfaction with life at $p < .01$ in Time 1 and $p < .001$ in Time 2.

Table 6.4

Time 2: SEM Results and Beta Coefficients for Personality, Implicit Theory, Adaptability, Buoyancy and Well-being

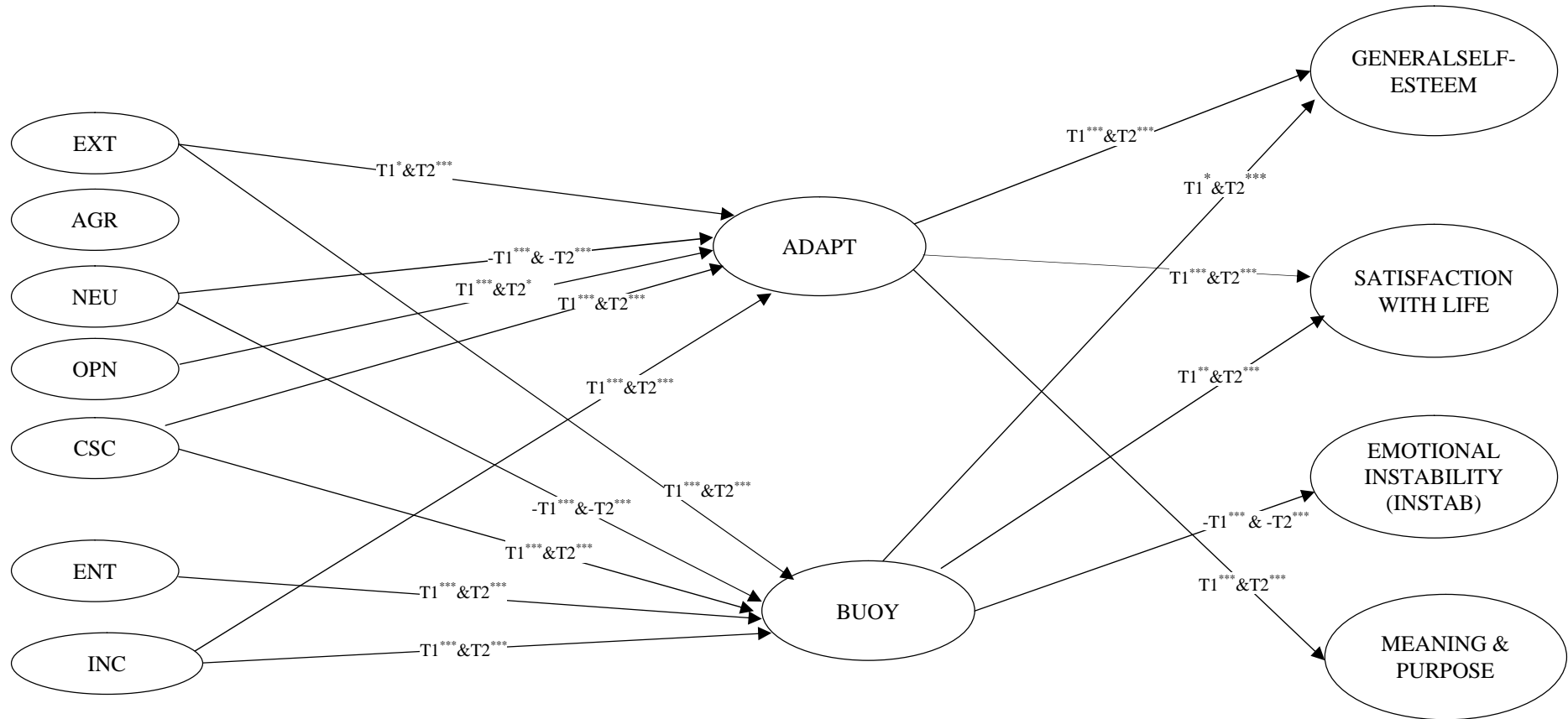
	PERSONALITY					IMPLICIT THEORY		ADAPT	COGNATE FACTOR	WELL-BEING OUTCOMES			
	EXT	OPN	NEU	CSC	AGR	ENT	INC	ADAPT	BUOY	GEN	SAT	INSTAB	MEAN
SOCIO-DEMOGRAPHICS													
Age	-.09***	-.18***	.16***	-.12*	-.15***	.16***	-.25***	.04*	-.01	-.03	-.05*	-.01	.02
NESB	-.16***	-.01	.03	.01	-.02	-.02***	.00	.06**	.05*	-.03	-.05*	.04**	.08***
Gender	-.09*	-.12***	-.08	-.11**	-.30***	.16***	-.05	.03	.08***	-.07	-.03	-.04	.02
SES	.06*	-.01	.04	-.13***	-.09*	.00	-.05***	.01	.00	-.02	.06*	-.01	-.10***
Achievement	.05*	.16***	-.08***	.20***	.20***	-.19***	.10**	.11***	.02	.25***	.07***	.04*	-.07***
PREDICTORS													
PERSONALITY													
Extraversion (EXT)								.11***	.11***	.04*	.11***	-.11***	.01
Agreeableness (AGR)								.07	-.04	.06	.08*	.11***	.12*
Neuroticism (NEU)								-.27***	-.46***	.02	-.11***	.54***	.07***
Openness (OPN)								.13*	.12*	.07	-.00	-.03	.13***
Conscientiousness (CSC)								.27***	.21***	.14***	.15***	-.01	.05
IMPLICIT THEORY OF ABILITY													
Entity (ENT)								.03	.14***	.11***	.05*	.19***	.04*
Incremental (INC)								.33***	.22***	.17***	.21***	.12***	.11***
ADAPTABILITY FACTOR													
Adaptability (ADAPT)										.36***	.26***	.05	.40***
COGNATE FACTOR													
Buoyancy (BUOY)										.15***	.09***	-.31***	-.03
PERCENTAGE VARIANCE:													
Explained (R ²)	6%	14%	4%	8%	7%	9%	8%	38%	36%	55%	41%	60%	31%

Note1. Gender (female = 1, male = 2); Language Background (1 = English speaking background or ESB; 2 = Non-English speaking background or NESB); SES = Socio-economic Status. * $p < .05$, ** $p < .01$, *** $p < .001$.



EXT = Extraversion; AGR = Agreeableness; NEU = Neuroticism; OPN = Openness; CSC = Conscientiousness; ENT = Entity; INC = Incremental, ADAPT = Adaptability, BUOY = Buoyancy; *** $p < .001$.

Figure 6.1: Time 2—standardised beta parameters significant at $p < .001$ (Table 6.4 provides all parameters).



EXT = Extraversion; AGR = Agreeableness; NEU = Neuroticism; OPN = Openness; CSC = Conscientiousness; ENT = Entity; INC = Incremental, ADAPT = Adaptability, BUOY = Buoyancy.

Figure 6.2: Time 1 and Time 2—common standardised beta parameters significant at $p < .05$, $p < .01$ and $p < .001$ (Tables 5.7 and 6.4 provide all parameters).

6.3 Revisiting Hypotheses and Chapter Summary

In summary, hypothesis 1a was supported in that the instrumentation (including the Adaptability Scale) was normally distributed and internally consistent. CFA (hypothesis 1b) supported the proposed factor structure of the instrumentation (including the Adaptability Scale) as indicated by acceptable goodness-of-fit indices, configuration of factor loadings, variances, covariances, and uniquenesses. Hypothesis 1c was supported by discriminant and convergent validity (higher correlations among related scales and lower or negative correlations among unrelated or inverse scales). Demonstration of hypothesis (hypothesis 2a) was evidenced through personality factors (e.g., extraversion, openness, and conscientiousness) and incremental beliefs positively predicting adaptability. Conversely, neuroticism negatively predicted adaptability after controlling for socio-demographics and prior achievement. Hypothesis 2b was confirmed through adaptability positively predicting psychological well-being outcomes. Hypothesis 2c was supported in that adaptability significantly predicted psychological well-being outcomes beyond variance attributable to buoyancy after controlling for socio-demographics and prior achievement.

Taken together, the Time 2 data and analyses provided a significant basis for addressing substantive as well as measurement hypotheses concerning adaptability. The first stage of statistical analysis provided the relevant framework to operationalising the adaptability construct by way of a general adaptability construct that comprised two factors (cognitive-behavioural factor and emotional factor). The subsequent analytic stage then incorporated all items and factors in psychometric analyses. This phase showed that all factors are reliable and normally distributed. The third phase showed that central measurement properties for all items and factor set were well supported by the data. The fourth stage investigated correlational properties and provided initial support for the theorised relationships between adaptability and its predictors and consequences. The fifth and final stage looked at the theorised substantive model with appropriate variance controls and confirmed the process of predictors on adaptability and adaptability on outcomes. The following chapter looks at the longitudinal profile of adaptability.

Chapter 7: Evaluating the Longitudinal Model of Adaptability

7.1 Introduction

Using a matched sample of students participating in both Time 1 and Time 2 surveys, this chapter evaluates the descriptive properties and factor structure of the Time 1 and Time 2 measures to establish the measurement bases of the longitudinal model. It then explores the predictive relationships between (a) the covariate factors (e.g., age, gender, SES, language background, and prior achievement), personality (e.g., extraversion, agreeableness, neuroticism, openness, and conscientiousness), implicit theory (e.g., entity and incremental), (b) adaptability and buoyancy, and (c) psychological well-being outcome factors (e.g., general self-esteem, life satisfaction, emotional instability, meaning and purpose). Importantly, by employing the matched Time 1–Time 2 samples, these longitudinal analyses control for prior variance in target factors. This process thereby enables the investigators to assess the unique variance attributable to predictors, including the focal factor, adaptability. Further, the mediating power of adaptability predicting psychological well-being outcome factors is assessed and evaluated using the Sobel test (Baron & Kenny, 1986; Preacher & Hayes, 2004; Sobel, 1982).

7.2 Descriptive Statistics and Reliability of the Full Set of Items and Scales

Consistent with the Time 1 and Time 2 phases, the longitudinal analyses involve the assessment of descriptive statistics. As described in previous chapters, descriptive analyses consist of a set of measures evaluating scale means and variances (standard deviation), analysis of distributional properties and reliability coefficients. These findings are presented in Table 7.1. For Time 1 factors, variances are generally proportional to their scale and the distributional properties of all scales are normally distributed as indicated by relatively low skewness and kurtosis values, with a range of -0.92 to -0.01 for skewness and -0.75 to 1.22 for kurtosis. Data in Table 7.1 also show internal consistency, as indicated by acceptable Cronbach's alpha values, with a range of .75 to .90 in Time 1. For Time 2, factor variances are generally proportional to their scale and the distributional properties of all scales are relatively normally distributed, within a range of -0.71 to 1.18 for skewness and -

1.01 to 0.53 for kurtosis. Data in Table 7.1 also show internal consistency, as indicated by acceptable Cronbach's alpha values, with a range of .75 to .92.

7.3 Factor Analysis

In line with Times 1 and 2 cross-sectional analyses, the factor analysis for the full set of items in the longitudinal model involved ESEM. Consistent with Time 1 and Time 2 analyses, in assessing goodness-of-fit, the RMSEA and CFI are emphasised. For RMSEAs, values at or less than .08 and .05 are taken to reflect acceptably close and excellent fits respectively (see Jöreskog & Sörbom, 1993; Marsh et al., 1996; Schumacker & Lomax, 1996). The CFI varies on a 0-to-1 continuum where values at or greater than 0.90 and 0.95 are typically taken to reflect close and excellent fits respectively (McDonald & Marsh, 1990).

In addition, important to note in these analyses is that the risk of conflating units or levels of analysis and biased standard errors can be a by-product of analysis involving data that are hierarchically structured, such as students nested within schools as in the present study (see Goldstein, 2003; Hox, 2010; Raudenbush & Bryk, 2002). Adjustments for this clustering of the participants within schools were addressed by using the 'cluster' command in *Mplus* under the 'complex' method. This approach adjusts standard errors and reduces the likelihood of biased tests of statistical significance (Muthén & Muthén, 2007).

ESEM analyses derived an excellent fit to the data ($\chi^2 = 386.376$, $df = 156$, CFI = .979, RMSEA = .039). Table 7.1 presents mean and median target and non-target loadings. Notwithstanding cases where two personality factors (neuroticism and agreeableness) in Time 1 and agreeableness in Time 2 indicated a minor departure from the theoretical structure (i.e., item sets that conceptually measure each of these factors load onto two separate factors), all other factors were identified as theorised. Acceptable reliability and target loadings were derived for all constructs.

Loadings are also presented in Table 7.1. Taken together, the loadings indicate that the factors for both matched time phases are well defined and robust. All items in Time 1 and Time 2 load highly on the factors they are intended to measure (average absolute factor loading for Time 1 = 93%; average absolute factor loading for Time 2 sample = 87%). As a result, these findings form the foundation

and rationale for a broader set of analyses aimed at examining predictors and consequences of adaptability among youth.

7.4 Developing Composite Scores

Given the evidence of sound psychometric properties described above, analyses followed Time 1 and Time 2 procedures by forming composite scores. Chapter 4 detailed how there can be problems when there are many parameters to estimate relative to the size of the sample. This can lead to instability in parameter estimates (Holmes-Smith & Rowe, 1994). It was described in Chapter 4 how composite score-based analyses can address this issue (Holmes-Smith & Rowe, 1994; Rowe & Hill, 1998). Through the use of confirmatory one-factor congeneric models that produce a weighted composite score for each factor, there is a reduction in the number of parameters to be estimated. The composite scores replace the multiple items used as indicators for the latent factor. Therefore, composite scores are useful because they take into account item error and how much each item contributes to the latent factor (Rowe, 2002, 2006). These composite scores were then the basis of correlations and SEM in central analyses (see the following).

7.5 Correlations Among Factors

Using weighted composite scores derived from confirmatory one-factor congeneric models, which are purged of unreliability, correlation analyses were conducted. As with the factor analyses above, adjustments for the clustering of students within schools was addressed by using the ‘cluster’ command in *Mplus* under the ‘complex’ method.

Table 7.1

Longitudinal: Descriptive Statistics, Cronbach's Alphas, ESEM Results and Summary of Factor Loadings of Key Factors in the Study (e.g., Adaptability, Personality, Buoyancy, and Well-being)

	Mean		Standard Deviation		Skewness		Kurtosis		Cronbach's		Mean Target Loading		Median Target Loading		Mean Non-target Loading		Median Non-target Loading	
	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
PRESAGE FACTORS																		
PERSONALITY FACTORS																		
Extraversion	4.91	4.96	1.09	1.09	-.32	-.34	-.24	-.27	.83	.84	.61	.64	.61	.65	.03	.03	.02	.02
Openness	5.09	5.14	.89	.92	.48	-.41	.83	.19	.75	.75	.37	.40	.30	.36	.03	.04	.02	.03
Neuroticism	3.71	3.76	1.01	1.06	-.04	.09	.04	.12	.75	.75	.36	.35	.26	.21	.06	.03	.04	.03
Conscientiousness	4.87	4.92	1.18	1.18	-.37	-.37	-.21	-.19	.86	.86	.59	.57	.63	.61	.03	.03	.02	.02
Agreeableness	5.68	5.67	.83	.86	-.94	-.92	1.60	1.51	.80	.80	.52	.49	.51	.45	.04	.07	.03	.04
IMPLICIT THEORY																		
Entity	2.68	2.62	1.25	1.31	.63	.58	-.11	-.41	.79	.84	.57	.47	.53	.46	.05	.03	.03	.04
Incremental	5.81	5.73	.99	1.08	-.99	-.94	1.15	.98	.84	.87	.68	.73	.67	.74	.05	.06	.03	.03
ADAPTABILITY FACTOR																		
Adaptability (ADAPT)	4.98	5.09	.99	.99	-.16	-.30	.11	.11	.90	.92	.63	.69	.66	.71	.05	.05	.04	.03
COGNATE FACTOR																		
Buoyancy	4.69	4.63	1.22	1.19	-.46	-.33	.08	-.01	.81	.77	.61	.45	.61	.46	.05	.05	.04	.03
WELL-BEING OUTCOMES																		
General Self-esteem	5.35	5.33	1.11	1.08	-.79	-.61	.73	.10	.80	.79	.42	.45	.50	.50	.08	.07	.04	.04
Satisfaction with Life	4.89	4.96	1.17	1.15	-.50	-.51	.02	.01	.80	.81	.60	.61	.52	.51	.06	.05	.04	.03
Emotional Instability	3.94	3.94	1.44	1.43	-.02	-.08	-.76	-.63	.84	.84	.68	.69	.68	.72	.07	.08	.04	.03
Meaning and Purpose	4.90	5.05	1.37	1.36	-.61	-.69	.23	.35	.84	.87	.76	.80	.77	.80	.03	.03	.02	.02

Note: T1 = Time 1; T2 = Time 2.

Table 7.2 displays the degree and direction of the correlations among the factors. Because the central focus of the current study is on the relationship between adaptability and its predictors and outcomes, these correlations are reported here in detail, all other correlations are reported in Table 7.2.

The notable difference between cross-sectional and longitudinal correlation matrices is the inclusion of Time 1 prior variance in the first row of Table 7.2. Here we see relatively sizeable (test-retest) correlations (e.g., the T1-T2 adaptability, $r = .60, p < .001$) – underscoring the importance of controlling for prior variance when estimating the central substantive model. Findings also demonstrate that adaptability is negatively correlated with age ($r = -.12, p < .01$), neuroticism ($r = -.25, p < .001$) and entity beliefs ($r = -.23, p < .001$). Adaptability is positively correlated with ability ($r = .21, p < .001$), extraversion ($r = .19, p < .001$), agreeableness ($r = .38, p < .001$), openness ($r = .25, p < .001$), conscientiousness ($r = .34, p < .001$) and incremental beliefs ($r = .27, p < .001$). Regarding the well-being outcomes, results show that adaptability is positively correlated with self-esteem ($r = .41, p < .001$), life satisfaction ($r = .36, p < .001$) and meaning and purpose ($r = .27, p < .001$). Adaptability, however, correlates negatively with emotional instability ($r = -.17, p < .001$). Taken together, correlation analyses provide preliminary evidence for the hypothesised relationships between adaptability and its hypothesised predictors and outcomes.

7.6 SEM

The hypothesised multivariate model was tested using composite score-based SEM described above. This model is presented in Figure 4.1 and in summary in Figure 7.1. In this SEM, (a) personality, implicit theories, adaptability, buoyancy, and outcomes are controlled for prior (Time 1) variance, (b) socio-demographic and prior achievement factors predicted personality, implicit theories, adaptability, buoyancy and well-being outcomes, (c) personality and implicit theories predicted adaptability, buoyancy and well-being factors, and (d) adaptability and buoyancy predicted well-being factors. As with the correlational and factor analyses above, adjustments for the clustering of students within schools was addressed by using the ‘cluster’ command in *Mplus* under the ‘complex’ method (Muthén & Muthén, 2007).

This multivariate model was estimated, producing a perfect model fit to the data because it is a saturated ‘fully forward’ model comprising composite and single-

item scale scores (CFI = 1.00, RMSEA = 0.000). All standardised parameter estimates are presented in Table 7.3. All significant substantive parameter estimates at $p < .001$ are presented in Figure 7.1 (see Table 7.3 for all significant and non-significant beta parameters estimated in the model). In the following section only significant adaptability parameters are reported.

After controlling for prior adaptability and socio-demographic factors, adaptability is positively and significantly predicted by prior achievement ($\beta = .09, p < .01$), conscientiousness ($\beta = .21, p < .001$) and incremental beliefs ($\beta = .29, p < .001$). Adaptability is negatively predicted by neuroticism ($\beta = -.19, p < .001$). After controlling for prior well-being outcome variance, adaptability positively and significantly predicts general self-esteem ($\beta = .27, p < .001$), satisfaction with life ($\beta = .29, p < .001$) and meaning and purpose ($\beta = .41, p < .001$).

Buoyancy, as the selected cognate factor to control for, was also included in this model. Results show that buoyancy positively and significantly predicts general self-esteem ($\beta = .11, p < .05$), beyond prior variance in self-esteem. It negatively and significantly predicts emotional instability ($\beta = -.29, p < .001$) and meaning and purpose ($\beta = -.10, p < .05$), beyond prior variance in these outcome factors. Comparing these significant effects and standardised beta parameters with those of adaptability, it is evident that the two explain unique variance and thus cannot be deemed as assessing the same construct.

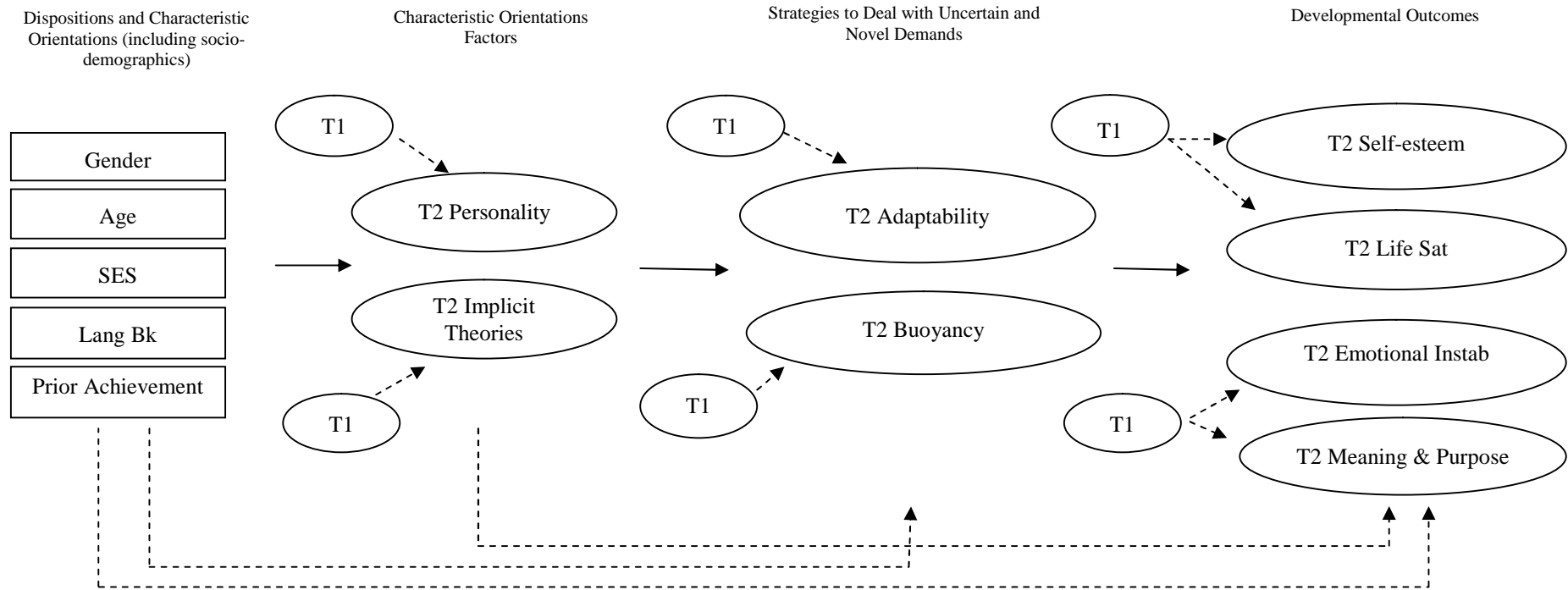
Table 7.2

Longitudinal: T1 and T2 CFA Factor Correlations for Adaptability, Socio-demographics, Prior Achievement, Personality, Buoyancy and Well-being

	T2 FACTORS (<i>r</i>)												
	EXT	AGR	NEU	OPN	CSC	ENT	INC	ADAPT	BUOY	GEN	SAT	INSTAB	MP
T1 PRIOR FACTOR CORRELATION	.77***	.72***	.69***	.64***	.71***	.54***	.50***	.60***	.62***	.62***	.65***	.58***	.51***
SOCIO-DEMOGRAPHICS													
Age	-.05	.05	.14***	-.11***	-.05	.17***	-.17***	-.12**	-.11*	-.18***	-.21***	.11*	-.10
NESB	-.15***	.01	.22	.02	-.01	-.07	.02	.03	.03	.02	.00	.04	.08**
Gender	-.14***	-.33***	-.14***	-.13*	-.11*	.15**	-.05	-.04	.13***	-.14***	-.02	-.15***	-.03
SES	.09*	.03	.05*	.08	-.03	-.05	-.04	.01	-.04	.05	.02	.06*	-.10
Achievement	.00	.21**	-.06**	.14**	.22***	-.17***	.04	.24***	.09*	.44***	.19***	-.02	.04
PRESAGE FACTORS													
PERSONALITY													
Extraversion	-												
Agreeableness	.12***	-											
Neuroticism	-.21***	-.10*	-										
Openness	.13***	.19**	-.07	-									
Conscientiousness	-.03	.33***	-.01	.15**	-								
IMPLICIT THEORY OF ABILITY													
Entity	-.04	-.26***	.01	-.13	-.07	-							
Incremental	.02	.27***	-.04	.08	.14***	-.36***	-						
ADAPTABILITY FACTOR													
Adaptability	.19***	.38***	-.25***	.25***	.34***	-.23***	.27***	-					
COGNATE FACTOR													
Buoyancy	.12***	.17*	-.37***	.15**	.17***	-.09	.16***	.42***	-				
WELL-BEING OUTCOMES													
General Self-esteem	.11***	.31***	-.15***	.20**	.31***	-.13***	.17**	.41***	.30***	-			
Satisfaction with life	.16***	.32***	-.24***	.11*	.30***	-.21***	.28**	.36***	.33***	.44***	-		
Emotional Instability	-.16***	.01	.48***	-.07	.01	.03	-.02	-.17***	-.39***	-.11**	-.12***	-	
Meaning and Purpose	.07**	.27***	-.06	.24***	.22***	-.16	.22**	.27***	.17***	.21***	.28***	-.02	-

Note 1. SES = Socio-economic Status, EXT = Extraversion, AGR = Agreeableness, NEU = Neuroticism, OPN = Openness, CSC = Conscientiousness; ENT = Entity, INC = Incremental, ADAPT = Adaptability, BUOY = Buoyancy, GEN = General Self-esteem, SAT = Satisfaction with Life, INSTAB = Emotional Instability; MP = Meaning and Purpose; * $p < .05$, ** $p < .01$, *** $p < .001$.

Note 2. Gender (female = 1, male = 2); Language Background (1 = English speaking background or ESB; 2 = Non-English speaking background or NESB)



T1 = Time 1; T2= Time 2 factor; SES = Socio-economic Status; Life Sat = Life Satisfaction (also referred to as Satisfaction With Life); Emotional Instab = Emotional Instability; Lang. Bk = Language Background; Gender (female = 1, male = 2); English Speaking Background (ESB =1), Non-English Speaking Background (NESB = 2).

Figure 7.1: The hypothesised longitudinal adaptability path model and the effects of covariate and presage factors on adaptability, buoyancy and the outcome factors; the predictive relationship between the adaptability and cognate factors on the outcome factors.

Note. Dashed paths are not central to the study’s substantive focus but are included to account for all variance in the model and to better estimate unique effects attributable to factors of central interest.

Table 7.3

Longitudinal (Controlling for Time 1 Variance): SEM Results and Beta Coefficients for Personality, Implicit Theory, Adaptability, Buoyancy and Well-being

COVARIATE FACTORS	PERSONALITY			IMPLICIT THEORY			ADAPTABILITY	COGNATE FACTOR	WELL-BEING OUTCOMES				
SOCIO-DEMOGRAPHICS FACTORS	EXT	AGR	NEU	OPN	CSC	ENT	INC	ADAPT	BUOY	GEN	SAT	INSTAB	MP
Age	.01	.02	.06**	-.05*	-.02	.11**	-.11**	.00	.01	-.06*	-.09***	-.01	-.03
NESB	-.05***	.01	-.01	.02	-.05	-.04	.01	.03	.04	.00	.02	.04**	.05*
Gender	-.06*	-.18***	-.07**	-.06	-.06	.09*	-.05	.02	.03	-.08	.01	.03	.01
SES	-.01	-.02	.01	.01	.01	.03	-.04	.04	.06	.01	.02	.04	-.05
Achievement	-.02	.10***	-.05*	.05	.14***	-.11***	.06	.09**	.06*	.24***	.07*	-.00	-.06**
PRESAGE FACTORS													
PERSONALITY FACTORS													
Extraversion (EXT)								-.00	.03	.03	.03	-.04*	-.01
Agreeableness (AGR)								.10	-.07	.00	-.01	.17**	.05
Neuroticism (NEU)								-.19***	-.37***	.01	-.11***	.49***	.04
Openness (OPN)								.05	-.01	.08*	.01	-.02	.08*
Conscientiousness (CSC)								.21***	.18**	.06*	.08**	.01	.02
IMPLICIT THEORY OF ABILITY													
Entity (ENT)								.10*	.17*	.12***	.12*	.16*	.06*
Incremental (INC)								.29***	.23***	.22***	.23***	.06	.13***
ADAPTABILITY FACTOR													
Adaptability (ADAPT)										.27***	.29***	.06	.41***
COGNATE FACTOR													
Buoyancy (BUOY)										.11*	-.04	-.29***	-.10*
PRIOR (TIME 1) VARIANCE	.77***	.66***	.65***	.65***	.69***	.48***	.44***	.35***	.42***	.34**	.45**	.23***	.36***
Percentage Variance													
Explained (R ²)	61%	54%	46%	45%	52%	30%	23%	52%	54%	67%	59%	66%	45%

Note 1. SES = Socio-economic Status; * $p < .05$, ** $p < .01$, *** $p < .001$; Prior (Time 1) Variance indicates the auto-regression between the same factors each assessed at Time 1 and Time 2.

Note 2. Gender (female = 1, male = 2); Language Background (1 = English speaking background or ESB; 2 = Non-English speaking background or NESB)

7.7 Tests of Mediation

For completeness, the Sobel test (Baron & Kenny, 1986; Preacher & Hayes, 2004; Sobel, 1982) was used to assess the predictive power of adaptability as a mediator on the psychological well-being outcomes. The Sobel test evaluates the strength of the indirect relationship between demographic, personality and implicit theories and psychological well-being outcomes via adaptability. The test of the indirect effect is generated by dividing the product of the indirect paths by the square root of derived variance. This produces a critical ratio that can be contrasted with the critical value from the normal distribution suitable for a specified alpha level (Preacher & Hayes, 2004). The Sobel test is, for the most part, appropriate in a large-sample study (such as the present investigation) and becomes less conservative with smaller sizes (Preacher & Hayes, 2004), see Table 7.4 and 7.5.

The results of the Sobel test revealed that prior achievement via adaptability positively and significantly predicted satisfaction with life (*Critical Ratio* = 2.40, $p < .01$), meaning and purpose (*Critical Ratio* = 2.45, $p < .01$) and self-esteem (*Critical Ratio* = 2.42, $p < .01$). Agreeableness through adaptability, positively and significantly predicted satisfaction with life (*Critical Ratio* = 2.45, $p < .01$), meaning and purpose (*Critical Ratio* = 2.50, $p < .01$) and self-esteem (*Critical Ratio* = 2.46, $p < .01$). Openness also positively and significantly predicted satisfaction with life through adaptability (*Critical Ratio* = 1.17, $p < .05$). Conscientiousness positively and significantly predicted satisfaction with life (*Critical Ratio* = 6.97, $p < .001$) and meaning and purpose (*Critical Ratio* = 6.20, $p < .001$) via adaptability. Neuroticism negatively and significantly predicted self-esteem, satisfaction with life and meaning and purpose through adaptability. Further, incremental beliefs positively and significantly predicted self-esteem (*Critical Ratio* = 4.59, $p < .001$), satisfaction with life (*Critical Ratio* = 4.51, $p < .001$) and meaning and purpose (*Critical Ratio* = 4.81, $p < .001$) through adaptability.

In summary, multivariate modelling provided support for the hypothesised links between adaptability and its predictors and consequences after controlling for prior (Time 1) and shared variance (among predictors, covariates and outcome variables) and adjustments for the clustering of students within schools. In addition, these effects appear to be different from those of the cognate buoyancy factor, providing further support for the discriminant validity of adaptability. Further, it

appears that adaptability not only directly predicts psychological well-being; it also operates as a significant mediator to outcomes.

Table 7.4

Sobel Test: Mediating Effects of Adaptability Relevant to Socio-demographics and Personality

			Sobel Test Statistic	<i>p</i> -value
Age	Adapt	Self-esteem	0.0344	0.972
Age	Adapt	Satisfaction with life	0.0344	0.972
Age	Adapt	Meaning and purpose	0.0344	0.972
Age	Adapt	Emotional instability	0.0344	0.973
NESB	Adapt	Self-esteem	1.5135	0.130
NESB	Adapt	Satisfaction with life	1.5104	0.131
NESB	Adapt	Meaning and purpose	1.5208	0.128
NESB	Adapt	Emotional instability	1.0432	0.297
Gender	Adapt	Self-esteem	0.5451	0.586
Gender	Adapt	Satisfaction with life	0.5449	0.588
Gender	Adapt	Meaning and purpose	0.5454	0.585
Gender	Adapt	Emotional instability	0.5098	0.610
Socio-economic	Adapt	Self-esteem	0.9907	0.322
Socio-economic	Adapt	Satisfaction with life	0.9898	0.322
Socio-economic	Adapt	Meaning and purpose	0.9927	0.321
Socio-economic	Adapt	Emotional instability	0.8162	0.414
Achieve	Adapt	Self-esteem	2.4159	0.016
Achieve	Adapt	Satisfaction with life	2.4033	0.016
Achieve	Adapt	Meaning and purpose	2.4455	0.014
Achieve	Adapt	Emotional instability	1.2368	0.216
Openness	Adapt	Self-esteem	1.1737	0.241
Openness	Adapt	Satisfaction with life	1.1729	0.024
Openness	Adapt	Meaning and purpose	1.1770	0.239
Openness	Adapt	Emotional instability	0.9097	0.363
Extraversion	Adapt	Self-esteem	-0.0857	0.932
Extraversion	Adapt	Satisfaction with life	-0.0857	0.932
Extraversion	Adapt	Meaning and purpose	-0.0857	0.932
Extraversion	Adapt	Emotional instability	-0.0855	0.932

Neuroticism	Adapt	Self-esteem	-3.4918	0.001
Neuroticism	Adapt	Satisfaction with life	-3.4544	0.001
Neuroticism	Adapt	Meaning and purpose	-3.5833	0.001
Neuroticism	Adapt	Emotional instability	-1.3311	0.183
Conscientiousness	Adapt	Self-esteem	7.2966	0.241
Conscientiousness	Adapt	Satisfaction with life	6.9720	0.001
Conscientiousness	Adapt	Meaning and purpose	6.1965	0.001
Conscientiousness	Adapt	Emotional instability	1.3968	0.162
Agreeableness	Adapt	Self-esteem	2.4636	0.014
Agreeableness	Adapt	Satisfaction with life	2.4503	0.014
Agreeableness	Adapt	Meaning and purpose	2.4951	0.013
Agreeableness	Adapt	Emotional instability	1.2431	0.214

Table 7.5

Sobel Test: Mediating Effects of Adaptability Relevant to Implicit Theories

			Sobel Test Statistic	<i>p</i> -value
Entity beliefs	Adapt	Self-esteem	1.8816	0.060
Entity beliefs	Adapt	Satisfaction with life	1.8757	0.061
Entity beliefs	Adapt	Meaning and purpose	1.8955	0.058
Entity beliefs	Adapt	Emotional instability	1.1434	0.253
Incremental beliefs	Adapt	Self-esteem	4.5940	0.001
Incremental beliefs	Adapt	Satisfaction with life	4.5096	0.001
Incremental beliefs	Adapt	Meaning and purpose	4.8084	0.001
Incremental beliefs	Adapt	Emotional instability	1.3739	0.169

7.8 Common Significant Paths Across Time 1, Time 2 and Time 1–Time 2

Analyses

Figure 7.2 represented the longitudinal path model (T1-T2) and the salient relationship among the dependent and independent factors. Figure 7.3 represents the significant common standardised beta paths relevant to the adaptability model, including the predictors and the outcome factors across Time 1 and Time 2 phases and also the longitudinal model. The relevant points taken from this path model are as follows. Neuroticism, conscientiousness and incremental theories of ability significantly ($p < .001$) predict adaptability, which is consistent in all three models.

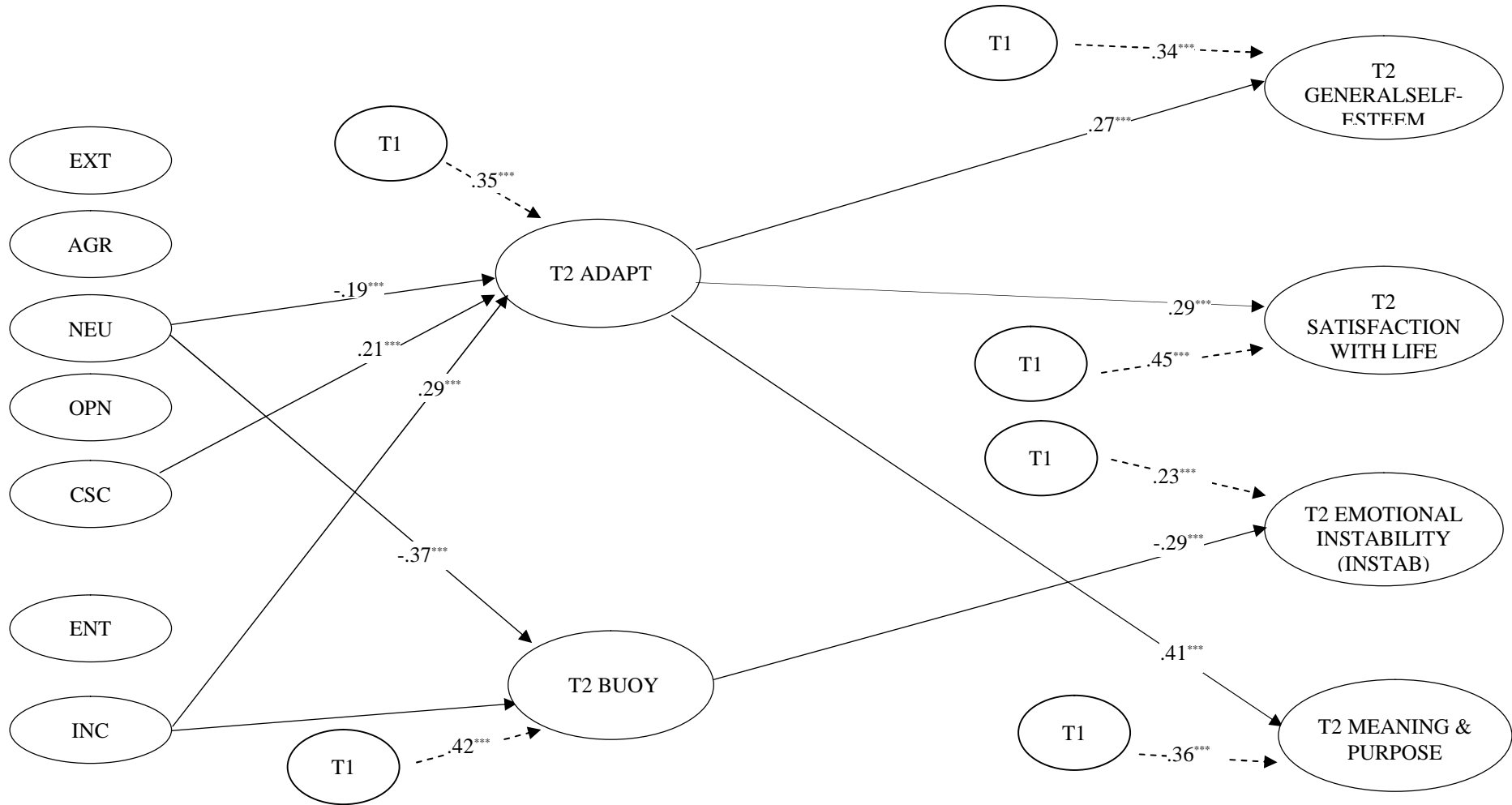
Neuroticism, conscientiousness and incremental theories of ability also significantly ($p < .001$) predict buoyancy in all phases. Adaptability significantly ($p < .001$) predicts general self-esteem, satisfaction with life and meaning and purpose and buoyancy predicts negatively and significantly ($p < .001$) emotional instability in all three models.

The above results describe the overlaying common path in the three models at $p < .001$, however, there are factors that are common across the three models at other levels of statistical significance: entity theories of ability significantly ($p < .01$) predicts adaptability in Time 1 and Time 2, but at $p < .05$ in the longitudinal model. Buoyancy, on the other hand, predicts general self-esteem at $p < .05$ in Time 1 as well as in T1-T2 model, but at $p < .001$ in Time 2.

7.9 Revisiting Hypotheses and Chapter Summary

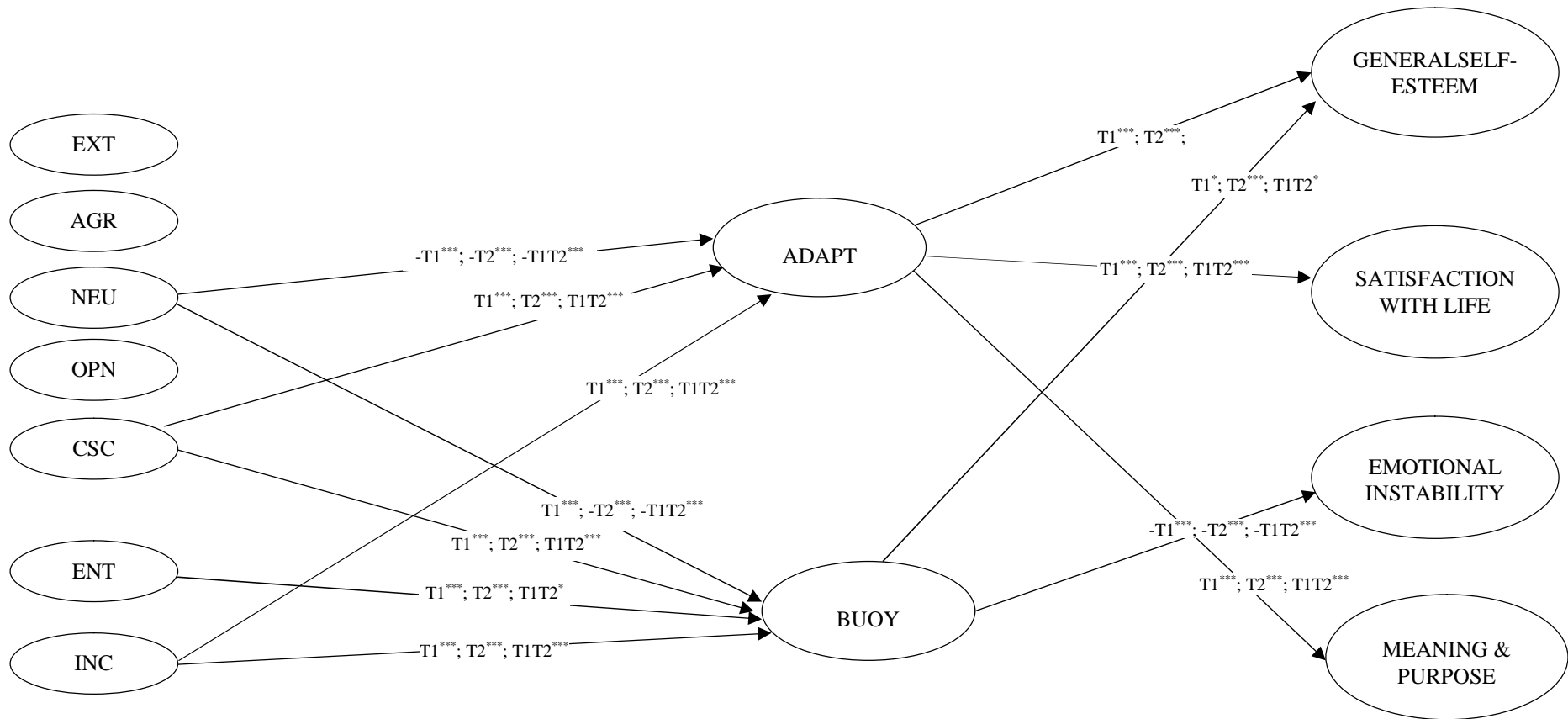
The longitudinal data and analyses provided a further foundation for addressing substantive and measurement hypotheses and research questions relevant to adaptability. All factors were found to be reliable and approximately normally distributed. Factor analysis showed that central measurement properties for the items and factor set were well supported by the data. Correlations provided initial support for the hypothesised relationships between adaptability and its predictors and outcomes. Importantly, the final phase involving SEM and the appropriate controls for shared and prior variance confirmed the hypothesised process of predictors on adaptability and adaptability on outcomes. Tests of mediation signalled a role for adaptability as a mediator between covariates, substantive predictors (presage factors) and outcomes.

These results thus provided support for the hypotheses. Specifically, hypothesis 1 was supported through instrumentation shown to be normally distributed and internally consistent in the matched sample.



T1 = Time 1 counterpart of Time 2 factor; EXT = Extraversion; AGR = Agreeableness; NEU = Neuroticism; OPN = Openness; CSC = Conscientiousness; ENT = Entity; INC = Incremental, ADAPT = Adaptability, BUOY = Buoyancy.

Figure 7.2: Longitudinal path model T1-T2—standardised beta parameters significant at $p < .001$ (Table 7.3. provides all parameters).



EXT = Extraversion; AGR = Agreeableness; NEU = Neuroticism; OPN = Openness; CSC = Conscientiousness; ENT = Entity; INC = Incremental, ADAPT = Adaptability, BUOY = Buoyancy.

Figure 7.3: Time 1, Time 2 and T1-T2—common standardised beta parameters significant at $p < .05$, $p < .01$ and $p < .001$ (Tables 5.7, 6.4 and 7.3 provide all parameters).

Factor analysis (hypothesis 1b) supported the hypothesised factor structure of the instrumentation as signalled by acceptable goodness-of-fit indices, configuration of factor loadings, variances, covariances and uniquenesses. Hypothesis 1c confirmed discriminant and convergent validity (higher correlations among related scales and lower or negative correlations among unrelated or inverse scales). Hypothesis 3a found support in that after controlling for prior (Time 1) variance, personality factors (e.g., neuroticism and conscientiousness) and incremental beliefs positively predicted adaptability. Conversely, neuroticism negatively predicted adaptability after controlling for socio-demographics and prior achievement. Hypothesis 3b also found support in that after controlling for prior (Time 1) well-being variance, adaptability positively predicted psychological well-being outcomes. Support for hypothesis 3c was derived through adaptability significantly predicting psychological well-being outcomes beyond the variance attributable to buoyancy after controlling for prior (Time 1) variance in well-being outcomes.

Chapter 8: Discussion

8.1 Introduction

Dealing and managing uncertain and novel life circumstances is not an inconsequential, automatised or merely dispositional capacity that individuals possess or activate throughout their life. Rather, it is proposed here that such a capacity is developed through adjusting cognitive, behavioural, and emotional reactions to most effectively manage uncertain or new circumstances. Adaptability is proposed as such a capacity (Martin, Nejad et al., 2012, 2013). It was hypothesised that socio-demographic, prior achievement, personality, and implicit beliefs factors would predict individuals' adaptability. It was also postulated that adaptability would predict psychological well-being outcomes in the form of general self-esteem, satisfaction with life, emotional instability, and meaning and purpose.

8.2 Summary of the Findings

Factor analyses suggested the best fitting model representing adaptability is a higher-order factor that comprises a reliable first-order cognitive-behavioural factor and a reliable first-order emotional factor. Multigroup CFA indicated invariance in factor structure and key measurement parameters (i.e., factor loadings, inter-factor correlations, and uniquenesses) as a function of gender, age, and language background. Based on correlations from factor analysis, adaptability was positively associated with prior achievement, conscientiousness and incremental beliefs about ability, negatively associated with neuroticism, and positively associated with self-esteem, satisfaction with life, and meaning and purpose.

In terms of the longitudinal SEM (the predominant focus for this discussion), the principal theories supporting the adaptability framework were reflected in the findings. The longitudinal data showed that beyond prior (Time 1) variance in outcomes, incremental beliefs and conscientiousness positively predicted adaptability; and neuroticism negatively predicted adaptability. In turn, adaptability significantly predicted psychological well-being outcomes including: self-esteem, satisfaction with life and meaning and purpose. It is thus noteworthy that adaptability is significantly associated with well-being alongside other factors in the study that are hypothesised to also predict well-being, such as personality and implicit theory factors (Chiu, Hong, & Dweck, 1997; Dweck et al., 1995; Lounsbury et al., 2003;

O'Rourke, 2005; Stipek & Gralinski, 1996). This finding is an encouraging one for adaptability as a new construct when one considers the well-established dispositional factors that were also assessed in the present study (e.g., personality, implicit theories). A further point to make is that the relationship between adaptability and well-being factors supports the proposition that adaptability is more than 'getting through' or 'getting by'. It is clearly associated with markedly positive indicators and the longitudinal work enables the modelling of positive trajectories through gains generated by partialling out pre-test dependent variable variance (e.g., see Martin, 2011; McArdle, 2009) that follow from adaptability (Martin, 2012).

Close relationships between adaptability and the other protective factors—for example, coping, resilience, buoyancy and the like - have been postulated. However, as recent studies have found cognate factors such as buoyancy are distinct from, for example, coping (Putwain et al., 2012; Putwain & Daly, 2013), the current investigation also inferred a parallel to this finding and suggested that adaptability is also distinct or an extension of such cognate factors. Consequently, based on previous related research (e.g., Folkman et al., 1986; Jordan, Lumley, & Leisen, 1998; Kozlowski, 2001; Martin & Marsh, 2009; Martin, Nejad et al., 2012, 2013; Motamedi, 1977), it was suggested that the core adaptability construct should correlate more strongly with factors such as buoyancy, personality and incremental beliefs and not so strongly (or negatively) with 'non-target' factors (such as entity beliefs). This turned out to be the case. The relationship between adaptability and buoyancy is important with respect to discriminant validity.

For reasons articulated in the review of literature, the buoyancy construct is conceptually aligned with adaptability (Martin & Marsh, 2009; Martin, Nejad et al., 2012, 2013). It was deemed essential to establish that while the two are, in fact, different, adaptability can be considered an extension (or complement) to this body of knowledge that includes buoyancy, coping and self-regulation frameworks. Granted the correlation was high, less than half the variance was shared between adaptability and buoyancy. Similarly, adaptability was more strongly related to most well-being factors than was buoyancy. While these findings require further corroboration, they suggest preliminary support for the proposition that the two serve, to some extent, different functions (potentially buoyancy for adversity and adaptability for novelty and uncertainty).

There are also some noteworthy socio-demographic findings. Interestingly, age is negatively associated with adaptability, with younger adolescents reporting higher adaptability than older adolescents. When reviewing the literature in relation to age, there were mixed viewpoints. Some research suggests greater capacity to regulate personal functions by older students (e.g., Garcia Coll et al., 1996; Locke, 1996), whereas other research suggests greater stability in the self-system (e.g., Marsh, 2007) that may mean less adaptability. The significant negative association between age and adaptability is worth further examination to get a better sense of what underlies it. Prior achievement (measured by literacy and numeracy) is also positively and significantly associated with adaptability. This suggests a connection between the development of academic skills and adaptability. However, due to the nature of the standardised achievement data collected, we could not model subsequent achievement (only prior achievement) and thus the causal ordering of achievement and adaptability requires further investigation.

8.3 A Closer Look at Factors Predicting Adaptability

8.3.1 Socio-demographic factors and prior achievement.

The inclusion of socio-demographic and prior achievement factors was important for four reasons. First, it broadens the earlier correlational work that did not control for shared variance among these factors (Martin, Nejad et al., 2012) (so a fuller sense of their unique effects can be explored). Second, it can provide educators, practitioners and researchers with a basis to better understand the socio-demographic and prior achievement characteristics of students likely to be higher or lower in adaptability. Third, including these factors offers an understanding of adaptability with socio-demographic and achievement variance partialled out. Fourth, socio-demographic and achievement findings may be important components as part of an intervention plan and approach by identifying the types of students who are likely or not likely to be adaptable.

8.3.1.1 Age.

Prior research has shown that age predicts personality attributes and traits and general cognitive abilities (e.g., Cattell, 1987; Ferrer & McArdle, 2004; Goldberg et al., 1998; Soto et al., 2011). The current study thus hypothesised that age may be a predictor of adaptability and also may indirectly predict psychological well-being via

adaptability (Martin, Nejad et al., 2012). The correlational findings showed that age was inversely associated with adaptability, such that younger adolescents reported higher adaptability than older adolescents. Relevant to the regulation of personal resources, the literature reports assorted debates regarding the potential effects of age as a relevant variable associated with constructs cognate to adaptability. Some research suggests greater capacity to regulate personal functions among older students (e.g., GarciaColl et al., 1996; Locke, 1996), whereas other research suggests stability in the self-system among older students (e.g., Marsh, 2007). The current study suggests that older adolescents are less capable of modifying and managing their cognitions, behaviours, and emotions. Perhaps one explanation could be that as children get older, they solidify their characteristic way of negotiating uncertainty and novelty. In any case, educators might look to sustain students' adaptability from early adolescence through to later adolescence. In particular, given the uncertainties and novelties in the transition from school to post-school life (Martinez, Martin, Liem, & Colmar, 2012), maintaining prior higher levels of adaptability may be important.

8.3.1.2 Language background.

The present research also included non-English speaking language background (referred to as NESB) as a potential predictor of endogenous factors in the adaptability model. It is noteworthy to mention that not all NESB students are assumed newcomers/immigrants in this study. At Time 2, NESB predicted adaptability such that NESB students were found to be more adaptable. Language background, however, did not significantly predict adaptability in the longitudinal model. This finding may have been the case because longitudinal modelling controlled for prior variance in outcomes and hence left little further significant variance to be accounted for by the language background (NESB) factor. In contrast, cross-sectional modelling did not control for prior variance in outcomes and therefore permitted variance to be explained by NESB in outcomes. Certainly, this further confirms the importance of collecting longitudinal data and controlling for auto-regression in psychological well-being outcome variables. The Time 2 NESB finding is noteworthy. This finding may emanate from experiences such as moving to and living in a new culture and environment that require a greater deal of flexibility,

tolerance and adaptability (Martin et al., 2012). This may strengthen NESB individuals' resources in personal management and adjustment.

Prior research has confirmed that in the Australian context, NESB students and students who are bilingual can achieve more highly than their ESB peers and cohorts in their academic pursuits (Martin et al., 2012; Mouw & Xie, 1999; Padilla & Gonzalez, 2001; Pong, 2009; Worswick, 2001) and in their cognitive and linguistic development (Barac & Bialystok, 2012). Further, in its 2003 report, the Organisation for Economic Co-operation and Development (OECD) showed that immigrant students from Australia, Canada, and New Zealand achieve more highly in problem solving and mathematics and science achievement compared to other participating countries (Organisation for Economic Co-operation and Development, 2003). Martin et al. (2012) argued that problem-solving skill is a factor in immigrant students' success in mathematics and science (see also García Coll et al., 1996). Problem solving abilities also mediate the relationship among settlement, immigration and achievement factors. Hence, the findings obtained in the present study may be indicating the significant role of problem-solving capacity for immigrant students' achievement (Martin et al., 2012). Further research is needed to explore this possibility.

Other research has shown that bilingualism can offer benefits to students and their achievement. It is claimed there are two views with respect to this research: the 'cultural view' and the 'cognitive view', both supporting the positive role of bilingualism in achievement (Mouw & Xie, 1999). The cultural view claims that bilingual children have access to a richer, broader and deeper cultural capital from their parents and home life (Bankston & Zhou, 1995). These children capitalise on the resources available from their ethnic and cultural heritage that is uniquely available to them. This breadth and depth of cultural capital may lay a foundation for a greater repertoire of cognitive, behavioural and emotional regulation in the form of adaptability.

In terms of the cognitive view, Cummins (1977) and Peal and Lambert (1962) have proposed that bilingualism is advantageous to mental development since it permits bilingual children and young people to switch readily between two linguistic mediums. This capacity to switch may be relevant to the adaptability construct under investigation here. Research by Padilla and Gonzalez (2001) shows that bilingual Mexican students who had received some schooling in Mexico prior to their move to

the United States reported higher academic achievement than United States-born Mexican children. The reports from the Family and Labour Studies, Statistics, Canada, also confirm that outcomes for many immigrant students surpassed their Canadian-born peers (Worswick, 2001).

Notwithstanding the significant effect for language background at Time 2, the longitudinal results did not replicate it. In line with this, Martinet al. (2012) suggest that there are few differences and small gaps between ESB (native English speaking students) and NESB (immigrant students whose mother tongue is other than English) concerning problem-solving, science and mathematics achievement after controlling for factors such as ability (literacy and numeracy), SES, how long the immigrant students have been in the host country and language spoken at home (or not speaking the local language at home). Martin et al.'s work further suggests that this difference and gap is even less for second-generation immigrant students (2012).

Taken together, the fact that language background positively predicted adaptability (at Time 2) and that NESB students were not lower in adaptability than their ESB peers in the longitudinal phase counters the 'deficit view' concerning immigrant students that asserts, for example, that immigrant students are inherently less capable (Garcia Coll et al., 1996; Valencia, 1997). The fact that a deficit perspective (see Garcia Coll et al., 1996; Valencia, 1997 for discussion) of immigrants and immigrant status can be countered by these findings brings into consideration more adaptive perspectives that inform awareness practices to NESB students' adaptability and well-being. These are discussed further in the following sections.

8.3.1.3 Prior achievement.

Achievement in high school requires the regulation of personal resources alongside the relevant skills and support required (Hattie, 2009). To this end, students will need to manage the multiple demands, diffuse subject matter, new teachers, different classes, diverse performance requirements and the like (Martin, 2010; Marzano, 2003). Approaching academic life from this perspective, it is perhaps not surprising that students who are able to develop these skills are also higher in adaptability.

Prior achievement in the present investigation was operationalised through literacy and numeracy using the nationally administered and standardised NAPLAN score. Informed by previous research (e.g., Duncan, 1982; Duncan et al., 2007;

Martin, 2001, 2003; Martin & Marsh, 2006; Schmidt, 2002), the current investigation hypothesised that individuals' past achievement is likely to predict adaptability and other endogenous factors in the model. As hypothesised, prior achievement, when examined in longitudinal analyses, positively predicted adaptability.

In the review of literature, it was argued that cognitive ability (including problem-solving ability) may assist individuals to handle and manage novel situations by facilitating the adjustment of personal resources required for adaptive functioning (LePine et al., 2000; Martinet al., 2012). Accordingly, it was predicted that students with higher academic achievements may also be more able to regulate the cognitive and other functions required to adjust to new and uncertain situations (Martin, Nejad et al., 2012, 2013). Indeed, of all the relevant covariates, the longitudinal findings showed that prior achievement seemed to play the most salient role in predicting adaptability. Consequently, emphasis is given to this factor when attempting to investigate and improve individuals' adaptability repertoire and psychological well-being outcomes.

8.3.2 Personality.

Among the Big-Five personality factors, neuroticism, extraversion, conscientiousness and openness seemed to be significantly associated with adaptability that in turn predicted well-being outcomes (see also Martin, Nejad et al., 2012, 2013). Personality is a construct that many researchers have attempted to demystify through a large body of empirical and conceptual work. Of the numerous approaches to personality, the Big-Five theory of personality was deemed particularly appropriate for the current study (see review of literature). The Big-Five personality framework comprises factors referred to as: extraversion, agreeableness, neuroticism, openness and conscientiousness. The multivariate modelling (that controlled for shared variance among personality factors) used in the present analysis extended the bivariate correlational work by Martin, Nejad et al. (2012) that found adaptability to be correlated with all personality factors. The current investigation showed personality predictors uniquely predicted factors in the model after accounting for shared variance among personality (and implicit theory) factors. Accordingly, consistent with Cantor (1990; see also McCrae & Costa, 1996), it seems that dispositional traits and characteristics can be adaptively expressed (in the case of conscientiousness) to respond to different stimuli, situations, conditions and

circumstances to bring about positive outcomes. Conversely, dispositional characteristics and traits may be maladaptively expressed (in the case of neuroticism) to lead to negative outcomes.

These results are consistent with what might be predicted by relevant personality theory. For example, McCrae and Costa's (1996) five-factor framework includes the regulatory and control processes that are shaped by personality. Consistent with this, theory and research tend to agree on conscientiousness as an important factor relevant to regulation and control (e.g., de Raad & Schouwenburg, 1996; Hoyle, 2010; McCrae & Löckenhoff, 2010). Conscientiousness is conceptualised as the personality feature promoting adaptive and effective decision-making, persistence, control and self-management (McCrae & Löckenhoff, 2010). These features are evidently aligned with adaptability and this is also in line with the framing of adaptability in the current study as a special case of personal adjustments associated with situational variability, novelty and uncertainty.

It thus appears to be the case that some individuals are dispositionally better placed for adaptability than others. This is vital to know because it can form and shape intervention designed to promote and sustain adaptability. For individuals who may be low in conscientiousness or high in neuroticism, it is important to point to the review by Ginns and colleagues (2011) who describe how individuals can be taught to modify cognition, behaviour, and emotion. Practitioners, then, would do well to understand individuals' trait-like profile as they direct intervention aimed at increasing adaptability.

8.3.2.1 Neuroticism.

Neuroticism is an inclination to experience negative emotions such as anxiety, anger, fear, worry, impulsivity and depression (Costa & McCrae, 1980; Spörrle, Strobel, & Tumasjan, 2010). Neuroticism is also concerned with impulse control. Based on McCrae and Löckenhoff's (2010) view, neuroticism was hypothesised to be a (negative) predictor of adaptability. The longitudinal analyses showed that neuroticism negatively and significantly predicted buoyancy and satisfaction with life and positively and significantly predicted emotional instability. More importantly for the present study, neuroticism negatively and significantly predicted adaptability. This finding highlights the fact that neuroticism impedes individuals' capacity to regulate and manage thinking, emotion and behaviour in an

adaptive manner. The current finding also aligns with previous research showing that neuroticism is associated with negative emotional reactivity, which impedes individuals' personal resource modifications (O'Rourke, 2005).

Interestingly, conceptualising about neuroticism shows poor impulse control as a key feature (McCrae & Löckenhoff, 2010). The noteworthy negative association between neuroticism and adaptability suggests that adaptability is not a function of impulsive cognitive, behavioural and emotional adjustment that might be an attribute of neurotic individuals. In combination with the positive association between conscientiousness and adaptability, the negative neuroticism effect suggests that students with adaptive (adaptable) adjustments in cognition, behaviour, and emotion may well be deliberate, considered and purposeful.

8.3.2.2 Conscientiousness.

Conscientiousness refers to a propensity to be self-disciplined, autonomous, organised (self-organising), reliable, responsible, and effortful (Judge, Higgins, Thoresen, & Barrick, 1999). The longitudinal results showed that conscientiousness positively predicted adaptability. Conscientiousness also positively predicted buoyancy and satisfaction with life. This aligns with prior research suggesting that conscientious individuals, through their higher tendency to be responsible, reliable and self-disciplined, thrive in autonomous settings (Digman, 1990; Judge et al., 1999). The positive association between adaptability and conscientiousness explains that individuals who have the propensity to be self-disciplined, autonomous, self-organising, reliable, responsible, and goal-oriented may also have greater capacity to modify and adjust their personal resources in order to successfully navigate uncertain and novel life circumstances.

8.3.2.3 Extraversion.

Extraversion refers to assertiveness, confidence and dominance (DeYoung, Peterson, Séguin, & Tremblay, 2008). Although the longitudinal analyses showed that extraversion did not have significant effects on adaptability, extraversion did positively and significantly predict adaptability at Time 2. The correlational analyses in Time 1, Time 2 and longitudinal phases also showed that extraversion was positively and significantly associated with adaptability. Extraversion is a personality factor that is hypothesised to have an effect on how individuals may use their ability

and capacity to adjust personal resources in the current study. Further, the current finding also aligns with previous research delineating that extraversion is associated with interest in social interaction, zestful, active and venturesome approaches to life, which assist individuals' personal resource modifications (Digman, 1997; for more details on the effects of personality factors on well-being, also see O'Rourke, 2005). Extraverted characteristics (e.g., venturesome approach to life, openness, and flexibility to life events and new circumstances) may potentially provide individuals with an adaptable propensity to regulate their personal resources.

8.3.3 Implicit theories of ability.

With regards to implicit theories of ability, the present investigation is based on research (e.g., Blackwell et al., 2007; Chiu et al., 1997; Dweck et al., 1995; Stipek & Gralinski, 1996; Wood & Bandura, 1989) proposing two views or beliefs about intelligence and ability: entity views and incremental views. Entity views hold that personal attributes, intelligence and mental abilities are relatively fixed. Incremental views hold that these attributes are relatively malleable and flexible (indicating that individuals may become more skilled and competent through expenditure of effort). It is probably accurate to state that neither of these views is the 'correct' one; rather, they are alternative approaches to constructing reality on a given phenomenon (Dweck et al., 1995). The current investigation theorised that individuals with an incremental outlook would view academic and non-academic outcomes as something that can be addressed through cognitive, behavioural, and/or emotional adjustment, and thus they would be more adaptable than individuals who believe their competence and ability as fixed and difficult to change or modify (i.e., they see less point in attempting cognitive, behavioural, and/or emotional adjustment).

In line with hypotheses, incremental beliefs about intelligence significantly and positively predicted adaptability. Entity beliefs also positively predicted adaptability; however, only moderately so. Moreover, adaptability significantly mediated the relationship between incremental beliefs and outcomes. Specifically, adaptability mediated the relationship between incremental beliefs and meaning and purpose, positively; satisfaction with life, positively, and general self-esteem, positively. It is also noteworthy that the incremental beliefs factor was the only substantive dispositional predictor of adaptability moderated by students' background characteristics. In particular, it was found that the effects of incremental

beliefs on adaptability were significantly moderated by ability (such that there were significantly stronger positive effects of incremental beliefs on adaptability for low ability students) as well as gender (significantly stronger positive effects of incremental beliefs on adaptability for males).

Prior research has revealed that individuals with incremental beliefs are more prepared to adjust their personal resources (e.g., cognitive, behavioural, and emotional adaptability) as they face life uncertainties and novelties (Blackwell et al., 2007; Molden & Dweck, 2006). This aligns with the current study's theorising (informed by Martin, Nejad et al., 2012, 2013) that individuals with a greater capacity for adaptability are also flexible and believe that they can change, adjust and modify their personal resources. The longitudinal analyses revealed that incremental theories of ability positively and significantly predicted adaptability, which is relevant to the present research. This finding, then, explains that individuals who hold incremental beliefs about their ability and intelligence are more adaptable than those with entity beliefs.

8.3.4 Relationship between adaptability and cognate correlates.

The current study hypothesised that adaptability can be deemed an extension of recent work that attends to factors and processes relevant to coping and defence mechanisms (Folkman et al., 1986; Jordan, Lumley & Leisen, 1998; Motamedi, 1977). This constellation of work comprises a wide spectrum of theories ranging from those articulating primarily biological adaptation processes (Corning, 2000) to more recent ones, including coping, self-regulation, buoyancy, resilience and various theories of motivation.

The adaptability framework has been proposed as an extension of this body of research in its attempt to disentangle the adaptability process as it is relevant to cognition, behaviour, and emotion. To better understand adaptability and how it may be distinct from factors and processes relevant to adversity, the present study also identified buoyancy as a relevant cognate factor that may share variance with adaptability. Accordingly, the current investigation empirically considered adaptability in the context of buoyancy. Importantly, findings showed that, although sharing variance with buoyancy, it was evident that adaptability accounted for unique variance in outcomes beyond that explained by buoyancy. Thus, for example,

adaptability uniquely predicted general self-esteem, satisfaction with life and meaning and purpose, whereas buoyancy did not.

Notwithstanding, buoyancy did explain unique variance in some outcomes. For example, buoyancy noticeably mapped onto emotional instability in a way that adaptability did not: buoyancy was the single predictor of this outcome factor. Thus, it seems that when mental health (as indicated by emotional instability) is more a focal point, adversity-related factors (such as buoyancy) are logically more significant. Indeed, relevant to this line of thinking, it was interesting to note that neuroticism (a major mental health personality indicator) significantly predicted buoyancy and yielded larger paths to buoyancy than to adaptability.

Following the adaptability conceptualisation outlined in the review of literature, adaptability was hypothesised as the capacity to adjust and modify personal resources in the face of life's novelty and uncertain circumstances (Martin, Nejad et al., 2012, 2013). Buoyancy, on the other hand, refers to students' ability to successfully deal with academic setbacks and challenges (e.g., poor grades, poor performance, stressors and pressures, threats to confidence; Martin & Marsh, 2008). As is evident, buoyancy connotes adversity, whereas adaptability connotes adjustment of personal resources in managing novel and uncertain circumstances. Hence, the important point of differentiation lies in the dissimilarities between adversity and setback on the one hand, and novelty and uncertainty on the other. Adversity is relevant to negative and uncomfortable situations that pose threats to one's safety and well-being (Martin & Marsh, 2008). New and uncertain situations, however, do not necessarily pose such threats. It is therefore important to know whether students are subject to adversity, or whether they are subject to uncertain and new situations and circumstances. It is also important to note that many illnesses also present individuals with novelty and uncertainty as many adversities do; however, the distinction is informed by being 'everyday' novelty and uncertainty. Additionally, that a adaptability (similar to buoyancy) is a proactive process whereas coping and resilience are more of reactionary responses to 'chronic' adverse and challenging life situations. The applied implications of this important differentiation are discussed further in a following section.

Furthermore, while the subtle differences between adaptability and its cognate factors, for example buoyancy, the roots of similarities are also acknowledged in the present study. As such, the results showed clear shared

variances between adaptability and buoyancy (Time 1 $r = .61$; Time 2 $r = .62$). The shared variance/overlap between the two constructs could be attributed to distal factors such as personality and ability, and to proximal factors such as socialising with and learning from the micro and macro environments (for example, parents and teachers) who might shape individuals' adaptability as well as buoyancy capacity in similar manners.

8.3.5 Role of adaptability in predicting psychological well-being.

Adaptability positively and significantly predicted general self-esteem, satisfaction with life and meaning and purpose at Time 1, Time 2 and in the longitudinal model. These findings confirmed important hypotheses in the current study. Adaptability was conceptualised as the capacity to modify and adjust personal resources as individuals navigate new and uncertain circumstances, leading to positive psychological well-being outcomes (Martin, Nejad et al., 2012, 2013).

It will be recalled that the three adaptability components (cognitive, behavioural, and emotional adjustments) were each argued to be potentially relevant to psychological well-being. In the case of cognition, this factor comprises information processing, self-beliefs and problem solving mechanisms and components (Schwartz, 1982). Cognition also appears to include cognitive control processes such as metacognition, forethought, performance control, self-regulation and SRL (Cleary et al., 2012; Cleary & Chen, 2009; Schunk, 2008). In line with these contentions, cognitive adaptability is also concerned with the regulation and modification of processes that require individuals to obtain (collect), store and process information they receive from their micro as well as macro environment and to make the necessary and appropriate cognitive adjustments in response to changes in these environments. Martin, Nejad, and colleagues (2012, 2013) argue that cognitive regulation plays a significant role in predicting well-being outcomes. Cognitive modifications have also been confirmed by other researchers to affect self-esteem, satisfaction with life and meaning and purpose (e.g., Pruessner et al., 2005).

Concerning behavioural regulation, it was proposed that individuals may display differential tendencies to regulate (adjust) their behaviour when faced with a disequilibrium relevant to new or different circumstances (Allison, 1976, 1981; Allison & Boulter, 1982; Allison, Miller, & Wozny, 1979; Ettinger & Staddon, 1983; Hanson & Timberlake, 1983; Hursh, 1978; Lea, 1983; Mazur, 1975; Rachlin &

Burkhard, 1978; Staddon, 1979; Timberlake, 1980, 1984; Timberlake & Allison, 1974; Timberlake & Wozny, 1979). Consequently, individuals who are better able to enact behavioural regulation may have an enhanced capacity to manage life uncertainty and novelty. Because such conditions have the propensity to deplete personal resources (Baumeister et al., 2006), behavioural regulation in the face of uncertainty and novelty may have positive effects on psychological well-being (and reduce negative effects on well-being). Indeed, others have also suggested that negotiation and management of life uncertainty and novelties is achieved through the adjustments and modifications of personal resources and that this leads to psychological well-being outcomes, including self-esteem (Crocker, Brook, Niiya, & Villacorta, 2006; Martin, Nejad et al., 2012, 2013).

Other research has shown that to successfully negotiate uncertain and novel circumstances, individuals also benefit from the capacity to adjust and regulate relevant emotion (Pekrun, Elliot, & Maier, 2006; Pekrun, Frenzel, Goetz, & Perry, 2007). One's capacity to regulate emotion holds implications for self-esteem, self-efficacy, self-regulation, problem solving, learning and achievement and similar psychological well-being outcomes (Nezlek & Kuppens, 2008; Pekrun et al., 2007; Pekrun et al., 2006). Even though there appears to be no definitive consensus on the definition of emotional regulation among researchers, most scholars tend to agree that emotional regulation embraces efforts to modify emotional stimulation in a way that promotes adaptive functioning (Calkins, 1997; Garber & Dodge, 1991; Keenan & Shaw, 2003). Such adaptive functioning encompasses well-being outcomes and positive development. Consistent with present conceptualising, it also encompasses "the ability to cope with life uncertainties and novelties" (Graziano et al., 2007, p. 4; see also Martin, Nejad et al., 2012, 2013).

There is a long history of emotional and cognitive-behavioural intervention research demonstrating students' capacity to enhance and sustain cognitive, behavioural and emotional regulation in a bid to more effectively function in relevant performance domains (e.g., Craven, Marsh, & Debus, 1991; Hattie, 2009; Martin, 2005, 2008; McInerney, McInerney, & Marsh 1997; O'Mara, Marsh, Craven, & Debus, 2006). These purposeful interventions may be a foundation for guiding advice on the personal regulation and modification required to constructively respond to novelty and uncertainty. These intervention efforts are discussed further in a following section.

8.4 Outline of an Adaptable Profile

Based on the current findings, a profile of the adaptable student may now be proposed. In terms of socio-demographics and prior achievement, it seems younger secondary school students are likely to be higher in adaptability. In terms of dispositional and characteristic orientations, adaptable students are likely to hold incremental beliefs of ability, to be conscientious and are less likely to be neurotic. Relevant to other adversity-based constructs, an adaptable student is more likely to be buoyant in the face of everyday academic difficulty and challenges. Finally, students' adaptability is likely to be demonstrated through higher levels of psychological well-being in the form of life satisfaction, self-esteem and sense of meaning and purpose. This profile represents a preliminary understanding that may enable practitioners to identify the types of students who are likely to be adaptable, assist students who may not reflect some or all of these factors and assess the effectiveness of students' efforts (on school-related tasks) by examining academic and non-academic outcomes to which adaptability intervention should ultimately connect. As discussed in Section 8.7, a second step in this research program is to formally profile adaptability using person-centred analytic approaches (e.g., cluster analysis) and to investigate intervention approaches relevant to the derived profiles.

8.5 Major Implications of Findings for Theorising

8.5.1 Adaptability and life-span theory.

Life-span theory asserts that development is a flexible and multidimensional process that involves cognitive, behavioural and emotional growth throughout life (Baltes, 1987; Staudinger et al., 1993). Further, life-span theory involves fixed components, which tend to be predispositional and which facilitate this dynamic process (Baltes, 1987). Similarly, adaptability focuses on the personal resource modifications and adjustments in individuals' psycho-behavioural functioning (Staudinger et al., 1993). Cognitive, behavioural and emotional components of development in adaptability are aligned with those articulated in life-span theory (Martin, Nejad et al., 2012). In life-span theory, the concept of malleability underscores the individual's potential to change in adaptive ability. Correspondingly, plasticity in adaptability also reflects the individual's capability of change (concerning personal resources) when faced with uncertainty and novelty. This capacity enables individuals to maintain successful (or discard unsuccessful)

strategies in dealing with various life circumstances (Staudinger et al., 1993). Another aspect of life-span theory that is aligned with adaptability is the multidimensional and multidirectional characteristics that aid an individual to adjust and modify individual resources throughout life and that also involves three interconnected factors (e.g., cognitive, behavioural and emotional; Martin, Nejad et al., 2012, 2013). The present findings also suggest the importance of personal beliefs (e.g., implicit theories) in considerations of life-span theory and also the inclusion of an emotional dimension in theorising in order to develop a comprehensive approach to how individuals deal with life changes and novelties.

The more specific life-span theory of control focuses on how an individual adjusts or modifies goals to the threats and opportunities that may exist in their environment (Heckhausen, 1999; Heckhausen & Schulz 1995; Heckhausen et al., 2010; Schulz & Heckhausen, 1996; Wrosch et al., 2002). Control in this theory refers to goal re-examination and regulation, which are theorised to be part of an adaptive adjustment and modification process (Tomasik et al., 2010). Although this theory includes two of the three components of adaptability, there is relatively less attention given to emotional adjustment (Martin, Nejad et al., 2012, 2013). Life-span theory of control thus may be further developed through inclusion of an emotional dimension in its constellation.

8.5.2 Adaptability and buoyancy.

Academic buoyancy is a factor that assists an individual to successfully and effectively manage minor difficulties and setbacks primarily in an educational setting (Martin & Marsh, 2008a). Adaptability is a construct linked with a person's capacity to effectively and successfully respond to novelty and uncertainty of everyday life adversities (Martin et al., 2012). Adaptability may extend buoyancy research and theory by providing added conceptual and applied dimensions to it. That is, whereas buoyancy is the capacity to help individuals deal with minor setbacks in academic setting, adaptability is the capacity that assists individuals to deal with uncertain and novel life (including academic life) circumstances through the adjustment and modifications of personal resources. Corresponding to adaptability, buoyancy is also a dynamic process that produces a desirable outcome and a positive adaptation. Both adaptability and buoyancy recognise and contend 'deficit-focused' approaches to development (Masten, 2001) and focus on meaningful adjustment and modification

of cognition, behaviour, and emotion through changes in life to achieve successful adaptive outcomes (Martin, Nejad et al., 2012, 2013). As with the 'everyday' nature of buoyancy, adaptability is also concerned with positive and negative changes that tend to be of the everyday nature (Martin, Nejad et al.).

8.5.3 Adaptability and evolutionary and Human Behaviour Ecology (HBE) models.

Evolutionary psychology is an approach to human cognition and behaviour in the context of adaptation to new environments (VandenBos, 2007). Human behavioural ecology (HBE) is defined as the evolutionary ecology of human behaviour. Its central focus is how the behaviour of modern humans reflects our species' history of natural selection (Borgerhoff Mulder, & Schacht, 2012). Both support the fact that uncertainty and change are part of life and individuals adhere to various resources and use complex behavioural and cognitive processes to adapt to these situations. Both HBE and adaptability are relevant to survival strategies through personal resource modification and adjustment to novelty and uncertainty. Evolutionary psychology and HBE are inclined to concentrate on behaviour and perception adjustment for survival, whereas adaptability also includes emotion and the management of situations dealing with novelty and uncertainty. Therefore, adaptability can potentially contribute to these theories by offering a further dimension to their framework that includes emotion regulation and the monitoring and management of situations to deal with life novelty and uncertainty.

8.5.4 Adaptability and positive psychology.

Positive psychology refers to processes that promote positive emotions and reduce maladaptive emotions in human development (Seligman et al., 2005). It is concerned with positive experiences, character strengths and virtues, happiness and positive relationships (Peterson, 2009), which consequently construct resilient personal resources (Fredrickson, 2001). Modification of cognition, behaviour, and emotion in positive psychology is similar to the role of these factors in adaptability, in that they equip and enable individuals to expand their emotional repertoires and cognitive-behavioural resources to enhance personal functioning (Bandura, 2001; Benight & Bandura, 2004). While positive psychology tends to concentrate on

emotion regulation for individuals' well-being, adaptability extends this approach by emphasising behavioural and cognitive factors as well.

8.5.5 Adaptability, models of change and models of adaptation.

8.5.5.1 Transtheoretical Model (TTM).

TTM focuses on development of healthy behaviour change (Prochaska et al., 1994; Velicer et al., 1998) through motivational willingness to support continuous, active and categorical views to healthy behaviour change. This model hypothesises that change is temporal and occurs in various stages (VandenBos, 2007). TTM concentrates on emotional and cognitive adjustments to achieve behaviour change (Parker et al., 2010a, 2010b). Adaptability also focuses on emotion and cognitive modification to attain change. Both TTM and adaptability theorise a progressive (individuals can move forward) and regressive (individuals may regress) process.

Adaptability complements and potentially extends the TTM model of change, in that TTM is a problem-oriented model of behaviour modification that is primarily aimed at individuals' health-related practices and functioning. TTM's stage progression is significantly associated with cognitive and affective changes that result in behaviour change (Parker et al., 2010a, 2010b). Adaptability shares some conceptual and contextual aspects with TTM. They both focus on cognitive and emotional adjustment and modification to bring about change. They both recognise a progressive as well as regressive process of adaptation. On points of difference, TTM looks at changing the person more substantially, whereas adaptability looks at adjustments in cognition, behaviour, and emotional repertoire that may be only temporary to deal with uncertain and novel circumstances. The adaptability framework also may offer greater flexibility and completeness to TTM frameworks since it recognises that substantial change (that is associated with TTM) is difficult, whereas more low-level adjustments may be more accessible and achievable. Further, while the TTM focus is to bring about desirable behaviour change and reduce relapse, adaptability does not dismiss the fact that regression or inaction can sometimes be regarded as an adaptive behaviour and/or outcome.

8.5.5.2 Adaptive Change Model (ACM).

ACM is an action and end-result oriented model. This model refers to changing or eliminating ineffective and unwanted behaviours and substituting them

with desirable ones utilising strategic processes (Bowles, 2010). This process includes visualisation of a desired behaviour, development of a plan followed by action and ultimate achievement of some closure that comprises change (Bowles, 2010). Although adaptability is parallel to ACM to some extent, instead of searching for a permanent or ongoing behavioural change, adaptability attempts to modify that behaviour based on an individual situation. Hence, adaptability is not so much about changing an individual or situation as much as it is about adjustment in cognition, behaviour, and emotion to navigate novelty and uncertainty. Thus, adaptability may be a complementary concept that can augment the scope of ACM to provide more flexibility in promoting cognitive, behavioural and emotional adjustment and modifications, not just behaviour change alone.

8.5.5.3 Adaptability and models of adaptation.

Models of adaptation argue that since individuals differ in their strategies and plans towards personal outcomes, it follows that adaptation must vary as well (Diener et al., 2006). Similar to adaptability, models of adaptation are based on the fact that when individuals are faced with uncertainties, they will regulate and adjust their behavioural, cognitive and emotional resources accordingly. However, these models of adaptation tend to place relatively heavier emphasis on the dispositional factors such as personality dimensions relevant to adaptation. It is proposed here that by also recognising adaptability, these models may extend their dispositional orientations to more state-like dynamic approaches that focus on cognition, behaviour, and emotion—all factors amenable to intervention, as discussed in the following section.

8.5.5.4 Adaptability, Self-regulated Learning (SRL) and emotion regulation.

SRL refers to control achieved through monitoring and directing behaviour, skills, thought, emotion and knowledge to invoke desirable behaviour and to circumvent undesirable ones (VandenBos, 2007). Self-regulation is an energy-based and adaptive human approach that allows individuals to attain autonomous control over their impulses, feelings and performances (Baumeister et al., 2006; Cleary & Zimmerman, 2004). The regulation of cognition can increase motivation and develop strategic planning. Self-regulation can also influence behaviour by way of gathering

information regarding the task at hand, making short-term plans and goals and then acting to bring about desired adaptation (Hadwin & Winne, 2001). There is also research theorising a relation between self-regulation and emotional regulation (Gross, 2002).

Gross (1998) defines emotion regulation as “the process by which individuals influence which emotions they have, when they have them and how they experience and express these emotions” (p. 275). Emotion regulation occurs when an individual evokes emotions as a course of action (Gross, 2002). Among outcomes of emotion regulation are adjustment in cognition and behavioural and physiological responses (Gross, 2002). Further, Pekrun, Goetz, Titz, and Perry (2002) asserted that the effect of emotion on academic achievement is mediated by a host of cognitive and motivational mechanisms. They also argued that emotion involves a cognitive component that comprises three elements: thoughts about task, thoughts about mastery and achievement and thoughts about social setting within the school environment. Pekrun and colleagues (2009) argued that SRL is an important instrument in academic achievement. SRL implies planning, monitoring, adapting learning strategies and promoting cognitive flexibility.

Alongside these approaches to self-regulation, it is appropriate to note that adaptability refers to the adjustment and modification of cognitive, behavioural, and emotional resources when navigating novel and uncertain situations. However, whereas adaptability quite evenly considers cognition, behaviour, and emotion, SRL approaches have tended to emphasise cognition and behaviour and give relatively less attention to emotion regulation. Indeed, recent research exploring the dual roles of adaptability and self-regulation in predicting academic and non-academic outcomes shows that each explains unique variance in these outcomes (Martin, Nejad et al., 2013).

The present study lends support to the need to also emphasise emotional regulation in SRL theorising. Additionally, the adaptability approach clearly identifies qualitative differences in the environmental demands placed on individuals, one of which is that involving uncertainty and novelty. SRL frameworks are not so specific about the demands or circumstances facing individuals. Thus, whereas self-regulatory models tend to focus broadly on learning tasks and academic demands, the adaptability construct is focused squarely on change and purposeful adjustments and modifications to deal with change. Lastly, whereas self-regulatory

models of learning see the adaptation phase as a final one, adaptability is hypothesised as a primary, active and purposeful strategy that is an antecedent to outcomes (as modelled and demonstrated in the present study). Taken together, adaptability may offer some added perspectives to existing SRL frameworks.

8.6 Intervention Relevant to the Present Findings

8.6.1 Intervention relevant to adaptability components.

8.6.1.1 Cognitive regulation.

In terms of intervention, it is noteworthy to recognise that cognitive adaptability is concerned with how individuals develop higher-order thinking and information processing strategies to encourage adjustment and modulation in cognition (Folkman et al., 1986; Schunk, 2008). Cognitive adaptability is relevant to the development of strategies that serve to support and encourage the process of thinking about one's thoughts, feeling, emotions and actions. Indeed, this is aligned with metacognition pertaining to higher-order thinking about what individuals know about themselves, their circumstances, their environments and their tasks (Folkman et al., 1986; Schunk, 2008). These strategies may include training that focuses on hypothetical novel or uncertain situations (Halpern, Hansen, & Riefer, 1990). Individuals may also need to relearn how to do things when they are faced with new situations. They may have existing unhelpful thought repertoires in new and uncertain situations that need to be refined or improved. This will entail teaching students how to move on from old learning scripts that guided past approach thinking. Further, there may be a need to teach students how to be more open and conscientious about their thinking processes (LePine et al., 2000).

Cognitive-behavioural theory posits that many psychological problems derive from maladaptive thinking processes (Beck, & Liese, 1998; Beck, Wright, & Newman, 1992; Beck, Wright, Newman, & Liese, 1993; Ellis, 2004; Ellis, Abrams, & Abrams, 2008). Cognitive-behaviour therapy (CBT) postulates that there are three bidirectional components in this theory: thinking, behaviour and emotion (Kaplan & Carter, 1995). CBT intervention offers a wide range of strategies assisting individuals with cognitive management and regulation. These include: contingency management and behaviour control, functional analysis, stress management, programmed therapy and writing therapy and attention to common cognitive errors,

such as filtering, polarised thinking, overgeneralising, mind reading, catastrophising, personalisation, control and fairness fallacies and the like (Beck, 1976). Furthermore, Cleary and Zimmerman (2004) have provided intervention advice that may improve self-regulation among students. Their intervention program (Self-Regulation Empowerment Program – SREP) includes graphing, cognitive modelling, cognitive coaching, and structured practice sessions. Such intervention programs are to help students learn specific academic and study skills as well as problem solving capacity (e.g., writing psycho-educational reports and conducting assessments). Each of these techniques may be useful to inform and guide the development of interventions seeking to foster cognitive regulation in the face of uncertainty and novelty.

8.6.1.2 Behavioural regulation.

Behavioural regulation is concerned with modifying and adjusting behaviour in response to internal and/or external stimuli as an individual faces disequilibrium (Timberlake, 1984). Importantly, in this model, cognition is argued to be a significant determinant of behaviour regulation (Schwartz, 1982) and thus to be able to regulate behaviour one needs to have the capacity for cognitive regulation as well. Behavioural regulation therefore includes elements of cognitive regulation. Another major tenet is that faulty and maladaptive behaviour is principally a learned behavioural pattern and that to change and modify it one needs to modify the reinforcement contingencies that govern that behaviour (Kaplan & Carter, 1995). A few of these techniques are as follows: extinction and cue exposure procedures, counter-conditioning and aversion procedures, contingency management and behaviour contracting, behaviour self-control training and programmed writing therapy (Kaplan & Carter, 1995). These may be fruitful intervention directions for the behavioural component of adaptability.

8.6.1.3 Emotional regulation.

Emotional regulation from the cognitive-behavioural standpoint is an extension of the individual's cognitive and behavioural response. In fact, cognitive-behavioural approaches postulate that behaviour is the individual's observable response and that emotion is the reaction to how an individual thinks about an issue and/or matter (Kaplan & Carter, 1995). Positive emotions are vital for human adaptation and behaviour (Pekrun et al., 2002). Positive emotions facilitate

envisioning goals and attainment, they facilitate problem-solving, protect health by promoting and nurturing resilience, facilitate attachment to significant others, prepare the groundwork for individual self-regulation and guide the behaviour of groups and social systems (Pekrun et al., 2002).

Recent studies point out two major areas for promoting and enhancing positive emotions: (a) nurturing students' interest in schoolwork and (b) attending to students' causal attributions, ability self-concepts and academic expectations (Ferris & Gerber, 1996; Helmke, 1993; Larson, Hecker, & Norem, 1985; Pekrun et al., 2002). Moreover, causal attributions, self-concepts, and academic expectations are relevant to students' view of control over school-related behaviour and outcomes (Pekrun et al., 2002).

Pekrun and colleagues (2002) assert that cognitive appraisals can be assumed to be significant sources of emotions beyond the effects of physiological processes and genetic dispositions. Further, they argue that a significant component of cognitive appraisal is the control-value construct that also is an important influencing factor in determining achievement-related emotions. Examples of value-related appraisals are intrinsic values and goals relevant to outcomes. Consequently, Pekrun and colleagues suggest that emotion regulation in the academic domain, for example, needs to address students' sense of mastery and control in a given academic subject, as well as the value and utility students attribute to academic subjects (2002). They believe that there is a host of variables that can affect value and control appraisals initially, which may then affect students' emotions (including students' adjustment of emotions). These variables are as follows: (a) the quality of classroom instruction, (b) autonomy support, (c) social achievement expectancies and values, (d) feedback and consequences of achievement, and (e) support and social relatedness with parents, teachers and peers in the learning context (Pekrun et al., 2002). Each of these dimensions may be informative to interventions aiming at promoting emotional adaptability or regulation.

8.6.1.4 An adaptability process.

Relevant to adaptability intervention, the present investigation proposes that adaptability intervention processes might be similar to adversity-related intervention processes such as those targeting resilience. For example, Morales (2000; see also Martin & Marsh, 2009) has hypothesised a resilience cycle that is focused on

supporting individuals' capacity to manage risk on a continuing basis. Drawing from and adapting this approach, adaptability intervention might encompass the following process:

1. The realistic and effective realisation and recognition of uncertainty and novelty that might call for adaptability;
2. The individual making appropriate adjustments to cognitive, behavioural, and/or emotional functioning;
3. This resource modification and adjustment assisting the individual to successfully navigate uncertainty and novelty;
4. The individual being motivated to distinguish the value of these modifications and hence improve them;
5. The ongoing improvement and implementation of cognitive, behavioural and/or emotional fine-tuning and regulation that sustains the individual's capacity to manage and handle ongoing uncertainty and novelty in their non-academic and academic life.

There is a wide range of emotional and cognitive-behavioural intervention research showing that students can be trained to regulate cognition, behaviour, and emotion to more effectively function in a given performance domain (e.g., Craven et al., 1991; Hattie, 2009; McInerney et al., 1997; O'Mara et al., 2006). These purposeful interventions may be a foundation for providing the sorts of modifications required to constructively respond to uncertainty and novelty.

8.6.2 Intervention relevant to predictors of adaptability.

Adaptability intervention may also focus on the socio-demographic, prior achievement, personality and implicit theories found to significantly predict it. Each of these factors is addressed in the following sections.

8.6.2.1 *Prior achievement.*

Prior achievement was found to significantly and positively predict adaptability. This finding suggests that low achievers might be identified and supported in the cognitive, behavioural, and emotional factors and processes relevant to the management of multiple academic demands that will concomitantly assist their adaptability. This may include, but not be limited to, educational support (Sanders, 1999), funding for reading and numeracy skill development (Duncan et al., 2007) and

teacher's aides (Gerber, Finn, Achilles, & Boyd-Zaharias, 2001). It may also entail educators providing educational opportunities that aim to enhance students' achievement and then develop processes that allow these students to build on those successes (Martin, 2010). The learning environment may need to be further considered in such a way that encourages students to take a proactive role in their learning endeavours (Au & Carroll, 1997; Driver & Oldham, 1986).

Alongside this might be a focus on skill development if key skills relevant to achievement may be flagging. Examples of such skills might include literacy, numeracy, writing, study management and similar (Duncan et al., 2007; Gerber et al., 2001; Martin, 2006; Martin et al., 2012). It might also involve instructional techniques that are known to yield larger effect sizes in achievement. Direct or explicit instruction is one such approach. This involves carefully planned curriculum and lessons that supply students with considerable, yet progressively reduced amounts of guidance focused on a sequenced and increasing mastery of curriculum-based ability (Liem & Martin, 2013a).

For parents, enhancing achievement might involve additional help and guidance with homework and study (Hoover-Dempsey et al., 2001; Hoover-Dempsey & Sandler, 1997) and obtaining educational assistance (e.g., tutoring for specific subjects; an occupational therapist for writing difficulties) when needed (Cohen, Kulik, & Kulik, 1982; Rosenblum, Weiss, & Parush, 2003). Assistance might also involve a closer relationship and communication with the young person's teacher/s, so parents may quickly identify problems as they arise and work with the school to resolve them (Hill & Taylor, 2004).

8.6.2.2 Language background.

The present research also included language background (referred to as NESB) as a potential predictor of endogenous factors in the adaptability model. At Time 2, NESB predicted adaptability such that NESB students were found to be more adaptable. Language background, however, did not significantly predict adaptability in the longitudinal model. This may have been because longitudinal modelling controlled for prior variance in outcomes and hence left no further significant variance to be accounted for by the language background factor (NESB). On the other hand, cross-sectional modelling did not control for prior variance in outcomes and therefore permitted variance to be explained by NESB in outcomes.

NESB students may have greater access to rich and novel experiences as they observe and learn from their parents on how to adapt to uncertain and new life situations in a new country. They may also experience this need for adaptability first-hand when they are faced with uncertain and novel situations that their new life offers them. It may therefore be desirable for adolescents from an ESB background to learn from this and engage in situations that evoke novelty and require the student to move beyond their comfort zone—as many NESB individuals must.

8.6.2.3 Personality.

Personality factors were significantly associated with adaptability that, in turn predicted well-being outcomes (see also Martin, Nejad et al., 2012, 2013; O'Rourke, 2005). It is important to point to a review by Ginns and colleagues (2011), who describe how individuals of different personality profiles can be taught to modify cognition, behaviour, and emotion. This holds important implications for intervention. The following section presents some thoughts concerning intervention relevant to the longitudinal findings on personality and adaptability.

8.6.2.3.1 Neuroticism.

Neuroticism was found to significantly negatively predict adaptability. Neuroticism refers to attributes such as anxiety, anger, fear, worry, impulsivity, depression (Costa & McCrae, 1980) and irrationality (Spörrle et al., 2010). Neuroticism is also concerned with poor impulse control (Costa & McCrae). It positively correlates with irrational thoughts and beliefs in which results in maladaptive emotions and reduced well-being, including satisfaction with life (Spörrle et al.). The present findings highlight the fact that neuroticism impedes individuals' capacity to regulate and manage thinking, behaviour and emotion. Hence, the findings have potential implications for practitioners dealing with individuals exhibiting a neurotic disposition. These practitioners may recommend talk therapy, counselling, CBT, or rational emotive behaviour therapy (REBT) to bring their client's maladaptive and ineffective thought process under control (Hooke & Page, 2002; Spörrle et al.).

Hooke and Page (2002) show that CBT intervention for dealing with neurotic disorders must include components of self-esteem and self-efficacy enhancement.

This process would also reduce stress and anxiety levels. Further, they suggest that the intervention program should include:

psycho-education, cognitive therapy (with self-monitoring), behavioural assignments to challenge thoughts and beliefs, goal setting, assertion, self-esteem training, stress management, information on a healthy lifestyle, relaxation training and a social supporters' session, where each participant attends the session with a significant person. The structure allows sufficient time and flexibility for the discussion of both group and individual issues. (Hooke & Page, 2002, p. 652)

Rational emotive behaviour therapists, on the other hand, believe that neuroticism positively correlates with irrational thinking, beliefs, and emotion that lead to maladaptive thoughts, behaviour, and emotions (Spörrle et al., 2010). REBT practitioners employ the ABCDE (Activating experience, irrational Belief about experience, upsetting emotional Consequences, Disputing of irrational ideas, new Emotional consequence or effect) model of therapy to assist clients to deal with neurotic disorders (Bernard & Wolfe, 2000; Ellis & Dryden, 1997; Ellis & Harper, 1997; Spörrle et al., 2010; Walen, DiGiuseppe, & Dryden, 1992).

REBT intervention tends to address the central irrational thoughts (including absolutist demands and self-evaluations) through a process of self-talk, debating, confronting and group discussions. The aim of therapy is to increase client awareness of the destructive force of irrational thoughts and beliefs, as well as the illogical origin of such beliefs. Consequently, interventions of this approach provide the basis for the successful regulation and adjustment of irrational cognitions that would potentially result in fewer cognitive, behavioural, and emotion maladaptive responses to the unpleasant events in a client's life (Spörrle et al., 2010).

For educators, it is important to recognise that they are likely to have anxious students in the classroom, that this potentially affects these students' adaptability (via neuroticism) and that in order to facilitate learning and better manage students' behaviour this symptom of neurosis must be dealt with. McInerney and colleagues (1997), in their study of the effects of metacognitive strategy training within a cooperative learning context, show that anxious students perform poorly and that this can lead to low self-esteem and self-efficacy. Consequently, they suggest that teachers needed to provide more structured curriculum and lessons for students with

worried, anxious and apprehensive dispositions and also engage a student-centred teaching style.

Educators might also look to reduce stress in these students' academic life and seek to promote or create more secure and supportive school climates. For example, research shows that students are less anxious more motivated and demonstrate more positive learning repertoires when their school or classroom accentuates mastery, improving skills and knowledge and understanding (Meece, Anderman, & Anderman, 2006). On the other hand, school settings that are focused on displaying high ability and rivalry for grades may elevate the academic performance of some students, but lead to reduced motivation and increased anxiety and fear of failure in other students (Martin & Marsh, 2003; Meece et al., 2006). Indeed, this is the case beyond the academic domain. It seems that a mastery climate (i.e., a learning environment emphasising skill development and mastery rather than competition among students) counteracts anxiety (and similar symptoms associated with neuroticism) by reducing social comparison pressure, focusing on controllable effort and by creating a mutually supportive group environment (McArdle & Duda, 2002; Vazou, Ntoumanis, & Duda, 2006).

In a similar vein, parents of children high in neuroticism might look to provide a supportive, accepting home environment for their children. However, it should be noted that parents' involvement in their children's academic lives and schoolwork is not always positive (Grolnick, Benjet, Kurowski, & Apostoleris, 1997; Pomerantz, Moorman, & Litwack, 2007; Wentzel, 1998) and this can exacerbate neurotic symptoms such as anxiety (Pomerantz et al., 2007). Parental involvement is categorised into two forms: in-school and at-home involvement. Most of parents' in-school involvement tends to be limited to attending school functions and teacher-parent meetings and conferences; that is, efforts that must be encouraged and welcomed by educators as well as parents. At-home involvement takes many forms, including helping with homework, optimising a stress-free and quiet home environment and providing a supportive home life (Pomerantz et al., 2007). It is through quality parental involvement that parents can positively affect their children's well-being, including reducing neuroticism symptoms such as emotional distress, anxiety and worry (Wentzel, 1998).

Parents' quality of involvement with their children (primarily aged between 4 to 15) can be further categorised into four styles: person focus versus process,

autonomy support versus control, positive versus negative beliefs about children's potential and positive versus negative affect (Pomerantz et al., 2007). Research shows that parents holding process-focused, controlling approach, negative emotions, and beliefs concerning their children would potentially give rise to neurotic disorders in their children (Spörrle et al., 2010). Following from these four styles, intervention recommendations include: parents giving attention to supporting autonomy more than control, focusing on positive more than negative emotion, holding positive more than negative parenting beliefs about children's potential, and emphasising a process more than person-focused approach (Pomerantz et al., 2007). Hence, to reduce neurotic emotions and behaviours, parents might look to provide autonomous, positive parental beliefs, and an encouraging home environment (Pomerantz et al., 2007).

8.6.2.3.2 *Conscientiousness.*

As indicated earlier, conscientiousness refers to a propensity to be self-disciplined, autonomous, organised (self-organising), reliable, responsible and effortful (Judge et al., 1999). The longitudinal results showed that conscientiousness positively predicted adaptability. These findings present important implications. They indicate the need to promote conscientious characteristics in students' lives to enhance their capacity to purposefully regulate their personal resources and enhance their adaptability.

Relevant to intervention, it is recommended that parents and mental health practitioners encourage and support conscientious attributes in order to increase adaptability and potentially additional positive well-being outcomes. As for educators, students high in conscientiousness tend to show more self-directed, self-organised and effortful actions towards achievement (Judge et al., 1999). In sum, they demonstrate notable intrinsic motivation, which has been associated with higher academic achievement, performance and well-being (Boggiano, Main, & Katz, 1991). Studies also reveal that caregiver or teacher controlling behaviour promotes an extrinsic orientation towards learning and an external locus of control that may lead to lowered intrinsic motivation, impaired problem-solving skills and decreased mastery strivings in children (Boggiano, Main, & Katz, 1988; Deci & Ryan, 1985, 1987; Flink, Boggiano, & Barrett, 1990; Lepper & Greene, 1978; Ryan, 1982). Other research shows that children with an extrinsic orientation see powerful others or

uncertain causes as accountable for their outcomes, whereas intrinsically oriented children view internal factors as accounting for achievement outcomes (Boggiano et al., 1989). Once again, there is evidence of teacher and parent practices that can address factors that predict students' adaptability.

8.6.2.4 Implicit theories of ability.

It has been proposed that there are two beliefs about intelligence and ability: entity or incremental views (Blackwell et al., 2007; Chiu et al., 1997; Dweck et al., 1995; Stipek & Gralinski, 1996; Wood & Bandura, 1989). Entity views hold that personal attributes, intelligence and mental abilities are relatively predetermined and primarily set at birth. Incremental views hold that personal characteristics are fairly malleable. Along the lines of hypotheses, incremental beliefs about intelligence and ability significantly and positively predicted adaptability, entity beliefs also moderately and positively predicted adaptability. Additionally, adaptability significantly mediated the association between incremental beliefs and the psychological well-being outcomes. Further, prior academic achievement as an indicator of ability significantly moderated the effects of incremental beliefs on adaptability (indicating a significantly stronger positive effect of incremental beliefs on adaptability for low ability students than for their higher ability counterparts) as well as gender (indicating a stronger positive effect of incremental beliefs on adaptability for male than female students). Importantly, the effects of incremental beliefs were more substantial than the effects of entity beliefs and so incremental beliefs are emphasised in the following discussion of intervention implications.

8.6.2.4.1 Incremental beliefs.

Longitudinal analyses showed that incremental theories of ability positively and significantly predict adaptability. Relevant to intervention, the findings on students' incremental beliefs hold numerous implications. Two lines of work are important here. First, research into the field of growth and growth mindsets (Dweck, 2006) informs practical methods aimed at promoting incremental beliefs about ability that assist people to see that personal modification and adjustment are possible and how to make such changes or modifications. Yeager, Miu, Powers, and Dweck (2013), for example, suggest that individuals' incremental beliefs and efforts are enhanced if there is emphasis on aspects of their tasks that they can control (e.g.,

their effort), more than on aspects of tasks over which they have relatively less control (e.g., luck). Parents and educators may seek to change and modify young people's schemata that are the building blocks of what young people think and believe about themselves. For example, they may adjust core academic schema through focusing more on learning goals (than performance goals) and fostering the value and usefulness of effort (more than on task difficulty or low ability) (Hong, Chiu, Dweck, Lin, & Wan, 1999). Parents and educators can also foster growth mindsets through developing, improving and nurturing mastery-oriented strategies such as skill development, learning for understanding and self-improvement (Robins & Pals, 2002).

Second, recent work has emphasised the potential utility of growth goals and growth assessment. This growth perspective on students' academic and non-academic development is in line with the adaptability construct and thus adaptability may be a significant factor to include in growth-related conceptual and applied frameworks. Research into growth goals (Liem et al., 2012; Martin & Liem, 2010) has indicated that personal best goals positively correlate with academic and non-academic outcomes. These growth goals may be another fruitful means by which to sustain incremental beliefs in students' lives. Similar growth approaches have been recently proposed in the assessment domain (Anderman, Anderman, Yough, & Gimbert, 2010) and these may also help lay a better foundation for students' incremental views.

Goal theory also offers guidance for sustaining incremental beliefs about intelligence and ability. Under goal theory, practitioners and parents are encouraged to promote mastery goals when dealing with children. Mastery goals focus on engaging with the task at hand and encouraging students to position themselves as their own points of (self) comparison. Moreover, mastery goals use task outcomes as a way of establishing competence as well as one's self. In so doing, they better define achievement for themselves, becoming more concerned with self-improvement (e.g., 'Can I do better next time than last time?') than normative or social comparisons (Elliot, 2005; Martin & Liem, 2010). Inherent in this view, young people would learn that they can improve their skill levels (an incremental belief) and to rely on factors they can control (Anderman et al., 2010).

In addition, parents may need to be aware of the same issues so they can assist their children by explaining, showing and then helping them to form healthy

and adaptive beliefs regarding their academic skills and abilities. Research concerning motivation and implicit theories asserts that parents' beliefs mediate their approach to childrearing (Dix, Ruble, & Zamberano, 1989; Dweck, 2006; Dweck et al., 1995; Hoover-Dempsey & Sandler, 1997; Runco & Johnson, 2002). For example, parents' own implicit beliefs of ability affect the development of implicit beliefs (in the form of schema) in their children (Dix et al., 1989).

8.6.3 Intervention promoting academic buoyancy.

Positioned as a cognate construct to adaptability, academic buoyancy did share significant variance with adaptability. To the extent that this is the case, efforts to promote buoyancy may also have potential 'ripple effects' for adaptability. Accordingly, some brief discussion on how to promote academic buoyancy is in order. Martin and Marsh (2006) and Martin, Colmar and colleagues (2010) emphasise the '5Cs' of academic buoyancy: coordination (planning), confidence (self-efficacy), commitment (persistence), composure (low anxiety), and control. In longitudinal (Martin, Colmar et al., 2010) and cross-sectional research (Martin & Marsh, 2006), the five factors are suggested to significantly influence students' academic buoyancy. The investigators further suggest these factors might also be useful from an intervention point of view. On each of these '5Cs', it is to be noted that various studies identify effective intervention programs and efforts (e.g., see Craven et al., 1991; Hattie, 2009; Marsh, 2007; Martin, 2005, 2008; McInerney et al., 1997; O'Mara et al., 2006).

Another study further identifies contextual factors that may also underpin academic buoyancy (Martin & Marsh, 2008a). Consistent with much prior study into risk (Masten, 2001), Martin and Marsh (2008a) identify the importance of good student-teacher relationships for supporting and encouraging academic buoyancy. Further, recommendations in other studies emphasise the necessity for teacher professional development to help and support disadvantaged and disengaged students. It is worth mentioning that improving student-teacher relationships is one of the main areas targeted for such professional development (Becker & Luthar, 2002; Martin & Dowson, 2009).

Process-focused frameworks are suggested as another means of enhancing buoyancy. This is based on practice and theory that articulate the processes by which intervention and support for buoyancy and resilience can emerge. For example, Rutter

(1987) suggests four stages in the path to building an ability to manage and handle adversity and setback as follows: (a) lessen the effect of risk or change students' risk exposure, (b) decrease possible negative chain reactions following exposure to risk, (c) develop self-efficacy, and (d) create and foster new opportunities for more adaptive outcomes.

Correspondingly, as discussed earlier, Morales (2000) suggests a resilience cycle in which students effectively recognise risk, the students search for protective factors that may reduce the effects of risk, the protective factors help students to navigate the risk and, finally, the students realise the worth of this protective factor and improve on it. According to Morales, the continuous process of modification, improvement and implementation of the protective factors that sustain students' capacity to navigate risk would follow. Collectively, these process-oriented approaches to optimising buoyancy and resilience may hold shared relevance to adaptability.

Putwain and Daly (2013) have also proposed approaches to build and augment academic buoyancy including the promotion of academic self-confidence through personalising tasks where possible, improving self-regulation by way of persistence and planning, utilising feedback to support effort attributions, and promoting feedback to reduce fear of failure and comparison with peers. Importantly, they also suggest that a major appeal of such strategies is that they can be integrated into standard learning and teaching activities, without the need for specialist intervention.

8.7 Limitations and Future Directions for Research

Notwithstanding the numerous contended contributions of the present study, there are some limitations that need to be addressed when interpreting findings. Recognition of these limitations also lays a foundation for future study and research.

8.7.1 Self-reported data.

It is important to be aware that data presented in this research are self-reported. Students answered a set of questions in class after teachers provided them with general directions about the procedure. A possible challenge with self-reporting measures is the supposition that people have a full understanding of adaptability and its factors (e.g., cognitive adjustment and so forth). Some students, for example, may not have a clear understanding about the difference between emotion and cognition, or chronic adversity and life uncertainties. Self-reported data are criticised because of a potential inconsistency between what students report and what they in reality do

(Cook & Campbell, 1979). It is argued that cognitive factors such as faulty recall, misinterpretation of item meaning and poor comprehension have the potential to compromise validity and produce erroneous data (Karabenick et al., 2007). Hence, the results from the current study must be interpreted with this in mind. Moreover, to further assess adaptability, it is important for future research to evaluate the construct using data derived from other sources, such as, for example, that from parents and teachers. Furthermore, since self-reported measures tend to rely significantly on subjective view and/or interpretations of participants concerning an issue or of self. To overcome this challenge in this study, the researcher could have used a mix of questionnaire (quantitative method) and observation/interview (qualitative method) to further investigate adaptation-related behaviours.

Even though the challenges concerning self-reported data are important to reflect on when interpreting results, there are also some significant advantages relevant to self-reported data, which may mitigate some of the above concerns. Research shows that self-report items can offer accurate data when appropriate data collection procedures and appropriate instrument construction are followed (see Brener, Billy, & Grady, 2003; Crockett, Schulenberg, & Petersen, 1987; Freier, Bell, & Ellickson, 1991; Hanna, Bligh, & Lenke, 1970). For example, studies show that student perception, or other people's perception of students, can provide more details concerning variance than observational data (e.g., Fraser & Walberg, 1981; Rosenshine, 1971). Further, the inclusion of self-reported data in the current study is justifiable and reasonable because the adaptability construct is by nature subjective, intra-psychic and latent (Crockett et al., 1987; Karabenick et al., 2007).

8.7.2 Domain-general versus domain-specific construct.

Another key factor germane to limitations and future investigations noteworthy of mentioning is that the current adaptability measure is domain-general and not specific to a particular situation, task or context (e.g., school, sport). It is, then, possible that the more focused the measure is on a specific domain or situation the more it connects to cognate factors also located in that domain. Importantly, however, the domain-general adaptability measure predicted general psychological well-being outcomes. Hence, it is recommended that even as a domain-general measure, adaptability is noteworthy. Future research, however, might look to investigate adaptability in specific school subjects - or in other performance areas

(e.g., sport, work) or towards specific contemporary situations or issues (e.g., attitude and behaviour towards climate change)—in order to better understand its importance as a construct.

8.7.3 Inclusion of qualitative and other methodologies.

In terms of methodology, the current research was a quantitative study and thus prone to limitations in terms of what can be understood through such data. Future studies might involve additional qualitative data to improve the level of understanding about how and when adaptability may function and operate. The types of questions that a qualitative study would answer might be the way different cultures use adaptability resources or how individuals from different ethnic backgrounds would interpret everyday novelties and uncertain life situations. These can be investigated through interviews and focus groups. Another course of action might be to collect data at the time of a new situation (e.g., at a time of transition such as the beginning of a school year) to examine the extent to which individuals who attain higher scores on adaptability show more helpful and successful modifications than those scoring lower on adaptability. Certainly, this might involve collecting real-time information from students, which would enable simultaneous qualitative and quantitative data at particular times of uncertainty and novelty). Recently, Malmberg and colleagues (in press) have shown the efficacy of Personal Digital Assistants as a means of collecting real-time data on learning and instruction from students. Further, the present investigation has adopted a variable-centred methodology to adaptability; future work might benefit further by considering person-centred methodologies. This method would entail recognising groups of students considered as adaptable (or not) and determining the factors that establish their group membership. This provides the advantage of studying patterns of adaptability occurring ‘naturally’ and it may also offer opportunities for in-depth case study research. Another course for future research would be to collect behavioural data in the context of a new (novel) circumstances (e.g., in the laboratory) or in the course of a period of transition (in daily life) to see whether adolescents who score higher on the Adaptability Scale in fact show greater plasticity, resourcefulness and efficacious cognitive, behavioural and emotional modification and fine-tuning than those scoring lower on the scale.

8.7.4 Inclusion of additional measures and constructs.

Adaptability, as discussed earlier, is an extension or complement to current models of adaptation, self-regulatory, and defence mechanisms. Hence, there is a likelihood that it also shares variance with cognate factors and correlates relevant to these models and processes. Consequently, there might be value, including coping and models of change (e.g., TTM and ACM) measures in future study. Although the current research included buoyancy as an adaptability correlate, future studies might endeavour to disentangle any remaining variance pertinent to coping, self-regulation and other such factors.

As noted above, recent research shows that adaptability and self-regulation each explain unique variance in academic and non-academic outcomes (Martin, Nejad et al., 2013). Other personal characteristics (e.g., capacity for delayed gratification, need for closure, risk aversion, tolerance for ambiguity) relevant to uncertain and new circumstances might also be valuable to reflect on. Extending the adversity-related investigation, it might also be of value to study and understand the collective effect of uncertainty and novelty. For example, is there a critical point where too much novelty or uncertainty represents adversity and would this signal the need for resilience, buoyancy, or coping? A recent study shows that the presence of two risk factors is sufficient to predict academic failure (Lucio, Hunt, & Bornovalova, 2012). Considering this, how does this compare with accumulating novelty and uncertainty? Further, it might be significant to realise the limits of adaptability. There may be new and uncertain circumstances where some level of stability and steadfastness is required. What would be the cost of a stable sense of self and character relative to personal resource regulation?

8.7.5 Current unexpected results and further investigation.

An interesting and unexpected finding was the effect of entity beliefs on adaptability. Entity beliefs positively predicted adaptability at Time 1 and at Time 2, but negatively, as expected, in the longitudinal model. This was a surprise since entity beliefs connote inflexible views about a person's ability and intelligence, somewhat contradictory to the adaptability framework. Adaptability describes an individual's capacity to adjust and modify personal resources in response to uncertainty and novelty, hence, being flexible and prepared to regulate and change cognition, behaviour, and emotion as required (Martin, Nejad et al., 2012, 2013).

Although entity and incremental beliefs conceptually operate as two independent constructs, there are some children and young people who see intelligence and outcomes as determined by both ability and effort (Dweck, Chiu, & Hong, 1995; Martin, Marsh, & Debus, 2001b; Stipek & Gralinski, 1996) and thus inclusion of both entity and incremental beliefs in the one model accounts for this and controls for shared variance. In doing so it is possible to identify the unique effects of entity and incremental beliefs. Accordingly, some of the surprising effects for entity beliefs may be accounted by the fact that some students hold both entity and incremental views, leading to the possibility of a positive association between entity beliefs and adaptability. Further research is needed to better understand the relationship between entity beliefs and adaptability.

8.7.6 Consideration of education perspectives.

The present study makes an assumption that individuals function within communities and are social beings; hence, there might also be advantage in exploring the role of school and school environment in the development of adaptability and its effects (Lerner & Galambos, 1998; Pintrich, 2000; Turner & Patrick, 2008). Sanders (1999) notes that teacher and school environment play a major role in student achievement, and student achievement is relevant to adaptability and how students regulate their personal resources to manage academic demands (Martin, Nejad et al., 2012, 2013). Consequently, it would be of interest to assess and examine the role of teachers, academic subjects, school environment and school connectedness in the development of students' regulatory capacity and adaptability and how all of these link to school achievement and other valued academic outcomes.

8.7.7 Consideration of intervention and practice perspectives.

Relevant to intervention and practice, it is important to examine how adaptability can be of use in a practical sense for enhancing psychological and behavioural functioning. Research shows that individuals' capacity to regulate their cognitive, behavioural and emotional repertoire may improve their psychological well-being (Martin, Nejad et al., 2012, 2013). Future research might focus on the effects of adaptability or the building blocks (factors) of adaptability in planning interventions for adolescents with behavioural difficulties (e.g., externalising

behaviour, conduct issues), emotional problems (e.g., feeling depressed), and cognitive difficulties (e.g., anxious or worrying thoughts).

8.7.8 Consideration of developmental perspectives.

The present research did not include post-school measures and samples. It would be beneficial for future research to assess how the central factors that develop through one's academic life serve to influence development later on in life after school. For example, it would be interesting to learn how and the extent to which cognitive adaptability, behavioural adaptability and emotional adaptability develop after adolescence. It would also be interesting to determine if adaptability in the final year of high school predicts positive post-school trajectories after leaving school. In line with calls for more comprehensive approaches to human development, Alexander (2000) argues that academic developmental research needs to examine models that account for academic growth and achievement through childhood, adolescence and adulthood. Adaptability is a construct that appears to align with this.

Taken together, a comprehensive developmental approach would provide additional insight into how the various processes offered in the model track through life-span trajectories. Applying appropriate and age-relevant educational interventions depends on a more comprehensive knowledge of how these constructs and their underpinning processes operate at distinct developmental levels. This would more efficiently provide treatments and interventions that are specifically suited to an individual's developmental stage and context.

8.7.9 Inclusion of emotional regulation in educational research.

Future research may also include an expanded consideration of emotion in educational research. The lack of inquiry on emotions in education (notwithstanding anxiety) has been noted by many recent studies and scholars (e.g., Ainley, 2006; Maehr, 2001; Pekrun et al., 2002; Schutz & Lanehart, 2002). Discussions concerning motivation and engagement have broadened the scope of such topics and the need to include emotional factors in future educational studies (e.g., Christenson, Reschly, & Wylie, 2012). The range of conceptualisations of emotional engagement encompasses connectedness and belongingness within school (e.g., Finn, 1989), emotional themes in the classroom (e.g., Skinner, Wellborn, & Connell, 1990) and value and interest in an activity or class (Fredrickson, 2000). Relevant to the current

study, research into interest in school and academic tasks has been recognised as a valuable positive emotion requiring further research (Ainley, 2006; Ainley, Hidi, & Berndorff, 2002; Fredrickson, 2000, 2001).

Empirical findings concerning the relationship between emotion and academic achievement and well-being is multifaceted; therefore, placing emotion in the academic well-being and achievement model may not be so simple. Moreover, some studies show that cognition and emotion are connected. For example, subjective valuing and perceived controllability over a task are proposed to relate to emotions such as pride, boredom, joy, shame and the like (Pekrun et al., 2007). Similarly, some studies show that motivation (also relevant to the regulation of personal resources) is associated with emotion. For example, mastery-approach goals have been argued to be positively associated with pleasant emotion and negatively to unpleasant emotion (Linnenbrink, 2005, 2007; Linnenbrink & Pintrich, 2002a). Further, engagement studies indicate that students' unpleasant mood hinders behavioural engagement in school-related tasks (Linnenbrink, 2007; Linnenbrink, Kelley, & Kempler, 2005; Linnenbrink & Pintrich, 2003).

Research has also shown links between emotion and cognition (Smith & Kirby, 2000; Zajonc, 2000). For example, academic satisfaction research points out that positive attitude towards school are a cognitive-emotional assessment of one's overall satisfaction with academic experiences (Huebner, 1994). Further, cognitive-motivational models suggest that the influence of emotion on learning is mediated by cognitive and motivational mechanisms (Pekrun, 1992). Considering these findings and the overlap in construct conceptualisation, it is significant to include emotional constructs in future research in adaptability with a view to aiding the development of potentially more accurate models of students' academic well-being processes (Linnenbrink & Pintrich, 2002b).

8.8 Chapter Summary

This chapter has outlined central and significant findings. Consideration was given to the cross-sectional and longitudinal construct validation of instrumentation. It then centred on cross-sectional and longitudinal assessment of the hypothesised adaptability process model. An extended discussion was provided regarding central findings and the relevance of these findings to subsequent theory, methodology and research. Consequently, suggestions and recommendations for practitioners,

researchers and parents/caregivers have also been detailed—along with potential refinements to the research that can improve and enhance future investigations.

Chapter 9: Summary and Conclusion

The present study explored the recent and available research with respect to adolescents' regulatory responses when faced with uncertain and novel situations and circumstances (adaptability). It reviewed a range of theory relevant to this regulatory mechanism. This theory accounted for perspectives and frameworks proposed under early theorists such as Freud, Piaget, and Vygotsky, and also more recent theory and research relevant to adaptation, self-regulation, implicit theories of ability, personality (the Big-Five), adversity (resilience, coping and buoyancy), positive psychology, theories of change, life-span theory of control, evolutionary psychology, human behavioural ecology, and models of change and adaptation. Having reviewed this theory and research, gaps relevant to some specific aspects of human adaptation were identified. This led to consideration of the adaptability construct and empirical efforts to measure it and then model it in a process hypothesised to comprise socio-demographic and dispositional predictors, as well as well-being outcomes proposed to follow from adaptability.

Factor analysis suggested the best fitting model representing adaptability was as a higher-order factor that included a reliable first-order cognitive-behavioural factor and a reliable first-order emotional factor. Multigroup CFA indicated invariance in factor structure as a function of gender, age and language background. Adaptability was positively associated with prior achievement, conscientiousness and incremental beliefs of ability; it was negatively associated with neuroticism and it was positively associated with self-esteem, satisfaction with life and meaning and purpose. The significant relationship between adaptability and well-being factors supports the proposition that it is more than about 'getting through' or 'getting by'; it is associated with positive indicators, including gains in well-being outcomes when included in longitudinal modelling (e.g., see Martin, 2011; McArdle, 2009). Further, although adaptability and buoyancy shared significant variance, they each explained unique variance in well-being outcomes. There were also some noteworthy socio-demographic findings. Interestingly, age is negatively associated with adaptability, with younger adolescents reporting higher adaptability than older adolescents. Prior achievement (measured by literacy and numeracy) is also positively and significantly associated with adaptability (but not as strongly with buoyancy).

The proposed relevance of these findings is significant, as adaptability appears to enhance adolescents' capacity to navigate uncertain and novel circumstances that otherwise might threaten their psychological well-being. More broadly, these findings shed light on the profile of young people who are adaptable and those who are not. Findings are also indicative of the types of personal well-being outcomes that adaptability predicts. This signals the potential importance of adaptability on the developmental and educational landscape. Accordingly, the theory and research presented here hold implications for researchers and practitioners seeking to better understand young people's responses to the uncertainty and novelty that are a reality of the ever-changing world ahead of them.

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Appendix A



Faculty of Education and Social Work, NSW 2006

Professor Andrew Martin (Rm 919 Bld A35)

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STUDENT SURVEY: ACADEMIC AND NON-ACADEMIC LIFE

Dear Student

This survey looks at day and boarding students' adaptability, resilience, academic motivation, beliefs about themselves as students, and some questions about their learning opportunities, learning challenges, and learning difficulties (eg. reading difficulties etc). It is funded by the Australian Research Council. The survey is administered to school students and aims to better understand their academic and non-academic outcomes – as well as their responses to issues relevant to adaptability (e.g. the environment and any learning challenges they may have experienced). When we are finished, we would like to combine all the answers together in order to get a broad picture of how students in the project describe themselves. We are especially interested in their involvement in class and other life activities, factors that are related to their motivation and engagement at school, what strategies they use when going about their learning and other life tasks, and some of the challenges in learning and school they experience and how they have dealt with them. It is hoped that the information gained will assist in development of new methods that will improve motivation and learning in school and also how to best prepare students for lifelong learning and effectiveness. The same survey is given to students one year apart. This allows the researchers to better understand students' learning, attitudes and knowledge over time. The survey will be conducted at school and will take about 40-50 minutes to complete.

We will not ask for your name. In this way we are able to keep each survey anonymous. Instead, we ask that you supply partial information from your first name, surname, date of birth, and last digits of your phone number. In this way we are able to keep each survey anonymous and yet are able to match the survey you do this year with the one you may have done last year. All aspects of the study, including results, will be strictly confidential, so your answers will not be shown to anyone. However, as the survey is anonymous, once it is submitted it cannot be withdrawn. All aspects of the study, including results, will be strictly confidential, so your individual answers will not be shown to anyone. All the surveys will be stored in a secured

location. Reports from the study may be submitted for publication and a PhD thesis will also be produced, but individual participants will not be identifiable in reports.

If you have any questions after reading this information, Professor Andrew Martin is available to answer them. Or, if you would like to know more at any stage of the study, please feel free to contact him at University of Sydney on 02 9351 6273 or by email at andrew.martin@sydney.edu.au.

Thank you for your assistance.

Professor Andrew Martin (Chief Investigator, Sydney University)

Dr Susan Colmar (Sydney University)

Dr Gregory Liem (Sydney University)

Mr Harry Nejad (PhD Student, Sydney University)

Instead of writing your name, please provide the following information as your identification number

First 2 letters of SURNAME	First 2 letters of FIRSTNAME	MONTH of birth	Last 2 numbers of HOME/MOBILE PHONE

Any person with concerns or complaints about the conduct of a research study can contact the Deputy Manager, Human Ethics Administration, University of Sydney on (02) 8627 8176 (Telephone); (02) 8627 8177 (Facsimile) or human.ethics@usyd.edu.au (Email).

SECTION A: BACKGROUND INFORMATION

1. Grade/Year _____
2. Gender (circle) Female Male
3. Month of Birth _____
4. Year of Birth _____
5. Age _____ years
6. Have you ever repeated a grade at primary or high school? (circle) Yes No
7. What grade did you repeat? _____ grade
8. About how many days were you absent from school last term? About _____ days
9. What was the main reason for your absence? _____

10. Language spoken at home

What language is spoken most by YOUR FAMILY at home?	1 <input type="checkbox"/>	English	2 <input type="checkbox"/>	Italian	3 <input type="checkbox"/>	Greek
	4 <input type="checkbox"/>	Spanish	5 <input type="checkbox"/>	German	6 <input type="checkbox"/>	Macedonian
	7 <input type="checkbox"/>	Arabic	8 <input type="checkbox"/>	Cantonese	9 <input type="checkbox"/>	Vietnamese
	10 <input type="checkbox"/>	Mandarin	11 <input type="checkbox"/>	Filipino/Tagalog	12 <input type="checkbox"/>	Indigenous
	13 <input type="checkbox"/>	Other	If other, which language?			

11. Are you Aboriginal or a Torres Strait Islander? (circle) Yes No

12. What is your parent's/guardian's level of education? (For each parent/guardian, please select one only)

	Female Parent/ Guardian	Male Parent/ Guardian
No education	1. <input type="checkbox"/>	1. <input type="checkbox"/>
Intermediate or School Certificate (Year 10 or equivalent)	2. <input type="checkbox"/>	2. <input type="checkbox"/>
Higher School Certificate (Year 12 or equivalent)	3. <input type="checkbox"/>	3. <input type="checkbox"/>
Trade/apprenticeship	4. <input type="checkbox"/>	4. <input type="checkbox"/>
Certificate/diploma	5. <input type="checkbox"/>	5. <input type="checkbox"/>
Degree (eg. Bachelor or Masters Degree)	6. <input type="checkbox"/>	6. <input type="checkbox"/>

13. What is your parent's/guardian's main occupation?

(For each parent/guardian, please select one only)

	Female Parent/ Guardian	Male Parent/ Guardian
Manager (e.g. general manager/director/CEO, grazier/farmer)	1. <input type="checkbox"/>	1. <input type="checkbox"/>
Professional (e.g. accountant, architect, doctor, teacher)	2. <input type="checkbox"/>	2. <input type="checkbox"/>
Tradesperson or Technician (e.g. hairdresser, mechanic, ICT technician)	3. <input type="checkbox"/>	3. <input type="checkbox"/>
Community or Personal Services (e.g. childcare worker, nurse, police officer)	4. <input type="checkbox"/>	4. <input type="checkbox"/>
Clerical or Administrative (e.g. bookkeeper, secretary, personal assistant)	5. <input type="checkbox"/>	5. <input type="checkbox"/>
Sales (e.g. sales assistant, real estate agent)	6. <input type="checkbox"/>	6. <input type="checkbox"/>
Machinery Operator or Driver (e.g. bus/truck/train driver, machine operator)	7. <input type="checkbox"/>	7. <input type="checkbox"/>
Labourer (e.g. cleaner, construction worker, kitchenhand)	8. <input type="checkbox"/>	8. <input type="checkbox"/>
No paid job	9. <input type="checkbox"/>	9. <input type="checkbox"/>
School student	10. <input type="checkbox"/>	10. <input type="checkbox"/>
University, College, or TAFE Student	11. <input type="checkbox"/>	11. <input type="checkbox"/>

SECTION B: ACHIEVEMENT AND MOTIVATION

Numeracy and Literacy (NAPLAN)

In the past 18 months, students will have received results on the National Assessment Program for Literacy and Numeracy – NAPLAN. Please circle (to the best you can remember) which BANDS you scored in Literacy and Numeracy:

	Band (Low)										Band (High)
A. Literacy	1	2	3	4	5	6	7	8	9	10	
B. Numeracy	1	2	3	4	5	6	7	8	9	10	

C. How often do you do and complete your homework (tick one)

- Never
 Not very often
 Some of the time
 Often
 Always

Disagree Strongly	Disagree	Disagree Somewhat	Neither Agree nor Disagree	Agree Somewhat	Agree	Agree Strongly
1	2	3	4	5	6	7

	Disagree Strongly	Agree Strongly
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Please note part of this survey has been omitted since the items cannot be reproduced due to copyright reasons and that the reader is referred to the publisher, Lifelong Achievement Group (www.lifelongachievement.com), for the full set of items.

1.	I'm able to use some of the things I learn at school in other parts of my life	1	2	3	4	5	6	7
2.	When I don't do so well at school I'm often unsure how to avoid that happening again	1	2	3	4	5	6	7
3.	Each week I'm trying less and less	1	2	3	4	5	6	7
4.	When exams and assignments are coming up, I worry a lot	1	2	3	4	5	6	7
5.	When I get a good mark I'm often not sure how I'm going to get that mark again	1	2	3	4	5	6	7

SECTION C: NON-ACADEMIC LIFE

	Disagree Strongly	Agree Strongly						
1.	When faced with a new situation, I am able to rearrange my plans or commitments to help me adjust to it.	1	2	3	4	5	6	7
2.	I am able to change the way I think about new situations to help me deal with them better.	1	2	3	4	5	6	7
3.	If a problem arises, I am able to reduce negative feelings (eg. minimise disappointment) to help me deal with the problem better.	1	2	3	4	5	6	7
4.	To more effectively face a new situation or problem, I am able to change the way I do things (eg. take a different course of action).	1	2	3	4	5	6	7

5.	I am able to think about a problem in different ways to help me through it.	1	2	3	4	5	6	7
6.	I am able to reduce negative emotions (eg. fear) to help me deal with challenging or uncertain situations.	1	2	3	4	5	6	7
7.	There isn't much some people can do to make themselves smarter.	1	2	3	4	5	6	7
8.	Overall, most things I do turn out well.	1	2	3	4	5	6	7
9.	A person who works really hard can be very smart.	1	2	3	4	5	6	7
10.	My personal beliefs give meaning to my life.	1	2	3	4	5	6	7
11.	In most ways my life is close to my ideal.	1	2	3	4	5	6	7
12.	Some people won't be smart no matter what.	1	2	3	4	5	6	7
13.	I am able to adjust my behaviour (eg. work harder or longer) to help me deal with challenging or difficult situations.	1	2	3	4	5	6	7
14.	I am able to think through a number of possible options to assist me in a new situation.	1	2	3	4	5	6	7
15.	I am able to use positive emotions (eg. enthusiasm) to help me successfully handle new or challenging situations.	1	2	3	4	5	6	7
16.	I am able to seek out new information, helpful people, or useful resources to effectively deal with new situations.	1	2	3	4	5	6	7
17.	I am able to revise the way I think about a new situation to help me through it.	1	2	3	4	5	6	7
18.	If I have a setback, I am able to minimise negative emotions (eg. shame, anger) so I can effectively deal with it.	1	2	3	4	5	6	7
19.	I worry more than I need to.	1	2	3	4	5	6	7
20.	My personal beliefs give me the strength to face difficulties.	1	2	3	4	5	6	7
21.	Any person could get smarter if they worked hard.	1	2	3	4	5	6	7
22.	The conditions of my life are excellent.	1	2	3	4	5	6	7
23.	I am a nervous person.	1	2	3	4	5	6	7
24.	People who are not smart can't do anything to change that.	1	2	3	4	5	6	7
25.	In uncertain situations, I am able to develop new ways of going about things (eg. a different way of asking questions or finding information) to help me through.	1	2	3	4	5	6	7
26.	I am able to adjust my thinking or expectations to assist me in a new situation if necessary.	1	2	3	4	5	6	7
27.	If I have a setback, I am able to play down my disappointment so I can overcome that setback.	1	2	3	4	5	6	7
28.	I am able to do things in a new or different way to help me in uncertain or challenging situations.	1	2	3	4	5	6	7
29.	I am able to look at a problem and adjust my thinking to effectively deal with it.	1	2	3	4	5	6	7
30.	To help me through new or difficult situations, I am able to draw on positive feelings and emotions (eg. enjoyment, satisfaction).	1	2	3	4	5	6	7
31.	Most things I do, I do well.	1	2	3	4	5	6	7
32.	Any person can get smarter by learning more.	1	2	3	4	5	6	7
33.	I get upset easily.	1	2	3	4	5	6	7
34.	I am satisfied with my life.	1	2	3	4	5	6	7
35.	People can learn new things but how smart they are doesn't change.	1	2	3	4	5	6	7
36.	I often feel confused and mixed up.	1	2	3	4	5	6	7
37.	To assist me in a new situation, I am able to change the way I do things if necessary.	1	2	3	4	5	6	7
38.	I am able to think through various possible options to help me deal with difficult situations.	1	2	3	4	5	6	7
39.	When a problem or uncertainty arises, I am able to minimise frustration or irritation so I can deal with it best.	1	2	3	4	5	6	7
40.	Overall, I have a lot to be proud of.	1	2	3	4	5	6	7
41.	As a person learns new things he or she gets smarter.	1	2	3	4	5	6	7
42.	I feel my life is meaningful.	1	2	3	4	5	6	7

43. I worry about a lot of things.	1	2	3	4	5	6	7
44. How smart a person is doesn't change.	1	2	3	4	5	6	7
45. My personal beliefs help me to understand difficulties in life.	1	2	3	4	5	6	7
46. So far I have gotten the important things I want in life.	1	2	3	4	5	6	7
47. As a person's knowledge increases, he or she becomes smarter.	1	2	3	4	5	6	7
48. If I could live my life over, I would change almost nothing.	1	2	3	4	5	6	7
49. I feel that my life is very useful.	1	2	3	4	5	6	7

SECTION D: SCHOOL. STUDENTS. YOU

	Disagree Strongly						Agree Strongly
1. Overall, I get along well with other students at this school	1	2	3	4	5	6	7
2. When I do my schoolwork I try to do it better than I've done before	1	2	3	4	5	6	7
3. I'm happy to stay on and complete school	1	2	3	4	5	6	7
4. It is important for me to do better than other students	1	2	3	4	5	6	7
5. I don't let study stress get on top of me	1	2	3	4	5	6	7
6. I enjoy being a student at this school	1	2	3	4	5	6	7
7. I participate when we discuss things in class	1	2	3	4	5	6	7
8. I look forward to continuing with most of my school subjects	1	2	3	4	5	6	7
9. I want to learn as much as possible in class	1	2	3	4	5	6	7
10. Overall, I am liked by other students at this school	1	2	3	4	5	6	7
11. When I do my schoolwork I try to do the best that I've ever done	1	2	3	4	5	6	7
12. I think I'm good at dealing with schoolwork pressures	1	2	3	4	5	6	7
13. I like my school	1	2	3	4	5	6	7
14. I get involved when we do group work in class	1	2	3	4	5	6	7
15. I'd like to continue studying or training after I complete school	1	2	3	4	5	6	7
16. It is important for me to do well compared to others in my class	1	2	3	4	5	6	7
17. Overall, other students are interested in me, what I do, and what I think	1	2	3	4	5	6	7
18. When I do my schoolwork I try to improve on how I've done before	1	2	3	4	5	6	7
19. I don't let a bad mark affect my confidence	1	2	3	4	5	6	7
20. Being a student at this school is pretty good	1	2	3	4	5	6	7
21. I get involved in things we do in class	1	2	3	4	5	6	7
22. I intend to complete school	1	2	3	4	5	6	7
23. It is important for me to understand the content of my school subjects as thoroughly as possible	1	2	3	4	5	6	7
24. Overall, I like other students at this school	1	2	3	4	5	6	7
25. When I do my schoolwork I try to get a better result than I've got before	1	2	3	4	5	6	7
26. My goal in class is to get a better grade than most of the other students	1	2	3	4	5	6	7
27. I'm good at dealing with setbacks (eg. bad mark, negative feedback on my work)	1	2	3	4	5	6	7
28. When I'm at school I feel pretty happy	1	2	3	4	5	6	7
29. I desire to completely master the material presented in class	1	2	3	4	5	6	7
30. I participate in class activities	1	2	3	4	5	6	7

Please use the below list of common human traits to rate yourself as accurately as possible. Rate yourself as you really are compared to other people you know of the same age and sex, not as you wish to be. Please write the extent to which each trait describes you (1-7) to the left of each trait.

1	2	3	4	5	6	7
Very inaccurate	Moderately inaccurate	Slightly inaccurate	Neither inaccurate nor accurate	Slightly accurate	Moderately accurate	Very accurate

_____ 1. Shy	_____ 11. Unimaginative	_____ 21. Jealous	_____ 31. Systematic
_____ 2. Talkative	_____ 12. Artistic	_____ 22. Unenvious	_____ 32. Organized
_____ 3. Energetic	_____ 13. Intelligent	_____ 23. Moody	_____ 33. Kind
_____ 4. Quiet	_____ 14. Philosophical	_____ 24. Unanxious	_____ 34. Sympathetic
_____ 5. Extraverted	_____ 15. Deep	_____ 25. Efficient	_____ 35. Harsh
_____ 6. Outgoing	_____ 16. Uncreative	_____ 26. Disorganized	_____ 36. Cooperative
_____ 7. Reserved	_____ 17. Envious	_____ 27. Careless	_____ 37. Unkind
_____ 8. Untalkative	_____ 18. Emotional	_____ 28. Untidy	_____ 38. Warm
_____ 9. Creative	_____ 19. Anxious	_____ 29. Neat	_____ 39. Rude
_____ 10. Intellectual	_____ 20. Unworried	_____ 30. Inefficient	_____ 40. Inconsiderate

THANKS – THAT IS THE END OF THE SURVEY

Appendix B



THE UNIVERSITY OF
SYDNEY

Faculty of Education and Social Work, NSW 2006

Professor Andrew Martin (Rm 919 Bld A35)

Fax (02) 9351 2606 Ph (02) 9351 6273. Email: andrew.martin@sydney.edu.au

TITLE

The Millennium Child: New Frontiers in Understanding the Adaptability of Children and Young People

PARENT/GUARDIAN and CHILD CONSENT FORM

I, agree to permit, who is aged years, to participate in the research project – “The Millennium Child: New Frontiers in Understanding the Adaptability of Children and Young People”.

1. I acknowledge that I have read the Participant Information Statement for Parents/Guardians, which explains the aims and the nature of the study and what is required of my child. The researchers have given me the opportunity to discuss the information and ask any questions I have about the project and they have been answered to my satisfaction.
2. I understand that I can withdraw my child from the study at any time without prejudice to my child’s relationship to the school or the University of Sydney, now or in the future.
3. I understand that the results of this research will be presented in a (thesis/publication), and that in the process of preparing that document every care will be taken to de-identify my child.
4. I understand that if I have any questions relating to my child’s participation in this research, I may contact Professor Andrew Martin at University of Sydney on 02 9351 6273 or by email at andrew.martin@sydney.edu.au who will be happy to answer them.
5. I acknowledge receipt of the Participant Information Statement for Parents/Guardians.

.....
Signature of Parent/Guardian

.....
Signature of Child

.....
Please PRINT name

.....
Please PRINT name

.....
Date

.....
Date

Appendix C



Faculty of Education and Social Work, NSW 2006
Professor Andrew Martin (Rm 919 Bld A35)

TITLE

The Millennium Child: New Frontiers in Understanding the Adaptability of Children and Young People

PARENT/GUARDIAN PARTICIPANT INFORMATION STATEMENT

(1) What is the study about?

This study looks at students' adaptability, resilience, academic motivation, what students think of themselves as students, and some questions about their learning opportunities and challenges (including learning difficulties they might experience). It is funded by the Australian Research Council under its Discovery Grants Program. The survey is administered to school students and aims to better understand their academic and non-academic outcomes – as well as their responses to issues relevant to adaptability (e.g. the environment and any learning challenges they may have experienced). We also ask students some (anonymised) background questions such as about parent/guardian education to get a better understanding of these support factors in their academic and non-academic lives. When we are finished, we would like to combine all the answers together in order to get a broad picture of how students in the project describe themselves. We are especially interested in their involvement in class and other life activities, factors that are related to their motivation and engagement at school, what strategies they use when going about their learning and other life tasks, and some of the challenges in learning and school life that they experience and how they have dealt with them. It is hoped that the information gained will assist in development of new methods that will improve motivation and learning in school and also how to best prepare students for lifelong learning and effectiveness. It was given to students last year and now again this year. This allows the researchers to better understand students' learning, attitudes and knowledge over time.

(2) Who is carrying out the study?

The study is being conducted by Professor Andrew Martin, Dr Susan Colmar, Dr Gregory Liem, and Mr Harry G. Nejad (of Sydney University).

(3) What does the study involve?

If permission is given, students from schools across Australia will complete a questionnaire. The questionnaire will ask students to provide demographic information, and respond to academic and non-academic self-report measures. In order to assess change and stability in the self-

report measures, we ask students to complete the same questionnaire one year apart.

(4) How much time will the study take?

The survey will take approximately 45-50 minutes (one lesson) to complete. However, because the survey is in two parts, schools and teachers have the option of conducting the survey in two sessions. Teachers from your child's school will supervise the completion of the survey.

(5) Can I withdraw my child from the study?

Your decision whether or not to permit your child to participate will not prejudice you, your child, or your child's school's future relations with the University of Sydney. If you decide to permit your child to participate, you are free to withdraw your consent and to discontinue your child's participation at any time without affecting your relationship with the school or the University of Sydney.

(6) Will anyone else know the results?

All aspects of the study at the individual student level, including results, will be strictly confidential and only the researchers will have access to information on participants. Reports from the study may be submitted for publication, but individual participants will not be identifiable in reports. A PhD thesis will also be produced from the project.

(7) Will the study benefit my child or myself?

We expect the project to benefit your child through targeted school-level reports on the key factors in the study, which will be provided to your child's school. In addition, the Project Team will work with all schools participating in the project to understand and use the results, through professional development opportunities. Lastly, we expect your child to benefit from the survey, as it will provide opportunities to contemplate aspects of his/her motivation, learning, and general attitudes relevant to school, school-work, and their lives more generally.

(8) Can I tell other people about the study?

Yes.

(9) What if I require further information?

When you have read this information, Andrew Martin will be happy to discuss it with you further and answer any questions you may have. If you would like to know more at any stage, please feel free to contact Professor Martin, ph. (02) 9351 6273.

(10) What if I have a complaint or concerns?

Any person with concerns or complaints about the conduct of a research study can contact the Deputy Manager, Human Ethics Administration, University of Sydney on (02) 8627 8176 (Telephone); (02) 8627 8177 (Facsimile) or human.ethics@usyd.edu.au (Email).

This information sheet is for you to keep.

Appendix D



The University of Sydney

Faculty of Education and Social Work, NSW 2006
Associate Professor Andrew Martin (Rm 919 Bld A35)

TITLE

The Millennium Child: New Frontiers in Understanding the Adaptability of Children and Young People

PRINCIPAL CONSENT FORM

I.....of.....
Name (please print) (Name of school)

give consent to my school's participation in the Australian Research Council /University of Sydney research project – "The Millennium Child: New Frontiers in Understanding the Adaptability of Children and Young People".

In giving my consent I acknowledge that:

1. The procedures required for the project and the time involved have been explained to me, and any questions I have about the project have been answered to my satisfaction.
2. I have read the Participant Information Statement for Principals and have been given the opportunity to discuss the information and my involvement in the project with the researcher/s.
3. I understand that my school or individual participants, including myself, can withdraw from the study at any time, without affecting my relationship with the researchers now or in the future.
4. I understand that my involvement is strictly confidential and no information about me, the school or individual students (or, indirectly, their teachers), will be used in any way that reveals our identity.
5. I understand that participation in this study is completely voluntary for my school.

Signed:

Name:

Date:

Any person with concerns or complaints about the conduct of a research study can contact the Deputy Manager, Human Ethics Administration, University of Sydney on (02) 8627 8176 (Telephone); (02) 8627 7177 (Facsimile) or human.ethics@usyd.edu.au (Email).

Appendix E



The University of Sydney

Faculty of Education and Social Work, NSW 2006
Associate Professor Andrew Martin (Rm 919 Bld A35)

TITLE

The Millennium Child: New Frontiers in Understanding the Adaptability of Children and Young People

PRINCIPAL Participant Information Statement

This study is an Australian Research Council (ARC) research project under its Discovery Grants Program. The current research is funded by ARC and looks at students' academic adaptability, resilience, motivation, how students think of and perceive themselves as students, and makes enquiries about their learning prospects and challenges.

Project Summary

This research project looks at students' adaptability, resilience, academic motivation, beliefs about themselves as students, and some questions about their learning opportunities and challenges (including learning difficulties). It is funded by the Australian Research Council under its Discovery Grants Program. The survey is administered to school students and aims to better understand their academic and non-academic outcomes – as well as their responses to issues relevant to adaptability (e.g. the environment and any learning challenges they may have experienced). When we are finished, we would like to combine all the answers together in order to get a broad picture of how students in the project describe themselves. We are especially interested in their involvement in class and other life activities, factors that are related to their motivation and engagement at school, what strategies they use when going about their learning and other life tasks, and some of the challenges in learning and school life that they experience and how they have dealt with them. It is hoped that the information gained will assist in development of new methods that will improve motivation and learning in school and also how to best prepare students for lifelong learning and effectiveness. It will be given to students this year and again next year – thus, consent covers the longitudinal data collection. This allows the researchers to better understand these factors over time.

The research will be conducted by a team from the University of Sydney from 2010 to 2014 and will be supported by a PhD student funded by the project.

If your school participates in the project, your school will be provided with a summary of findings that can be built into pedagogy and counselling to enhance students' academic and non-academic outcomes. The report will also include tips that can be disseminated to parents/guardians and students that can enhance student learning, motivation, engagement, and general life outcomes (e.g. self-esteem). Survey items will transparently invoke key components of learning and learning challenges, motivation, adaptability, engagement, and general life factors to raise awareness of these vital dimensions in students' academic and non-academic lives – an important part of enhancing and sustaining these important dimensions.

Researchers from the University of Sydney, Faculty of Education and Social Work:

Assoc. Prof. Andrew Martin	(02) 9351 6273	a.martin@edfac.usyd.edu.au
Dr Susan Colmar	(02) 9351 6265	s.colmar@edfac.usyd.edu.au

Dr Gregory Arief (02) 9114 1377 gliem@usyd.edu.au
 Mr Harry G. Nejad (PhD Student) (02) 9114 1377 mgha6542@mail.usyd.edu.au

Commitment and Time for schools

What?	Who?	How long?
Paper and pencil survey	Approx 10 schools (between approx. 200-500 students per school); students aged 11/12 yrs - 17/18 yrs (Teacher supervised)	2010: About 45-50 minutes – the survey is in two Parts and so can be administered with a break midway 2011: About 45-50 minutes – the survey is in two Parts and so can be administered with a break midway

Withdrawal from the study

Participation in this study is entirely voluntary: schools or individuals are not obliged to participate and – if they do participate – they can withdraw at any time without prejudice or penalty. These conditions will be communicated to all individual participants – students and their parents/guardians.

Release of results

Specific data collected in this study will be strictly confidential and only the researchers will have access to information on participants. A report of the study will be compiled and several publications may result, but individual participants will not be identifiable in these documents. A PhD thesis will also result from the project. There are no reasons to prevent general discussion about the project, keeping in mind the standard professional ethics regarding school business and individuals.

Benefits of the study

We expect the project to benefit students through targeted school-level reports on the key factors in the study, which will be provided to the school. In addition, the Project Team will work with all schools participating in the project to understand and use the results, through professional development opportunities. Lastly, we expect all students to benefit from the survey, as it will provide opportunities to contemplate aspects of their motivation, learning, and general attitudes relevant to school, school-work, and their lives more generally.

Further information

When you have read this information, Andrew Martin will be happy to discuss it with you further and answer any questions you may have. If you would like to know more at any stage, please feel free to contact Associate Professor Martin, ph. (02) 9351 6273.

Complaint or concerns

Any person with concerns or complaints about the conduct of a research study can contact the Deputy Manager, Human Ethics Administration, University of Sydney on (02) 8627 8176 (Telephone); (02) 8627 7177 (Facsimile) or human.ethics@usyd.edu.au (Email).

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Appendix F



Faculty of Education and Social Work, NSW 2006
Professor Andrew Martin (Rm 919 Bld A35)

TITLE

The Millennium Child: New Frontiers in Understanding the Adaptability of Children and Young People

STUDENT PARTICIPANT INFORMATION STATEMENT

(1) What is the study about?

This study looks at students' adaptability, flexibility, academic inspiration and drive, what students think of themselves as students, and some questions about their learning opportunities and challenges. A survey will be administered to school students and aims to better understand their academic and non-academic outcomes – as well as their responses to issues relevant to adaptability (e.g. the environment and any learning challenges they may have experienced). When we are finished, we would like to combine all the answers together in order to get a broad picture of how students in the study describe themselves. We are especially interested in their involvement in class and other life activities, factors that are related to their motivation and engagement at school, what strategies they use when going about their learning and other life tasks, and some of the challenges in learning and school they experience and how they have dealt with them. It is hoped that the information gained will assist in development of new methods that will improve enthusiasm and learning in school and also how to best prepare students for lifelong learning and effectiveness. The same survey will be given to students one year apart. This allows the researchers to better understand students' learning, attitudes and knowledge over time.

(2) Who is carrying out the study?

The study is being conducted by Professor Andrew Martin, Dr Gregory Liem, Dr Susan Colmar, and Mr Harry G. Nejad (of Sydney University).

(3) What does the study involve?

If permission is given, students from schools across Australia will complete a questionnaire. The questionnaire will ask students to provide family background information, and also answer academic and non-academic questions. In order to look at students' development over the course of a year, we ask students to complete the same questionnaire one year apart.

(4) How much time will the study take?

The survey will take approximately 45-50 minutes (one lesson) to complete. However, because the survey is in two parts, schools and teachers have the option of conducting the survey in two sessions. Teachers from your school will supervise the completion of the survey.

(5) Can I withdraw my child from the study?

Your decision whether or not to participate will not affect you, or your relationship with your teacher or school. If you decide to participate, you are free to withdraw your consent and to discontinue your participation at any time without any penalty or negative consequences as far as this study is concern.

(6) Will anyone else know the results?

All aspects of the study at the individual student level, including results, will be strictly confidential and only the researchers will have access to information on participants. Reports from the study may be submitted for publication, but individual participants will not be identifiable in reports. Results of this research will be presented in a (thesis/publication) and the researchers will take every care to de-identify students.

(7) Will the study benefit me?

We expect the project to benefit students through an overall report to schools on the key findings in the study that can be used by the school and teachers to assist student outcomes. In addition, the Project Team will work with all schools participating in the project to understand and use the results, through professional development opportunities. Lastly, we expect you to benefit from the survey, as it will provide opportunities to reflect on your motivation level, learning, and general attitudes relevant to school, school-work, and your life more generally.

(8) Can I tell other people about the study?

Yes.

(9) What if I require further information?

When you have read this information, Andrew Martin will be happy to discuss it with you further and answer any questions you may have. If you would like to know more at any stage, please feel free to contact Professor Martin, ph. (02) 9351 6273.

(11) What if I have a complaint or concerns?

Any person with concerns or complaints about the conduct of a research study can contact the Deputy Manager, Human Ethics Administration, University of Sydney on (02) 8627 8176 (Telephone); (02) 8627 8177 (Facsimile) or human.ethics@usyd.edu.au (Email).

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Appendix G

Items of each measure

Demographics:

Age

Gender

SES

Language background

Prior Achievement (Ability):

 Literacy

 Numeracy

Personality:

Agreeableness

Extraversion

Conscientiousness

Neuroticism

Openness

Personal Bests:

Entity beliefs

Incremental beliefs

Adaptability:

Cognitive

Behavioural

Emotional

Buoyancy:

Buoyancy

Psychological Well-being Outcomes:

General Self-esteem

Satisfaction with Life

Mental Instability

Meaning and Purpose