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Context effects on  
alcohol-related  
cognitions:  
A multi-  
methodological  
approach

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## I. Declaration

I declare that this thesis is my own work carried out under the normal terms of supervision. I confirm that this work has not been submitted for any comparable academic award.

Signed: *R.L.Monk* [signed electronically]

## **II. Acknowledgements**

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### III. Publications from thesis

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## V. Abstract

**Aim:** To examine the hitherto under-researched effects of social and environmental contexts on alcohol-related cognitions in a variety of laboratory and field settings. **Method:** *Study 1* – University students were recruited via opportunity sampling and completed questionnaires in either a university lecture theatre or in a student union bar, with statistical controls adopted in order to control for individual variations in consumption. *Study 2* – Questionnaires were distributed across colleges, universities and businesses in order to compare and contrast cognitions across a more varied sample than has been previously assessed. *Study 3* – Environmental cues were delivered by the use of panoramic filming and projection, creating an immersive video of either a bar or lecture theatre. These environmental cues were simultaneously manipulated alongside social context (peer group or solitary testing). *Study 4* – A specifically designed smartphone application was used to conduct context-aware time stratified experiential sampling. **Results:** Alcohol-related cognitions varied between real-world social and environmental contexts. Laboratory procedures were also found to mirror these effects. Specifically, positive outcome expectancies and normative beliefs about consumption were higher, and refusal efficacy lower, when questioning occurred in alcohol-related environments and in the presence of social others, when compared with responses in non alcohol-related environmental and during solitary response sessions. Exposure to immersive, alcohol-related cues and group testing in the laboratory had similar effects on responses. **Conclusion:** Alcohol-related cognitions appear to be fluid and, as such, are affected by changes in social and environmental contexts. These findings suggest that the traditional approach of conducting assessments in laboratories and/or classrooms may produce results which do not represent people's beliefs in contexts associated with alcohol consumption. Technologically advanced research designs are recommended to provide the tools to conduct context aware research and produce more ecologically valid findings. Future research may therefore be advised to conduct more contextually aware research, in order to more fully elucidate alcohol-related cognitions. These findings also have implications for the improvement of therapeutic interventions which are likely to benefit from potentially contextually varying needs/desires of the client. **Original Contributions:** The effect of context on alcohol-related cognitions has been a hitherto largely ignored phenomenon. This thesis therefore presents work to address this gap in the research and suggests that existing research may be limited owing to its failure to consider such influencing factors. Indeed, these findings are a reflection of the wider axiom that context effects are largely overlooked across psychology and related disciplines. Furthermore, the multi-methodological approach utilised in this research is original and provides a blueprint for more ecologically valid, context-aware procedures which can be implemented both within and outside the laboratory in many areas of research.

## **VI. Thesis outline**

It has been well evidenced that people will drink more frequently and in greater quantity when in the company of others and when in certain environments. Such findings are not unique, indeed the impact of physical and social contexts on cognition and behaviour has long-been accepted and acknowledged across a vast spectrum of Psychology. However, the cognitive processes that drive contextual changes in consumption remain largely under-examined. Indeed, outcome expectancies, Drink Refusal Self-Efficacy (DRSE) and normative beliefs have been found to be associated with, and predictive of, increased alcohol consumption. However, research which has examined these cognitions largely utilises exclusively student samples and is typically based on a single explicit cognitive assessment conducted in non alcohol-related environments. Resultantly, the in-vivo nature of alcohol-related cognitions has been largely ignored and it is not known how these cognitions may vary across diverging contexts.

The aim of this PhD research is to provide an original contribution to the existing literature by assessing the impact of people's present situational and social contexts on these alcohol-related cognitions by conducting in-vivo assessments of such cognitions and monitoring potential changes between contexts. By using a multi-methodological research design which incorporates technologically advanced methods, this thesis aims to proffer an original approach to the study of alcohol-related cognitions. Field research, immersive cueing techniques, and the use of smart-phone

technology are therefore incorporated into this thesis. It is argued that to be successful, interventions aimed at reducing alcohol-related harms should cater to the contextually dependant desires and motives of the consumer. Findings demonstrating the contextually varying nature of alcohol-related cognitions may thus have important applications to the improvement of therapeutic interventions. Furthermore, such results provide but one demonstration of the axiom that all behaviours, beliefs and cognitions are contextually varying, despite the relative lack of research in this area.

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## **1.1 *The study of context: An introduction***

You do not often shout in a library (if at all), but you may do so frequently and excessively at a football match. You do not frequently invest large quantities of time and energy with people you hardly know, but you may do so in the course of your work commitments. You do not often see large numbers of people pushing and shoving their way into the local shop, but this may be a frequent and accepted part of commuting on the London underground. Indeed, there are seemingly a whole host of social and environmental cues which govern behaviour and resultantly mean that one's behaviours, and indeed one's thoughts about this behaviour, differ from one context to another. However, much psychological research conveniently forgets or ignores this as it gets on with more immediate and pressing concerns. This thesis therefore intends to address this. Specifically, it examines how context affects alcohol-related cognition, in light of the lack of research in this area (Monk, in press).

## **1.2 *Research premise***

Smith and Semin (2004) argue that the context in which research is conducted should not be ignored or overlooked. They note that it is flawed to view the laboratory as a preferable research environment as the controlled nature of this environment limits the contextual information and cues which impact behaviour. This may, therefore, hinder observations of behaviour and impede our knowledge of a particular area:



*“If human behaviour is sensitive to social situations and contexts, it follows that the situation cannot be ignored when social behaviour is being studied. Sometimes the social psychological laboratory is regarded as a sterile, virtually context-free setting for studying behaviour, and thus superior to other more specific and limiting contexts. In our view this is a mistake. The laboratory is a social situation and thus many aspects of it ... affect participants’ responses, just as they do in any social situation”* (pg 88, Smith & Semin, 2004).

### **1.3 The philosophy and theory of contextual influence**

#### **1.3.1 Functional contextualism**

‘Contextualism’ is one of the four ‘world hypotheses’ put forward by Stephen Pepper (1942). Here, Pepper (1942) suggests that all the events which we encounter have properties – specific ‘qualities’ and ‘textures’ which make each event unique from another experience. The context of an event provides these qualities and textures and context is, therefore, considered highly important to an understanding of the world. Indeed, Pepper (1942) argues that it is only by experiencing an event that we can have knowledge of it, as each event is unique. This focus on the environment, or the context in which events, behaviours and thoughts occur, is termed functional contextualism - a philosophy which extols the critical importance of considering the environments in which behaviour occurs - analysing the ‘ongoing act in context’ (Biglan, 2001; Hayes, 2004).

However, Biglan and Hayes (1996) argue that research focuses on models of behaviour and examines attitudes and self-efficacy expectations, but pays little or no attention to contextual influences (ibid). Key factors within the proposed models may be targeted but the contextual variables which could be manipulated to affect behaviour, remain unspecified, meaning that there is little suggestion as to how to change behaviour (pg 47, Biglan & Hayes, 1996). As a result, it is argued that there is now an expanse of research which is not effective for practical application (ibid). The contextualist approach therefore holds that examining and researching the influence of context on behaviour is crucial - as it is the only way that behavioural processes can be understood, enabling effective methods of intervention. Specifically, Biglan and Heyes (1996) argue that whilst there are alternative research approaches, a contextualist approach allows the discovery of contextual variables which predict and influence behaviour, therefore providing the practical tools to address social problems.

### ***1.3.2 Relational frame theory***

Relational frame theory takes note of the contextualist proposals regarding the importance of context. It has been proposed as a comprehensive theory of language and cognition. The history and context of learning are believed to cause 'relational networks' in memory. In other words, people learn that certain things are associated and, thus, these things become related in memory. Words, feelings, emotions and beliefs are, therefore, all connected by a series of relational frames. This relational learning also transfers to

events, on the basis of contextual cues which are present during learning (Barnes-Holmes et al., 2006; Barnes & Roche, 1996; Hayes, 2004). Contextual cues therefore become part of established relational frames, as people learn that certain relations occur in particular environments or in the presence of specific situational cues (Barnes & Roche, 1996). All cognitive functioning is therefore seen as the product of items which are related in memory (ibid). For example, if it is learnt that A leads to B, the history of this relationship (i.e. how frequently it is observed to occur) strengthens this relation. The context of this relationship (for example A leads to B in context C) also becomes related to A and B both separately and in combination. Relational frames are accordingly believed to be bidirectional and combinatorial (Hayes, 2004). If another item is linked with item A, for instance, this will also provide new information about items A and C, as these are related in memory. Relational frames are, thus, also believed to be transformative (ibid).

Given the nature of relational frames, it is apparent that they are very difficult to completely disrupt. A particular thought has any number of relational frames (varying in strength) and therefore any number of arbitrary contextual cues may trigger this thought through transformation of the stimulus function (Hayes, 2004). Even attempting to avoid a particular thought may ultimately cue the cognition by strengthening the underlying relational frame (ibid). This has implications for treatment approaches as therapy which focuses on changing maladaptive cognitions may ultimately

strengthen said problematic thought processes (ibid). As a result, Hayes (2004) argues that removing problematic behaviour from the context in which it occurs misses “the nature of the problem and avenues for its solution” (pg 646). In other words, and in-keeping with the functional contextualist approach, context is important to both the understanding and treatment of behaviour. That context is related to cognitions and can have a role in eliciting these cognitions is, therefore, a key component of this theory. Functional contextualism consequently supports the premise of the research within this thesis – that cognition should be studied in context.

### ***1.3.3 Connectionist theories***

In reading this account of relational frame theory, it is apparent that this theory may map onto biological/connectionist models of memory and behaviour. The influence of context on behaviour may therefore also have a biological, as well as a theoretical, basis. Connectionist approaches suggest that cognitions are linked within memory and biological accounts suggest that these connections map onto specific nodes, or regions, within the brain (Feldman & Ballard, 1982; McClelland & Rumelhart, 1981). These theories propose that upon activation of a particular cognition, associated thoughts are also activated, owing to their established connections. Biological accounts state that this happens as a result of spreading neurological activation, whereby an activated node sends electrical impulses, via connecting neurons, to associated nodes, which are then also excited (Elman et al., 1996; McLeod, Plunkett, & Rolls, 1998). These connections within

the brain are also postulated to become associated with contextual cues, meaning that context can also trigger the stimulation of related cognitions or nodes. The potential impact of context on behaviour and cognition is thus also a key component of such connectionist models.

#### ***1.3.4 Environmental conditioning***

In its most basic form, this theory is linked to classical or Pavlovian conditioning (1927). Here, the continual pairing of a stimulus with a specific response/outcome is seen to cause this stimulus to become conditioned/associated with an outcome or response (ibid). This process can occur following intentional stimulus-response pairings, or it can be the unintended product of situational connections formed during learning. Conditioning theory therefore suggest that context can spontaneously activate associated cognitions which have become associated with a specific stimuli over time. For example, entering a familiar environment may lead to the unplanned recall of a deceased spouse – a simple example of an environmentally conditioned response (Hayes, 2004). Bolles' (1972) 'primary law of learning' seems to fit well with this area. This theory contends that people learn that certain cues predict particular consequences in specific circumstances. Stimulus-outcome expectancies are therefore postulated to be learnt and to be context specific, with different expectancies being associated with different situations. Further, in the field of alcohol and drug use, conditioning theory has been used as an explanation of cases of

withdrawal, tolerance and overdose (e.g. Kenny, Chen, Kitamura, & Markou et al., 2006; Siegel, 2001).

Indeed, it is suggested that returning to an environment commonly associated with drug use can activate symptoms of withdrawal, leading to possible relapse (Connors Longabaugh, & Miller, 1996; Lê, Poulos, & Cappell, 1979). Here, drugs, their effects, and the environment in which drug use occurs, are postulated to become associated in memory. Entering a drug-related environment is therefore suggested to activate those associated/related behavioural responses, leading to the production of withdrawal symptoms (Kenny et al., 2006). Conversely, it is theorised that tolerance to a particular drug is not just a biological mechanism, but one associated with the context in which drug use occurs (Ramos, Siegel, & Bueno, 2002; Siegel, 1984; Siegel, 2001; Siegel & Ellsworth, 1986). This has been termed ‘conditioned place preference’ and has been attributed as the cause of both fatal and non-fatal overdose (Gerevich, Bácskai, Farka, & Danics, 2005; Gutiérrez-Cebollada, de la Torre, Ortuño, Garcés, & Camí, 1994). Here, changing one’s drug-using environment lowers one’s context-related tolerance, leading to overdose – a so called “failure of tolerance” (Siegel, 2001). This has also been observed when drug users alter the bodily location typically used for drug injection. Conditioning theory therefore offers another basis to believe that behaviours and cognitions (including those relating to substance use) can become linked with and impacted by context and environmental cues.

### ***1.3.5 Environmental cueing or priming***

Similarly, and building on connectionist theories, models of cueing or priming propose that situational cues can trigger, and even alter, associated cognitions, beliefs and behaviours, out of conscious awareness (Bargh & Pietromonaco, 1982). For instance, according to the ‘mere exposure effect’ (Zajonc, 1968), environmental factors can affect one’s thoughts or feelings towards an object or person. Repeated interactions with a person may render one more likely to approve of, or be attracted to that person. This theory therefore proposes there is an environmental determinant of cognitions.

Similarly, the situated inference model (Loersch & Payne, 2011) states that stimuli from the current environment make related information accessible, meaning that one’s current context can inform what inferences are drawn. A three-step system is believed to operate here: First, priming stimuli makes related information highly accessible. This information then becomes misattributed to one’s natural response toward an object in one’s current environment. This misattributed content is then finally used to answer the most salient question afforded by the environment (Loersch & Payne, 2011). Thus, the way in which the primes are used is proposed to be constructed by the context - primes will lead to different cognitions, beliefs and behaviours depending on the context in which these cues are triggered (ibid). Indeed, this model further specifies that in contexts where judgements about another object or individual appear appropriate or

required, construal priming results. If the situation calls for a judgment about how to behave, effects on behaviour are observed – referred to as behavioural priming. If the situation calls for a person to examine their desires, effects on motivation or ambition occur, an effect known as goal priming (ibid). Priming theories - or theories of cued responding – are, therefore, another area which posit a context effect. In a similar vein, Tulving and Thomson (1973) proposed an encoding specificity theory. They postulated that memories are encoded along with situation cues, meaning that things are more likely to be recalled or brought to mind if one is in the context in which encoding first took place (ibid). In Godden and Baddeley's (1975) early experiment, there was strong support for this theory. Here participants (deep-sea divers) were more able to record the words they had memorised earlier if recall occurred in the same environment as memorisation, whether this be under the sea or on land (ibid). Where recall and encoding were incongruous, recall was around 40% less accurate (ibid).

Developing from this, synergistic or hybrid cueing theories (Reich, Noll, & Goldman, 2005) stress the importance and the cumulative effect of cues and context. One word may not immediately evoke an associated word. For example, beer may not necessarily evoke the word happy, or vice versa, although the two are fundamentally associated through experience. Yet, the simultaneous presentation of both of these associated words in a given situation/context causes the pattern to be recognised by the perceptual system. In turn, this guides information processing down a different



pathway (ibid). Models of situational priming and cueing therefore offer a contextually driven model of a wide range of phenomena, behaviours, attitudes and cognitions. Notably, this theory of environmental cueing has been proposed to explain alcohol-related cognitions such as expectancies. For instance, Wall, Mckee, and Hinson (2000) propose that expectancies are cued, or primed, by specific contexts, and that viewing pub related videos has been shown to impact both alcohol-related cognitions and consumption (c.f. Roehrich & Goldman, 1995). This role of cued contextual priming on alcohol-related cognitions will be specifically examined in further detail in subsequent chapters. However, such theories add further support to the importance of considering the effect of context when studying behaviours.

### ***1.3.6 Social impact theory***

Social impact theory suggests that one's social context (who you are with), may also influence behaviour. It states that other people influence one's behaviour in social situations and that the real, imagined or implied presence of others can impact one's thoughts, values, beliefs and behaviours (Latane, 1981). Indeed, it is theorised that there are three areas which mediate the impact of social forces on behaviour (ibid). First, it is asserted that the strength of the social force is an important determinant of social impact. By this, it is meant that the perceived salience, importance or intensity of the source determines the degree of influence observed on the target. Salience, or importance, is typically determined by factors such as socio-economic status, age or prior relationships. Further, it is proposed that

the presence of friends exerts the greatest influence over cognitions and behaviour (ibid). Second, it is suggested that the number of people present has an incremental effect on the social force observed and experienced by the target. An example of this effect can be found in Asch's (1951) conformity research, in which it was found that larger groups elicited greater conformity with the normative response. Finally, the immediacy of the social force is asserted to be a key factor impacting the degree of influence observed. Here, proximal (closer/immediate) social sources are believed to have a greater impact on behaviour than do distal (distant) sources. Indeed, this effect was demonstrated in Milgram's (1963) obedience research, whereby social influence was increased, and more obedience observed, when the researcher was directly in front of the participants, rather than relaying instructions over the phone. This theory therefore cumulatively suggests that a person sitting amongst a large group of close friends is more likely to have their thoughts, beliefs and behaviours influenced – as opposed to someone who is sitting alone or in a smaller group of mere acquaintances. Similarly, Festinger (1954) proposed that the process of social comparison aids individuals determining what is/is not appropriate, and asserted that this comparison impacts behaviour and beliefs. Certainly, there is much evidence suggesting that decisions about the incidence of behaviour will guide action as the psychologically troubling position of deviating from the norm is actively avoided (Asch, 1951). There is, therefore, an apparent theoretical background which suggests that it is pertinent to investigate the effect of other people on behaviour and beliefs.

### ***1.3.7 Focus theory of normative conduct***

The focus theory of normative conduct also suggests that physical as well as social contexts may have an impact on people's thoughts and behaviours. Indeed, according to this theory, the perceived norm of behaviour may appear more salient in particular environments than in others (Kallgren, Reno, & Cialdini, 2000). Certainly, it has been demonstrated that actions appear more likely to be in accordance with the norm when one's attention is drawn to it (ibid). Consequently, variations in behaviour across context are evident both anecdotally and via experimental research which manipulates environmental/contextual variables. For instance, littering has been shown to be reduced after participants' attention is drawn towards an 'anti-littering' norm (Kallgren et al., 2000). Furthermore, it has also been suggested that manipulating environmental conditions can impact helping behaviour positively or negatively (c.f. Mathews & Canon, 1975). Here, participants were less likely to assist another person if they were exposed to noxious environmental stimuli at the time (ibid). It is therefore evident that environmental stimuli can impact individuals' cognitions and behaviour, affording support for the notion that both desirable and undesirable behaviours can be shaped by environmental contexts (Kallgren et al., 2000).

Alcohol consumption is a behaviour that is frequently viewed ambivalently as both desirable and undesirable (Room, 1976). As both negatively and positively perceived behaviours can be influenced by an individual's social

and physical context (Kallgren et al., 2000), it therefore seems unlikely that alcohol consumption would be immune to such influences. Indeed, contextual factors may cue behaviour and mediate alcohol-related cognitions. There is therefore a clear theoretical basis upon which to believe that contextual factors (both social and environmental) are likely to impact a wide range of behaviours, attitudes and cognitions. Accordingly, the following is an analysis of evidence which suggests that thoughts about alcohol and alcohol-related behaviours are contextually varying.

#### **1.4 Contextual substance use and alcohol consumption**

The diary of Roger Lowe, a seventeenth century apprentice shopkeeper and writer (c.f. Martin, 2006), provides an interesting historical insight into the contextual nature of alcohol consumption. It details alcohol consumption that occurred in a variety of different contexts and illustrates how these divergent contexts impacted on the patterns of alcohol consumption which took place (heavy consumption in a short period of time as opposed to steady consumption over a longer period). The ‘wetness’<sup>1</sup> of the situation is also believed to be an important determinant of consumption, drinking being heavier at parties and in bars than in restaurants, for example (ibid). Social context is also asserted to have a historic (and continued) role in alcohol consumption. Clark (1988) refers to the ‘worlds of heavy drinking’ where

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<sup>1</sup> In respect of alcohol consumption, ‘wet’ refers to a culture or context where alcohol consumption is commonplace whilst ‘dry’ refers to a culture or environment where there is little or no alcohol consumption.

there are shared, social perceptions on alcohol. Roger Lowe's account (c.f. Martin, 2006) also emphasises the sociability of drinking. For example, it highlights the importance that alcohol played in social and community celebrations such as weddings and christenings. Furthermore, the social nature of alcohol consumption is evident in the fact that of the 170 drinking occasions described in this five year account, only twelve of them were solitary occasions. This historical account of alcohol consumption could easily be (mis-) attributed to a modern day account of consumption. Indeed, the environmental and social contextual nature of alcohol consumption seems ubiquitous. Throughout much of the Western world, alcohol is an important social lubricant and is part of celebrations, business events, social occasions, sporting events and even religious and cultural ceremonies (Gordon, Heim, & MacAskill, 2012). Drinking alcohol also serves a social interaction and bonding function (ibid). The degree to which alcohol is embedded within many social cultures is also reflected within language. For example, in English, the term drink has the connotation of the consumption of alcohol (pg 128, Mandelbaum, 1965). Indeed, even the way in which people act when drunk – their so called “drunken comportment” - has been shown to change between cultures and from one context to the next (Macandrew & Edgerton, 1969). There appear to be socially agreed standards regarding what is (not) acceptable behaviour when sober and when drunk. This means that whilst certain behaviours are seen as acceptable when the actor is drunk, they would be negatively perceived if the person was sober (ibid). Resultantly, there appear to be pre-determined,

culturally and contextual defined freedoms granted to intoxicated people which mean that certain behaviours become an acceptable part of intoxication (ibid). There do, however, remain some constraining limits on this intoxicated behaviour, meaning that some actions may exceed cultural tolerances and be viewed negatively as a result (ibid). As subsequent chapters will demonstrate, people are therefore found to drink alcohol differently and vary in their perceptions of alcohol (e.g. Wall et al., 2000), depending on the context.

Anecdotal accounts of dramatic reductions in heroin use by soldiers returning from the Vietnam war (Robins, 1993) also demonstrates the contextual varying nature of substance use. Here, heroin use was reported in up to 45% of soldiers in Vietnam, whilst rates fell to 3% upon returning home from the war, suggesting that drug use was a temporary response to environmental stimuli (ibid). It has been suggested that substance use is the product of the physiological, cognitive and environmental factors - the 'drug, set and setting' (Zinberg, 1984) - and findings such as those of Robins (1993) certainly seem to support this assertion. Moreover, it has been argued that just as context can alter drug use, so too can it alter how drug use is perceived. Cohen (1990) argues that contextual changes alter the social reality of the substance. Similarly, Davies (1998) argues that the attribution of a pharmacological addicted state is not a consistent one, but instead is a functional attribution that is used in cases where it is necessary or beneficial to remove blame. Whilst it is not the purpose of this thesis to

examine this theory in detail, a brief overview of this view seems relevant given that this line of thought is one which also proposes that substance use, and how it is perceived, is the product of the environment.

### **1.5 *'The myth of addiction'***

The attributions made about one's own and other's behaviour can be functional in that they may serve a psychological and social purpose, for example they allow blame and guilt to be displaced (Shaver, 1985; Shaver, & Drown, 1986). This argument is found in Davies' (1997) 'The Myth of Addiction' which states that the common labelling of drug using behaviour as "addictive" is functional. This assertion is supported by research suggesting that explanations of addiction can ascribe or remove guilt depending on the interests of the attributor (Monk & Heim, 2011). Indeed, evidence suggests that substance users frequently explain their own use by adopting 'addicted' explanatory styles in order to minimise personal responsibility for their undesirable behaviour (Davies, 1997). This is also a label popularly attributed by others, in order to explain this unusual (anti social) behaviour (ibid). Labelling oneself as "an addict" may appear counter-productive as it implies a loss of one's free will (Davies, 1997). However, these attributions can also be self-serving. They imply that one suffers from an uncontrollable condition or disease and hence personal responsibility is removed and blame diminished, thus protecting one's self-esteem (Davies, 1997). Here, internal self-attributions effectively reduce blame in much the same way as an external attribution – where

environmental stimuli render users unable to control their actions (Eiser, Sutton, & Wober, 1978a; Eiser, Sutton, & Wober, 1978b).

Further evidence in support of this contention has been found within vignette-based research. The descriptions of the drug use provided within research have been found to dramatically alter how drug use is perceived by others, the concept of addiction being relaxed when the drug use is described as social and non-problematic (Heim, Davies, Cheyne, & Smallwood, 2001). Additionally, whether drug use is described as light or heavy has been found to interact with one's own drug-use status (drug user or non drug user) to produce a form of self-image bias, where people project their personal drug-use attributions onto the consumption which was most akin to their own experiences (Monk & Heim, 2011).

The call to consider the influence of context, and to view behaviours as being context-specific, is therefore widespread in the relevant literature. There are numerous theories which propose that context may impact behaviour and, also, how that behaviour is perceived. These theories have broad and far-reaching applications. However, in light of the problems caused by substance use, it is apparent that studying the effect of context on substance-use behaviours may be particularly important. Specifically, if the factors driving alcohol consumption are impacted by context or environment, a better understanding of this might benefit intervention approaches and thus reduce alcohol-related harm.



## **1.6 Problems associated with alcohol consumption: Why should we care?**

Mirrored in ever mounting media attention, the perception of a large proportion of the public is that alcohol consumption - and 'heavy episodic' drinking in particular - has increased in recent years (McAlaney & McMahon, 2007a). The concern about the rise in the so called 'binge drinking culture' (Measham & Brain, 2005) is evident in intervention-focused international research linking heavy drinking with injury and hospital admissions (WHO, 2007). It is also mirrored in the global rise in alcohol control policies (Institute of Alcohol Studies, 2010) and proposed legal changes (Andreasson, Holder, Norström, Österberg, & Rossow, 2006; Casswell & Thamarangsi, 2009; Sornphaisarn, 2005).

Psychological and social research on alcohol consumption is always in danger of being used for political purposes and can, on occasions, fuel a level of media sensationalism about the 'evils' of all alcohol consumption (Wallack, 1980). A report by Nutt, King, and Phillips (2010), for example, concludes that alcohol is more 'harmful' overall than cocaine and heroin. Whilst this research was questioned methodologically (van Amsterdam & van den Brink, 2010), it sparked increased media attention calling for more prohibitive policies (Boseley, 2010). However, whether or not research findings may be unduly altered by media attention (in terms of their impact on policy and practice), the fact remains that alcohol consumption, and particularly heavy episodic drinking or 'binging', can have serious health, economic and social implications (Room, Babor, & Rehm, 2005; Valentine,

Jayne, & Gould, 2013; WHO, 2005). Given the health and social concerns associated with alcohol, it is therefore only appropriate that the study of alcohol consumption is a highly active area in research. Alcohol consumption is the third leading global risk factor for disease and disability, accounting for 1.8 million deaths per year and over 69 million Disability-Adjusted Life Years (WHO, 2011). As such, alcohol is an ever present cause of concern and is the subject of large quantities of research. In England, current health guidelines suggest that males should not regularly drink more than 3-4 units of alcohol a day, and adult women should not regularly drink more than 2-3 units a day. Yet, whilst drinking levels have been found to decline in recent years (HSCIC, 2012), recent statistics suggest that alcohol consumption remains high in the UK and some people are far exceeding drinking recommendations (ibid). In 2010/11 there were 198,900 hospital admissions where the primary diagnosis was attributable to the consumption of alcohol and it has been estimated that, in 2008, the cost of alcohol-related harm to the NHS £2.7 billion, as measured by 2006/07 prices (HSCIC, 2012). Excessive alcohol consumption, in particular, is therefore both a global and local issue which requires attention.

It has been noted that research informing public health guidelines is fraught with difficulty. Indeed, Kendell (1987) notes that “*It is extremely difficult to answer the layman’s question ‘How much can I drink without damaging my health?’ Indeed, it is impossible to provide an answer which is both simple and scientifically defensible*” (pg. 1281). A recent report from the House of

Commons Science and Technology Committee (2012) suggests that people should have two alcohol free days per week and this too has been the subject of much debate, as well as receiving widespread media attention. The discussion continues as to what advice should be given in order to protect public health from alcohol-related harms (be they chronic or acute – indeed this is a contended issue in itself). However, a better understanding of the factors which drive alcohol consumption are of paramount importance to informing this debate.

### **1.7 Overview of thesis**

This chapter has outlined a number of theories and models which propose that a wide range of attitudes, beliefs, cognitions and behaviours are shaped by contextual factors. In support of these theories, numerous behaviours have been shown to vary depending upon contextual forces. Furthermore, alcohol use itself has been shown to vary from one context to the next. Given the impact of alcohol-related cognitions on consumption, such contextual changes suggest that there may be underlying, context-dependent variations in cognitions which drive these differences in consumption patterns. Indeed, such a proposal is in line with the environment-dependent changes which have been observed in a wide range of thoughts and beliefs about alcohol.

However, research examining the contextually varying nature of alcohol-related cognitions has been scarce. It is believed that the reliance on laboratory and classroom based research using almost exclusively student

samples may be the symptom of this. Indeed, research in the field of alcohol-related cognitions has relied on results which, based on contextualist theories, may not generalise to the real-world. Research has, instead, largely assumed that these cognitions are static – something which is commonplace in conceptualisations of substance use (Davies, 1997). Yet, without an adequate examination of the contextual nature of behaviour, our ability to alter behaviour also appears limited (Biglan & Hayes, 1996). The purpose of this thesis is therefore to provide an original contribution to the literature by addressing the paucity of contextually-aware, in-vivo research in the field of alcohol-related cognitions. In so doing, it is believed that greater light will be shed on previous research in this field, and an increased understating of the dynamic processes involved in alcohol consumption will be established. Such results may have implications for future research in this area, and for the improvements of alcohol-targeted interventions.

The following three chapters present reviews of the key theoretical components of this thesis: Alcohol-related cognitions – specifically, alcohol-related outcome expectancies, drink refusal self-efficacy and normative beliefs. As previously outlined, there is a clear philosophical and theoretical basis for believing that context may impact such cognitions. As such, a systematic attempt has been made in the literature reviews in Chapters 2, 3 & 4 to identify any research which has previously considered such effects. The subsequent chapters then present research which examines the effect of various contexts on alcohol-related cognitions. The original

contribution of this thesis can therefore be characterised in two ways. First, it provides evidence of the influence of context on alcohol-related cognitions, a hitherto largely unexamined area. Second, it provides methodologically advanced and novel methods of researching this phenomenon. Whilst the use of advanced technology in the study of alcohol is by no means unusual, its use to conduct cost-effective, experiential examinations of alcohol-related cognitions is original.

Studies within this thesis examine the impact of contexts on alcohol-related cognitions, utilising both field experiments and controlled, experimental designs. Thus, with the intention of informing theory and practice, this thesis expands the present literature in the field of alcohol expectancies, efficacy and normative beliefs. This will contribute to a more informative model of alcohol consumption where, in contrast to dominant models, these alcohol-related cognitions are treated not as static factors, but as dynamic variables which are modified by the settings in which they are elicited. This will afford a clearer understanding of their respective roles in shaping alcohol consumption.

Study 1 administered identical alcohol norms, efficacy and expectancies questionnaire to participants, in either a bar or a lecture setting, to allow for a between participants examination of the effect of context on alcohol norms, efficacy and expectancies. Controls for between participant variations in alcohol consumption were utilised.

Study 2 examined alcohol-related cognitions between college students, university students and business professionals within the UK. A questionnaire measuring alcohol-related cognitions was administered in the participants' place of study or work and between-group comparisons were made. This enabled an examination of any age-related variations in cognitions and studied the possibility that variations in personal context (or experiences of alcohol consumption) may impact cognitions. For example, people divergent in age may share some similar alcohol-related cognitions and yet differ in others – owing to (dis-) similarity in alcohol-related experiences. This research also contributed to the diminutive, non-student-based research in this area.

Study 3 projected panoramic videos across a laboratory room. These videos were specially filmed and projected to create a panoramic effect depicting a populated student lecture theatre and pub. Participants completed a questionnaire (akin to that described above) whilst viewing one of these stimuli. This study examined the effects of contextual priming/cueing on alcohol-related cognitions.

Study 4 used a context aware experience sampling methodology. This involved using a smart-phone application as a method of 'ecological momentary assessment' or experiential sampling. The application was used to monitor participants' cognitions at timed intervals, in a similar manner to that used in a recent investigation into 'mind-wandering' (Killingsworth & Gilbert, 2010). Participants were contacted at random time intervals over the course of a week and asked to respond to a series of short, multiple response

questions. These questions ascertained the participants' environmental and social context, present alcohol consumption and present alcohol-related cognitions. This allowed for a dynamic method of assessing contextual influences on cognitions over a period of time.

### **1.8 Overview of data analysis**

Studies 1, 2 and 3 were subject to data screening for missing data (using missing values analyses) and Little's MCAR's tests (see Tabachnik & Fidell, 2001) to assess for patterns in missing data. Where data were deleted this has been detailed in the appropriate results sections. Estimation Maximisation was used in all studies (where appropriate, detailed accordingly) to replace values that were missing at random. Inferential statistics have been conducted using ANOVAs and post hoc testing with adjusted ( $p < .01$ ) levels of statistical significance (which are specified throughout). All post hoc analyses were two-tailed. Study 4 data were analysed using multi-level modelling. This form of analysis accounts for missing data and thus missing data analyses and adjustments were not required.

## **2. CHAPTER 2 – A SYSTEMATIC REVIEW OF OUTCOME EXPECTANCIES**

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## ***2.1 Introduction to the outcome expectancy literature***

The cognitions which may moderate alcohol consumption have been a key focus of research. Of the many alcohol-related cognitions considered, outcome expectancies have been a particular focus (McAlaney & McMahon, 2007a). Alcohol expectancies are defined as explicit or implicit<sup>2</sup> beliefs about the likely results of alcohol consumption (Reich, Below, & Goldman, 2010), and research focuses on their impact on consumption (Brown, Goldman, Inn, & Anderson, 1980; Goldman, 1994). Early research such as the development of the alcohol outcome expectancy questionnaire (Brown et al., 1980), for example, gauged expected enhanced social and sexual performance. Such anticipated positive outcome expectancies have been found to be associated with immediate (Anderson, Grunwald, Bekman, Brown, & Grant, 2011; Brown et al., 1980; Carey, 1995; D'Alessio, Baicco, & Laghi, 2006; Kushner, Sher, Wood, & Wood, 1994) and long term increases in alcohol consumption (Aas, Leigh, Anderssen, & Jakobsen, 1998). Meta-analyses (Hull & Bond, 1986) and have also demonstrated outcome expectancies to predict a significant amount of variation in alcohol consumption. Further, real-time observations in semi naturalistic bar environments have found positive outcome expectancies to be associated with greater alcohol consumption (Bot, Engels, & Knibbe, 2005; Larsen, Engels, Wiers, Granic, & Spijkerman, 2012; Roehrich & Goldman, 1995).

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<sup>2</sup> Explicit beliefs are those which are fully and clearly expressed, believed or demonstrated whilst implicit beliefs are implied and evident in other words, actions or behaviours, rather than being expressly stated.

Research also suggests that negative, as well as positive, outcome expectancies can be predictors of alcohol consumption (Leigh & Stacy, 1993; Leigh & Stacy, 2004; Stacy, Widaman, & Marlatt, 1990). Negative expectancies appear to predict a decrease in consumption, where positive expectancies are associated with an increase (Fromme & D'Amico, 2000; Leigh & Stacy, 1993). High drinking levels are also observed in those respondents who are ambivalent about possible negative outcomes (Gaher & Simons, 2007). Accordingly, clusters of students identified on the basis of strong positive and negative expectancy endorsements appear particularly prone to impaired control (Leeman, Kulesza, Stewart, & Copeland, 2010).

Some studies suggest that positive expectancies are better predictors of drinking (Jackson & Matthews, 1988; Leigh & Stacy, 1993; 2004; Stacy et al., 1990), whilst others indicate the opposite (McMahon, Jones, & O'Donnell, 1994). However, longitudinal research by Zambouanga, Horton, Leitkowski, and Wang (2006) found that negative outcome expectancies did not significantly predict hazardous drinking levels at base rate or one year later, whilst positive expectancies did. Studies utilising both positive and negative expectancy measures may therefore be considered more probative (Mann, Chassin, & Sher, 1987). Overall, the research to date suggests that expectancies are associated with alcohol consumption and, resultantly, that they may be targeted by interventions which are designed to reduce drinking. However, the expectancies literature is also characterised by discrepant findings. These variations in results require fuller consideration if

therapeutic interventions based on this body of knowledge are going to be successful.

## **2.2 Rationale of review**

With the above in mind, this chapter reports a systematic review of articles published between 1970 and 2013, focusing specifically on alcohol-related outcome expectancies. The purpose of this review is to assess the validity of the research into alcohol-related outcome expectancies, drawing attention to conflicting findings, sampling and methodological variations and limitations. Studies involving expectancy-based treatment approaches were not included. A particular focus of this review is to systematically explore the extent to which a study's context is considered within the expectancies literature, since the way in which people conceptualise substance use is asserted to be a function of an individual's personal context. As outlined in Chapter 1, environmental factors may consequently change the social reality of the substance use (Davies, 1997), with consumption being thought of differently depending on the context of the use (Davies, McConnochie, Ross, Heim, & Wallace, 2004; Heim, Davies, Cheyne, & Smallwood, 2001; Monk & Heim, 2011). The notion of a mediating role of context in behaviour is not a new one in the realm of expectancies. Bolles' (1972) 'primary law of learning' asserts that people learn that certain cues predict particular consequences. As such, outcome expectancies have been postulated to be learnt and to be context specific, with different expectancies being associated with different situations (Wall et al., 2000). The first research question guiding this review, therefore, was:

‘is context an area which has been researched within the expectancy literature and, if so, what effects do contexts exert on alcohol expectancies?’ In light of the high prevalence of student-based research within the literature, the author also sought to question whether findings from student populations could be generalised to the wider population. The relatively high level of female participation in higher/further education and the preponderance of American research (where drinking practices/laws governing alcohol consumption differ) were also considered in light of the possibility that gender and cultural disparities within the literature may impact findings. The second research question underpinning this work therefore was ‘does the expectancy literature examine how demographic factors such as age, gender and culture impact expectancies?’.

During an initial consultation of the literature, three further variations in the expectancies literature were identified, and these informed the following additional research questions: First, since the alcohol consumption measures used appeared to vary substantially, it was decided that the review should assess ‘how does the alcohol consumption measure used impact research findings?’. Second, ‘how does the inclusion of efficacy measures impact findings within the expectancy literature?’, as the inclusion of this measure was observed to be inconsistent within the literature. Finally, the review questioned, ‘does temporal distance impact expectancies?’, as it was observed that some research utilises proximal outcome expectancies, whilst others use more distant or long term consequences.

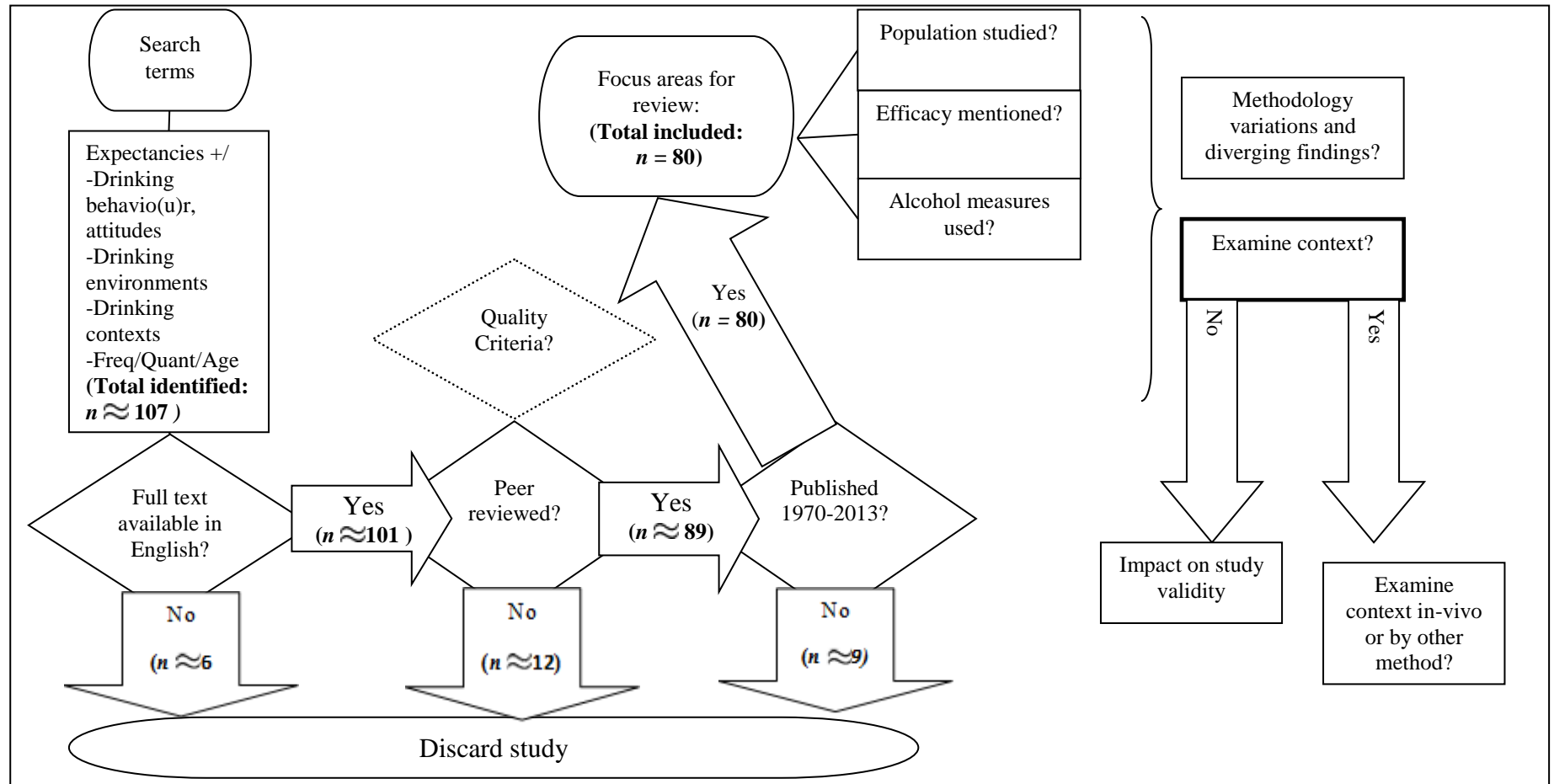
### **2.3 Method of review**

A synthesis of the studies into appropriate categories (context, target population studied, alcohol consumption measure used, efficacy measures and temporal distance) was conducted and a summary of this review process is presented in a flow diagram in Figure 1. In line with recommendations (Wright, Brand, Dunn, & Spindler, 2007), the minimum criteria for inclusion was that the full text articles were available in English and that publications were peer reviewed. In order to allow a review of the past four decades of research, publication time constraints (1970-2013) were also set. Assessing the quality of articles was guided by a checklist which required the consideration of internal and external validity, methodological rigor and measurement items (Khan, Riet, Popay, Nixon, & Kleijne, 2005). However, in line with recommendations (Wells & Littell, 2009), quality criteria did not form the sole basis of our assessment because studies of varying methodological quality may help explain discrepant findings (Wilson & Lipsey, 2001).

Accordingly, it was decided that using the original quality criteria as exclusion criteria would be overly cautious. For instance, an initial assessment of expectancy studies revealed very few studies which convincingly met the external validity requirements (see Table 1). It was therefore decided that studies which did not meet this criteria should not be excluded as they highlight an important limitation of the current research in this area. Similarly, selection and measurement bias may impact the internal

validity of studies (Khan, Kunz, Kleijnen, & Antes, 2011). Yet, limiting inclusion to those studies which utilise diverse measures and demographics may exclude information which is pertinent to the proposed research questions, specifically those concerning alcohol consumption measurement and the demographics of the target population. As suggested by Khan et al. (2005), the initial checklist of quality assessment items therefore aided the analysis and interpretation of studies - rather than serving as a guide for removal. These criteria also assisted in the subsequent structuring of this review into the different sections.

Published empirical (80) work on alcohol expectancies was therefore identified on the basis of these research questions and criteria. Studies were located searching JSTOR, PsycARTICLES, PsychINFO, ScienceDirect and Web of Knowledge. Search terms utilised were “alcohol expectancies”; “drinking behavio(u)r and attitudes”; “drinking environments” and “drinking contexts”. A particular effort was made to identify any papers with titles which simultaneously referenced expectancies and contexts/environment.



**Figure 1** Flow diagram depicting the process of the systematic review of the expectancies literature.

Search terms relating to participant demographics (e.g. age) and consumption measures (e.g. frequency and quantity) were subsequently added following the initial searches, to broaden the scope of the review and answer the additional research questions. Additional articles and academic texts were located by reading the references of retrieved articles. Five reviews (Ham & Hope, 1993; Jones, Corbin, & Fromme, 2001; McAlaney & McMahon, 2007; Oei & Morawska, 2004; Weschsler & Nelson, 2008) and four meta analyses (Hull & Bond, 1986; Mckay & Schare, 1999; Reich et al., 2010; Quigley & Collins, 1999) which met these search criteria were also identified. The majority (n = 55) of work uncovered was published in North America. However, articles were also identified from the UK (n = 3), the Netherlands (n = 2), India (n = 1), Italy (n = 1), Norway (n = 1), Finland (n = 1) Australia (n = 7). There was also one cross continental piece of research. Table 1 summarises the articles considered and details their key findings and their respective methodologies. It also specifies whether context effects were considered and outlines participant demographics, study location, and those additional variables which were pertinent to the research questions.



**Table 1***Summary of the expectancy literature reviewed with key methodologies and findings.*

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age(Years) M = Mean</i>	<i>Sample Gender (% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Aas et al.	1998	O.E Pos	Norway	7 <sup>th</sup> Grade Students	45.7	Adolescents (Non clinical)	Longitudinal Questionnaire	RSR (Frequency, quantity and drunkenness)	NAR (College where questions administered)	Positive outcome expectancies are associated with longer term increases in alcohol consumption
Anderson et al.	2011	O.E Pos	America	9 <sup>th</sup> to 12 <sup>th</sup> Grade High School Students	Sample 1 – 48.8% Sample 2 - 51.8	Students (Non clinical)	Questionnaire	RSR (Frequency and quantity in past month)	NAR (Classrooms)	Interaction of drinking (and not drinking motives) and expectancies which predicted alcohol consumption
Baldwin et al.	1993	O.E Pos	Australia	17-29 (M = 19.1)	59.3	1st year Undergraduate Students (Non clinical)	Questionnaire	RSR (Frequency and quantity)	NAR (Lab/ University building-group completion)	Positive expectancies are unrelated to frequency but were associated with quantity of consumption

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age(Years) M = Mean</i>	<i>Sample Gender (% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Barry & Goodson	2012	Context	America	Qualitative study 1 – Not specified Quantitative study 2 – M = 22)	Qualitative study 1 – 85% Quantitative study 2 – 55%	University Students (Non clinical)	Interview and Questionnaire	N/A	NAR (University building)	Social and environment /contextual factors found to be associated with drinking Alcohol consumption associated with context
Beck et al.	1993	Context	America	High School (Age not specified)	50	Students (Non clinical)	Questionnaire	RSR (Frequency and quantity across contexts)	NAR (Classrooms)	Alcohol consumption associated with context
Beck & Treiman	1996	Context	America	High School (Age not specified)	54	Students (Non clinical)	Questionnaire	RSR (Frequency and quantity across contexts)	NAR (Classrooms)	Alcohol consumption associated with context
Bojesson & Dunn	2001	O.E <b>Pos and Neg</b>	America	15-49 (M = 21.34)	51	University Students (Non clinical)	Questionnaire	RSR (Quantity and frequency)	NAR (Unspecified location, in groups)	Gender differences in O.E

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age(Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Bond et al.	2010	Context	22 Countries in Europe (8); the Americas (7); Asia (3); Australasia (2), and Africa (2)	Majority 18-75	Nos. Male and Female (n varied cross country variation c.f. Bond, pg 2141)	Adults (Non clinical)	Survey – face to face, telephone +/- or post	RSR (Frequency and quantity of public and private)	NAR (Lab or home)	Gender and context (private vs public) variations in the frequency and quantity of alcohol consumed
Bot et al.	2005	O.E and Context <b>Pos and Neg</b>	Netherlands	18-28 (M = 20.48)	46	Young Adults	Questionnaire and Lab/simulated context bar assessments	RSR (Quantity and frequency) Observed consumption	Lab based bar	O.E associated with observed alcohol consumption
Brown et al.	1980	O.E <b>Pos</b>	America	15-60	44 (phase 1) 47 (phase 2)	Mixed (Non clinical)	Questionnaire	Diary Self-Report (Frequency and quantity of drinking during week)	NAR (Unspecified)	Positive O.E associated with increased reported alcohol consumption
Carey	1995	O.E <b>Pos</b>	America	17-38 (M = 18.9)	61	University Students	Questionnaire	RSR (Max no. of drinks per day-quantity and frequency of intoxication)	NAR (Unspecified but in small groups)	Different O.E predict quantity or frequency of alcohol consumption

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age(Years) M = Mean</i>	<i>Sample Gender (% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Christiansen et al.	2002	O.E <b>Pos</b> And social context	America	M = 19.91	70.8	Students (Non clinical)	Questionnaire	RSR (Quantity and frequency)	NAR (Group based sessions on campus)	Differences in O.E between lone and social group drinkers
Clapp et al.	2000	Context	America	M = 24.0	44.5	Students (Non clinical)	Phone Survey	RSR (Quantity of drinks across provided contexts)	NAR (Participant's home)	Social context impacts alcohol consumption
Clapp et al.	2006	Context	America	18-20 (M = 24.58)	54.8	Students (Non clinical)	Phone Survey	RSR (Quantity of drinks across provided contexts)	NAR (Participant's home)	'Wet' environment such as pub associated with higher alcohol consumption
Clapp et al.	2001a	Context	America	M = 23.8	56.2	Students (Non clinical)	Telephone Survey	RSR (Quantity in differing contexts)	NAR (Participant's home)	Context variation in consumption
Clapp et al.	2001b	Context	America	14-21 (M = 16.3)	51.5	Teenagers (Non clinical)	Longitudinal youth survey data	RSR (Quantity in differing contexts)	NAR (Participant's home)	Context variation in consumption
Clapp et al.	2003	Context	America	Study 1 =18-61 (M = 24.4) Study 2 = 18-22	Study 1 = 55 Study 2 = not specified	Students (Non clinical)	Telephone Survey	RSR (Quantity in differing contexts)	NAR (Participants home)	Context variation in consumption

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Clark	1988	Context	America	18-22 yrs 18-40+	48.6	Adult Sample	Questionnaire	RSR (Frequency, quantity and types)	NAR(Place questionnaire received)	Context variation in consumption
D'Alessio et al.	2006	O.E <b>Pos</b>	Italy	M = 22.59	64.2	Students (Non clinical)	Questionnaire	RSR (Frequency and quantity)	NAR (University Classrooms)	Positive outcome expectancies are associated with increased consumption
Demers et al.	2002	Context	Canada	Undergraduate (unspecified)	57.2	Students (Non clinical)	Multilevel Analysis of questionnaire (postal)	RSR (No. of drinks per occasion)	NAR (Personal residence unspecified)	Alcohol consumption is higher in the contexts of: social groups, friends, bars, pubs, parties, meal
Friedman et al.	2009	O.E <b>Pos</b>	America	21-26	52 (n = 46)	Undergraduate Students (Non Clinical)	Questionnaire and priming tasks	Alcohol consumed in lab measured	In Lab, in presence of alcohol	Those primed with positive expectancies drink more in later testing

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Fromme & D'Amico	2000	O.E <b>Pos and Neg</b>	America	13 – 17 (M = 15)	50	Adolescents (Students)	Questionnaire (postal)	RSR (Frequency, quantity and total)	NAR (Personal residence unspecified)	Positive expectancies predict increased drinking. Negative expectancies predict decrease
Gaher & Simons	2007	O.E <b>Pos and Neg</b>	America	18-25 (M = 20.6)	69	College Students	Questionnaire	RSR (Amount, frequency, binge drinking, problems)	NAR (Unspecified)	Curvilinear relationship with expectancies and binge drinking
Giles et al.	2006	DRSE (and O.E)	America	M = 19	61	Students (Undergrad)	Questionnaire	RSR (Frequency, quantity & AUDIT)	NAR (Participant's own home)	Low DRSE and high positive O.E are associated with greatest consumption
Goldsmith et al.	2012	DRSE (and O.E)	America	M = 19.00	66	Students (Non clinical)	Questionnaire	RSR (Frequency & quantity)	NAR (University building)	O.E. & DRSE predict consumption (and O.E interaction)

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age(Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Ham & Hope	2003	O.E and problem drinking	-	-	-	Student and problem drinkers	Review	-	-	Problem drinkers are particularly high in positive outcome expectancies such as tension reduction.
Ham et al.	2010	O.E and context <b>Pos and Neg</b>	America	M = 19.46	74.8	Students	Self-report Survey	RSR (Amount, frequency)	NAR (Unspecified)	Positive outcome expectancies are associated with participation in student drinking games
Harford	1979	Context	America	+ 18 years	Male & Female	Adult	Questionnaire	RSR (Frequency, quantity and volume)	NAR (At place questionnaire and interview administered)	Gender and context specific variation in alcohol consumption

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Hasking & Oei	2002	O.E and efficacy <b>Pos and Neg</b>	Australia	18 - 60 (M = 33.18)	52.3	Adult (Clinical and Non clinical)	Questionnaire (Postal)	RSR (Average and volume alcohol consumed)	NAR (Unspecified)	Interaction between O.E, drink refusal self-efficacy, alcohol consumption measure and participant sample
Holyfield et al.	1995	O.E and context	America	18-65+	Male & Female	Adult Survey (Previous survey data 1964-1984)	Surveys (Interviews)	RSR (Frequency, quantity)	NAR (Unspecified – place of interview)	Importance of context and expectancies in predicting alcohol consumption
Hull & Bond	1986	O.E	-	-	-	-	Meta Analysis	-	-	O.Es are associated with alcohol consumption
Jackson & Matthews	1998	O.E <b>Pos and Neg</b>	UK	Undergraduates (unspecified)	60.6	University Students	Questionnaire (Postal)	RSR (Consumption of various drinks and drinking rate)	NAR (Unspecified)	Positive expectancies are better predictors of drinking
Jones et al.	2001	O.E <b>Pos and Neg</b>	-	-	-	-	Review	-	-	Inconsistent finding regarding pos/neg O.E



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Kirmani & Suman	2010	O.E <b>Pos</b>	India	17-19 (M = 18.90)	46.7	University Students	Questionnaire	RSR (Frequency)	NAR (Unspecified)	Gender differences in O.E
Kushner et al.	1994	O.E <b>Pos</b>	America	Undergraduates (unspecified)	52.2	University Students (Non clinical)	Questionnaire	RSR (Recent consumption)	NAR (Unspecified)	O.Es are associated with immediate increases in consumption
Labrie et al.	2011	O.E and context <b>Pos</b>	America	18 - 22 (M = 20.22)	43.5	College Students (Non clinical)	Questionnaire	Blood Alcohol (Breathalyser)	College socials event and follow up (NAR)	Positive sex expectancies more strongly endorsed while drinking in college social environment

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Larsen et al.	2012	O.E and Context <b>Pos</b>	Netherlands	Study 1 – 18-28 (M = 21) Study 2 – 18-26 (M = 20) Study 3 – 18-27 (M = 21.5)	Study 1 - 46.9 Study 2 – 52.8 Study 3 – 52.5	Undergraduate Students	Questionnaire and Lab/simulated context bar assessments	RSR (Quantity and frequency) Observed consumption	Lab based bar (Testing also occurred out of this setting)	O.Es are associated with observed alcohol consumption An effect of social influence and context effects on observed consumption
Lau-Barraco & Dunn	2009	Context	America	M = 24.04	All Male	University Students (Non clinical)	Questionnaire and Lab/simulated context bar assessments	RSR (Frequency and total & Alcohol consumed in lab measured)	In Lab, in presence of alcohol	Those primed with a simulated bar showed significantly greater alcohol-related memory associations and drunk significantly more

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Lee & Oei	1993	O.E and Efficacy <b>Pos and Neg</b>	Australia	14 – 62 (M = 31.2)	49	General Community	Questionnaire	RSR (Usual Frequency, max quantity of drinks on an occasion, maximum frequency)	NAR (Unspecified questions delivered by peer distribution)	O.E and DRSE are associated with consumption (variations between quant and freq)
Lee et al.	1999	O.E <b>Pos and Neg</b>	Australia	16–84 (M = 38.0)	50.5	General community of drinkers (Non clinical)	Questionnaire	RSR (Frequency and quantity)	NAR (Unspecified)	Interaction with pos/neg O.E and alcohol consumption measure used (pos O.Es best predicted quantity of alcohol consumed per session, whilst neg O.E best predicted frequency of drinking)

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age(Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Leeman et al.	2012	O.E <b>Pos and Neg</b>	America	M = 19.64	73.6	University Students (Non clinical)	Questionnaire (Online)	RSR (Frequency and quantity)	NAR (Place where computer accessed)	Sub clusters of students were identified in terms of expectancy endorsement Pos and Neg O.E predict consumption Pos O.E is a more powerful motivator of drinking.
Leigh & Stacy	1993	O.E <b>Pos and Neg</b>	America	17 -52 (M =20)	54.8	University Students (Non clinical)	Questionnaire	RSR (Quantity of consumption and frequency of consumption, feeling drunk & intoxication)	NAR (Unspecified)	Pos O.E is a more powerful motivator of drinking.
Leigh & Stacy	2004	O.E <b>Pos and Neg</b>	America	12 + Median = 36	58	Community (National Survey)	Questionnaire (Postal)	RSR (Frequency, quantity, frequency of drunkenness, maximum quantity)	NAR (Personal residence unspecified)	Neg O.E were better predictors of alcohol consumption in those over 35 yrs, whilst pos O.E were better predictors of consumption under 35 yrs

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Leonard & Blane	1988	O.E <b>Pos</b>	America	20-30 (Sample 1, M = 24) (Sample 2, M = 19)	All Male	General community	Questionnaire	RSR (Quantity and frequency of drunkenness)	NAR (Unspecified)	Relationship between alcohol expectancies and a variety of personality factors
Lundahl et al.	1997	O.E <b>Pos</b>	America	17 -35 (Group 1 M = 19.01) (Group 2 M = 24.62)	68.6	College Students (Non clinical)	Questionnaire	RSR (Quantity, frequency, variability).	NAR (Distributed on campus, completed at home)	Participants under the age of 20 years show greater global, positive effects, social facilitation, sexual enhance, power and aggression compared to those over the age of 20 years -Age/gender interaction

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MacLatchy-Gaudet et al.	2001	<b>O.E Pos and Neg</b> and context	America	M = 22.5	100	Undergraduate Students (Non clinical)	Questionnaire	Prospective self-report (Diary-quantity)	NAR (Unspecified, although participants asked to imagine different contexts)	O.E variations found across imagined context and interactions in predicting consumption
Mann et al.	1987	<b>O.E Pos and Neg</b>	America	High School (Unspecified)	46.9	Students (Non clinical)	Questionnaire	RSR (Quantity, Frequency)	NAR (Classroom)	Both pos & neg O.E are equally important predictors of alcohol consumption
McAlaney & McMahan	2007	Alcohol	-	-	-	-	Review	-	-	Variation in how the term binge is defined
Mckay & Schare	1999	O.E and cue reactivity	-	-	-	-	Meta Analysis	-	-	Physiological and expectancy based cue reactivity

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McMahon et al.	1994	O.E <b>Pos and Neg</b>	UK	18-62 (M = 31)	50.3	General community	Questionnaire	RSR (Frequency per week, per week)	NAR (In presence of researcher)	Neg O.E were more important in predicting consumption than pos O.E -Gender, reference group, proximity and consumption measures interaction
Monk & Heim	2013	O.E <b>Pos and Neg</b>	UK	M = 20.52	62	University Students (Non Clinical)	Questionnaire	RSR (Frequency)	Questions given during contextual cueing	Social and environmental contextual factors impact alcohol-related cognitions
Morawska & Oei	2005	Binge Drinking	Australia	Sample 1 (M = 18.93) Sample 2 (M = 18.48)	Sample 1 - 62 Sample 2 - 73	University Students (Non clinical)	Questionnaire	RSR (Frequency & quantity)	NAR (In groups, unspecified location)	Validated model of alcohol consumption (O.E and efficacy important)

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age(Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Mulligan-Rauch & Byrant	2000	O.E <b>Pos and Context</b>	America	Sample 1 16-37 Sample 2 18-49 (M = 18)	Sample 1 - 61 Sample 2 – 66	University Students (Non clinical)	Questionnaire delivered Interview	RSR (Frequency & quantity)	NAR (Imagined context whilst in lab setting)	Context, gender and quantity/frequency measure used were found to have interactive effect on O.E
Mustonen et al.	1999	O.E <b>pos and neg</b> And context	Finland	15-69	48	Population survey (Non clinical)	Interview	RSR (Frequency & quantity)	NAR (Unspecified location)	Variation in O.E across social contexts
Noar et al.	2003	O.E <b>Pos and Neg</b>	America	Median = 18.70	73	College Students (Non clinical)	Questionnaire	RSR (Frequency, quantity, peak consumption)	NAR (Classroom)	The importance of the proximity of pos and neg O.E
Nyaronga et al.	2009	<b>Context</b>	America	Age 18 +	Not specified	Population (Non clinical)	National Survey Data	RSR (Frequency, quantity, volume across contexts)	NAR (Unspecified)	People can be categorised by their preferred drinking context



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Oei et al.	1998	O.E and Efficacy <b>Pos and Neg</b>	Australia	18-62 (M = 31.2)	42.9	Community and Clinical	Questionnaire	RSR (Frequency, quantity, max consumption and frequency of such)	NAR (Unspecified)	Low self-efficacy predicted greater alcohol - Deviation in the proportion of variance explained by O.E & efficacy depending on sample (problem/non-problem) -Expectancy did not predict significant variance in the alcohol consumption in a clinical sample)
Oei & Baldwin	1994	O.E and Efficacy <b>Pos and Neg</b>	Australia	-	-	-	Model development	-	-	Refusal efficacy and O.E determine drinking

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Oei & Morawska	2004	O.E and Efficacy	-	-	-	-	Review and model construction	-	-	O.E and efficacy are important in a model of alcohol consumption
O'Hare	1990	Context	America	Undergraduates (age unspecified)	56.1	University Students (Non clinical)	Questionnaire (Postal)	RSR (Quantity and frequency)	NAR (Participants' own home or place questions received)	Context, sex and gender differences in consumption
O'Hare	1998	O.E Pos and Context	America	19-29 (M = 18.8)	39.7	University Students (Non clinical)	Questionnaire	RSR (Participants rated the chances of drinking excessively across contexts)	NAR (University Campus)	O.E vary with context
O'Hare et al.	2001	O.E Pos and Context	America	18-26 (M = 18.8)	39.7	University Students (Non clinical)	Questionnaire	RSR (Participants rate quantity and frequency of their heavy drinking across contexts)	NAR (University Campus)	O.E vary with context

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Park et al.	2008	Context	America	M = 17.9	58	College Students (Non clinical)	Questionnaire	RSR (Frequency and quantity of personal consumption)	NAR (College Campus)	Social context associated with consumption
Paschall et al.	2007	Context	America	18 – 26 (M = 20.25)	58	University Students (Non clinical)	Questionnaire (Mail or online)	RSR (Total 28 day quantity)	NAR (Place questions received – asked report for different contexts)	Context related variation on alcohol consumption
Read et al.	2004	O.E Pos	America	18-23 (M = 19.7)	52.3	University Students	Questionnaire (Computer)	RSR (Quantity)	NAR (Lab room)	Gender differences in O.E
Reich et al.	2004	O.E Pos	America	Undergraduate Students (not specified)	Experiment = 99 Control = 73	University Students	Lab based priming and questionnaire	RSR (Frequency and Quantity)	Staged bar of alcohol-neutral (Conference room)	Greater false recall of expectancy based words in alcohol-related vs non alcohol rested context

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Reich et al.	2005	O.E Pos	America	Students (not specified)	83	University Students	Lab based priming and questionnaire	RSR (Frequency and Quantity)	NAR (In lab)	Word lists of expectancy-related adjectives which started with an alcohol-related word (beer) created better recall than list starting with non alcohol-related word
Reich et al.	2010	O.E	-	-	-	-	Meta Analysis	-	-	Compares explicit and implicit O.E studies
Roehrich & Goldman	1995	Alcohol Priming	America	25-45	100	University Students (Non clinical)	Lab based priming and questionnaire	RSR (Quantity and frequency) Alcohol Consumed in lab	In Lab (In presence of alcohol)	Those primed with positive expectancy words consumed more alcohol in subsequent testing

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Senchak et al.	1998	O.E <b>pos and neg</b> and Context	America	M = 19.05	50	Students (Non clinical – parents clinical_	Questionnaire	RSR (Quantity and frequency of drinking and drunkenness)	NAR (Unspecified)	Heavier drinking in those who prefer drinking in large social, mixed gender groups rather than those who prefer smaller, mixed groups
Stacy et al.	1990	O.E <b>Pos and Neg</b>	America	Undergraduate (unspecified)	Study 1 & 3 = unspecified Study 2 = All Male	University Students (Non clinical)	Questionnaire	RSR (Quantity and frequency, peer and self-reports)	NAR (Unspecified)	Positive expectancies are much better predictors of drinking
Thombs et al.	1993	O.E and context <b>Pos and Neg</b>	America	18-22	57.1	University Students (Non clinical)	Questionnaire	RSR (Quantity and frequency)	NAR (University campus)	Social context impacts outcome expectancies

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Treno et al.	2000	Context	America	14yrs + (55.93 % below 41 yrs)	Approx 50	Community sample (Non clinical)	Telephone Survey	RSR (Frequencies of use, average drinks per occasion and a measure of the variance of drinking levels (across different contexts))	NAR (Home)	Variations in alcohol consumption across contexts
Quigley & Leonard	1999	Alcohol Consumption and Context	-	-	-	-	Meta Analysis	-	-	Consuming alcohol occurs in situation-specific contexts
Wall et al.	2001	O.E and context <b>Pos and Neg</b>	Canada	19+	50.2	University Students (Non clinical)	Questionnaire	RSR (Quantity and frequency)	Bar and neutral context on campus	A bar, as opposed to a neutral context, increases positive outcome expectancies (within subject)

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Wall et al.	2000	O.E and context <b>Pos and Neg</b>	Canada	M = 19.74	51.3	University Students (Non clinical)	Questionnaire	RSR (Quantity and frequency)	Bar and neutral context on campus	As above (Between subject)
Weschler & Nelson	2008	Context	America	-	-	-	Review	-	-	Context is important in consumption
Weitzman et al.	2003	Context	America	Unspecified (previous research cohort)	Unspecified (previous research cohort)	1 <sup>st</sup> year college students	Questionnaire (Postal)	RSR (Number of drinks)	NAR (Personal residence unspecified)	Context is important in alcohol consumption
Wiers et al. (Conference proceedings)	2003	O.E and Context <b>Pos</b>	America	18–26	Unspecified	University Students (Non clinical)	Questionnaire	N/A	Bar, pre bar and lab (On campus)	Increases in negative outcome expectant responses in a bar context, as opposed to neutral or pre-bar contexts

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age(Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Zamboanga et al.	2006	O.E <b>Pos and Neg</b>	America	17-22 M = 19.6	100	College Students (Non clinical)	Questionnaire (longitudinal)	RSR (Quantity and frequency)	NAR (During one of each team's scheduled events)	Neg O.E did not significantly predict 'hazardous drinking' levels at base rate or one year after, whilst pos O.E did

\* O.E = Outcome Expectancies (Pos = positive. Neg = negative); RSR = Retrospective Self-report; NAR = NAR



## **2.4 Drink refusal self-efficacy and outcome expectancies**

Whilst considering alcohol expectancies, some researchers have underlined the need to increase the examination of self-efficacy (Oei & Morawska, 2004). Bandura's (1971) social cognitive model, which has been applied to health promotion (e.g. Bandura, 2004), highlights the existence and importance of two types of expectancy: outcome expectancies and efficacy expectancies. Here, efficacy expectancies are defined as the perception of one's own ability to refuse alcohol, and low self-efficacy has been found to predict greater alcohol consumption (Baldwin et al., 1993; Oei, Fergusson, & Lee, 1998; Oei & Morawska, 2004). Indeed, according to Bandura's social cognitive model, outcome expectancies are asserted to explain only moderate additional variance to that contributed by self-efficacy (Solomon & Annis, 1990). This position is supported by findings which indicate that self-efficacy has a greater impact on alcohol consumption than outcome expectancies (Oei & Morawska, 2004). Similarly, Hasking and Oei (2002) and Goldsmith, Thompson, Black, Tran, and Smith (2012) found an interaction between outcome expectancies and drink refusal self-efficacy (DRSE) which impacted alcohol consumption. Here, Hasking and Oei (2002) observed that, in a community sample, those with high DRSE did not differ significantly in the volume of alcohol consumed whether they had high or low positive expectancies. However, where DRSE was low, more positive outcome expectancies were associated with significant increases in the volume of alcohol consumed (ibid). In light of this, perceived self-

efficacy, specifically drink refusal self-efficacy, has been incorporated into a model of alcohol consumption along with outcome expectancies (Oei & Morawska, 2004). This has been validated by its ability to correctly classify participants as problem or non-problem drinkers (Morawska & Oei, 2005). Problem drinkers, for example, were correctly classified on the basis of their low DRSE and high positive outcome expectancies (ibid).

## ***2.5 Measuring alcohol consumption***

Despite citing the link between outcome expectancies and consumption, there have been some conflicting findings with regard to the alcohol consumption measure used. Specifically, positive expectancies have been found to have a different effect on the quantity and frequency of consumption. Baldwin, Oei, & Young (1993) found that positive expectancies were related to increased drinking volume, but not to frequency of consumption. As such, positive outcome expectancies have been found to be associated with participation in student drinking games (high quantity, low frequency drinking) (Ham, Zamboanga, Olthuis, Casner, & Bui, 2010). Research therefore surmises that positive outcome expectancies determine how much, as opposed to how often one drinks, whilst frequency of consumption appears to be more accurately predicted by efficacy (Lee & Oei, 1993; Lee, Oei, & Greeley, 1999; Oei & Baldwin, 1994; Oei & Morawska, 2004) and by negative expectancies (Lee et al., 1999). It is also apparent that different aspects of consumption may be the product of divergent expectancies. Carey (1995) found that global positive

outcome expectancies predicted quantity of consumption whilst positive sexual expectancies predicted frequency of intoxication. The influence of expectancies on consumption is therefore clearly complex and variations in research findings may represent differences in the alcohol consumption measure used and the expectancies targeted. The AUDIT measure used by Zambouanga and colleagues (2006) takes into account both frequency and quantity of consumption – appreciating that these can differentially impact results. Accordingly, Gilles, Turk, and Fresco (2006) found that higher positive outcome expectancies were most probative when both frequency and quantity measures were both assessed. It is thus advisable that research into outcome expectancies should adopt quantity-frequency measures as standard. The standardisation of the term binge drinking is also seemingly warranted within the literature.

The term 'binge drinking' is not measured or operationalised consistently (Gmel, Rehm, & Kuntsche, 2003), causing some journals to reject articles utilising the term (McAlaney & McMahon, 2007a). A common definition is a drinking session which exceeds six units by women, or eight for men (ibid). Other studies of outcome expectancies define binge drinking as the consumption of four or more drinks per session for women and five or more (e.g. D'Alessio et al., 2006; Gaher & Simons, 2007) or six or more for men (e.g. Oei & Morawska, 2004). There are also examples in the expectancies literature where the same classification criteria have been utilised for both males and females (Calahan, Cisin, & Crossley, 1969). On the other hand,

Norman, Bennett and Lewis (1998) operationalised binge drinkers as any participant who has consumed half or more of their weekly allowance in a single session. This variation in the operationalisation of drinking patterns calls into question the reliability of research in this area, as studies may incorrectly homogenise participants whose drinking, and associated expectancies, may differ quite considerably. For example, those who report consuming eight units in a single session may be measured alongside those who do so frequently when, in fact, such frequent drinkers may be expected to vary in their expectancies, according to previously highlighted research (c.f. Lee et al., 1999). In light of the frequency/quantity variations observed within the expectancy literature, the consistent operationalisation of this term seems crucial to the reliability of research.

## ***2.6 The target population studied***

The population studied is a further variable which can impact the results of studies in this area. Oei et al. (1998) suggest that the proportion of explained variance in alcohol consumption varies depending on whether a problem or non-problem drinking sample is utilised. For example, research using community samples found that those with low DRSE consumed significantly lower volumes of alcohol when they had lower expectancies than when they had higher expectancies, whilst those with high DRSE did not differ substantially regardless of having high or low expectancies (Hasking & Oei, 2002). In a community sample, expected outcomes therefore had little impact on those with a strong belief that they can refuse

alcohol. However, expectancies appear important in those with little efficacy (ibid). Conversely, in a clinical sample, those with low DRSE showed little difference in the quantities of alcohol consumed, regardless of whether respondents had high or low expectancies. However, those with high DRSE consumed greater quantities when they had low relative to high expectancies (Hasking & Oei, 2002). Whilst seemingly counterintuitive, these results suggest that high expectancies may be more important in determining the alcohol consumption of clinical samples, whilst DRSE may be more important to predicting the consumption of non clinical drinkers (ibid). In other words, once drinking becomes a problem, individuals may no longer believe they can refuse a drink and as such this is no longer an important determinant of drinking, rather, the expected outcomes become important (ibid). Research in this area must therefore be considered carefully before overly ambitious generalisations are made.

Furthermore, Holyfield, Ducharme, and Martin (1995) found that the power of context and expectancies to predict alcohol consumption varied depending on the type of alcohol consumption analysed. For instance, removing expectancies from the regression model had the greatest detrimental impact on the variance explained when 'symptoms of psychological dependence' were used as the target variable (a reduction from 11% to 3.9% of explained variance when expectancies were removed). However, the removal of context from the predictive model had a greater negative effect on variance explained where the dependent variable was

‘overall consumption’ (removing context reduced explained variance from 20% to 2.5%). These findings also suggest that expectancies are more important in driving dependent or problem drinking than non-problem drinkers’ consumption. Accordingly, Hasking and Oei (2002) found that outcome expectancies were more important in predicting alcohol consumption in clinical (problem) than non-clinical samples. A review by Ham and Hope (2003) further indicates that problem drinkers score particularly high on measures of positive outcome expectancies such as tension reduction. An interaction between the alcohol measure (quantity vs. frequency of alcohol consumption) and the participant sampled (dependent vs. non-dependent) has also been found (Baldwin et al., 1993). This research suggests that non-dependant samples may be characterised by higher positive outcome expectancies, although these expectancies are not associated with the frequency of their drinking, as the practicalities of their lives limit how often they are able to consume alcohol (ibid). However, when given the opportunity to drink, high positive expectancies in non-dependent respondents were predictive of greater quantities of consumption (ibid). This indicates that high outcome expectancies are predictive of the quantity but not the frequency of consumption in non-problem drinkers.

Participant age is a further individual variable that may impact findings in this area of research. There is a marked discrepancy between studies utilising student samples and studies which survey wider age ranges. The majority of the research examining alcohol expectancies utilises student

samples (Mcalaney, Bewick, & Bauerle, 2010), with the exception of those studies cited which employ national survey data (Leigh & Stacy, 2004) or community samples (Lee et al., 1999; Leonard & Blane, 1988; McMahon et al., 1994). However, those studies that have included wider age ranges point to variations in results as a function of age. Leigh and Stacy (2004), for example, found that negative outcome expectancies were better predictors of alcohol consumption in those over 35 years of age, whilst positive expectancies were better predictors of consumption under 35 years of age. Participants under the age of 20 years have also been found to exhibit greater expectancies of global positive effects, social facilitation, sexual enhancement and feelings of increased power and aggression, compared to those over the age of 20 years (Lundahl, Davis, Adesso, & Lucal, 1997). It is proposed that alcohol expectancies are based, at least in part, on actual experiences of alcohol (Jones et al., 2001). This observed variance in expectancies across age categories may therefore be a result of age-related increases in exposure to, and experience of, alcohol consumption. Resultantly, there may be a limit to the generalisability of present research owing to its preponderant use of student samples. Future research may therefore be improved by wider participant sampling.

Variation observed between males and females in the frequency and quantity of alcohol (Bond et al., 2010; Nyaronga, Greenfield, & McDaniel, 2009) suggests that gender of participants is a further participant variable which may impact alcohol expectancies. Indeed, variations in outcome

expectancies between males and females have been demonstrated. Beliefs that alcohol improves social situations were the expectancies which were most commonly endorsed and related to consumption in both males and females (Bojesson & Dunn, 2001). However, expectations about how drinking will affect the opposite sex appeared to affect participants differently. Men drank more when they believed that alcohol would make women have a better time in social situations and make them happier and more confident. Men who did not expect alcohol to affect women in this way consumed comparatively less (ibid). Conversely, women's expectations regarding the effect of alcohol on men's tension and romance levels were more strongly related with personal consumption levels. Women who believed that alcohol would reduce men's tension/pain and increase romance reported drinking more than those who did not endorse these beliefs as strongly (ibid). Further, both males and females showed social facilitation expectancies for their own sex. However, women expected mood elevation in other women following alcohol consumption, yet they did not personally endorse this belief. In other words, women did not believe that alcohol would improve their own mood, although they thought it would have this effect on other women (ibid). Such findings point to the interactive importance of both the participant's gender and the gender of the target of the questions. The importance of personal expectancies on personal consumption is also evident, as is the influence of expectancies about the opposite sex. Research which does not examine or control for the effects of gender would therefore seemingly warrant careful scrutiny.



Research findings in this area may be further complicated by suggestions that differences in drinking levels between the sexes account for at least some of the variance observed in men and women's expectancies (Mulligan-Rauch & Bryant, 2000). Accordingly, there has been deviation observed in the relationship between expectancies and consumption (quantity) as a function of gender. Women have been found to report social enhancement expectancies more readily, and endorse these beliefs more strongly (Read, Wood, Lejuez, Palfai, & Slack, 2004). This association also remained after controlling for the quantity of alcohol typically consumed; yet the relationship between social outcome expectancies and consumption quantity was strong and significant for men but not for women (ibid). Such results suggest that amongst men, heavier drinking may be associated with the rapid reporting of social enhancement expectancies, whilst this is not the case for women (ibid). Further, when controlling for quantity of consumption, men and women have not been found to differ in terms of their sexual enhancement expectancies (Mulligan-Rauch & Bryant, 2000). However, when controlling for drinking frequency (which Read et al., 2004 did not measure), men were found to score significantly higher on tension reduction expectancies than women, whilst this did not occur when quantity of consumption was controlled for (Mulligan-Rauch & Bryant, 2000). The relationship between gender, expectancies and consumption is therefore seemingly multifaceted. As well as considering gender, there is an apparent need for careful consideration of variations in personal consumption and the alcohol consumption measure used within research (quantity/frequency).

Other research has also demonstrated gender differences in outcome expectancies. Context effects on outcome expectancies have also been found to be impacted by participant gender (Mulligan-Rauch & Bryant, 2000). Further, male endorsements of positive outcome expectancies have been found to be greater than females' endorsements, who have been found to demonstrate higher negative expectations than males (Kirmani & Suman, 2010). This finding is in contrast with aforementioned research by Bojesson and Dunn (2001).

However, this variation may be due to cultural differences in the participants used between the two studies (Indians and Americans respectively) and conceivable differences in terms of socialisation. However, such research variation may also highlight a further and complex interaction with participant nationality. The majority of studies conducted in this area (see Table 1) utilise North American samples. However, there are grounds to assume that American and non-American samples may differ in their expectations. American samples, particularly students, are subject to more stringent laws surrounding the consumption of alcohol, specifically a higher legal drinking age than is commonly observed internationally (Degenhardt et al., 2008). Indeed, if alcohol expectancies are based on actual experiences (Jones et al., 2001), it is plausible that expectancies may differ as a function of cultural variations and restrictions in alcohol use.

In summary, a number of participant variables may seemingly impact outcome expectancies and a complex interpretation of these variables is plausible. Existing research which does not consider or control for these population variables should therefore be viewed with caution, and future research would be benefitted by such considerations.

## ***2.7 Temporal distance***

The temporal distance between types of outcome expectancies and alcohol consumption has been noted to be an important moderator thereof. Negative expectancies are mainly distal consequences, and thus less likely to impact drinking than more proximal positive expected outcomes (Noar, Laforge, Maddock, & Wood, 2003; Zamboanga et al., 2006). Therefore, research into the effects of outcome expectancies on alcohol consumption can be further advanced, and findings standardised, by assessing both distal and proximal negative and positive outcome expectancies. One study which attempted to do so was conducted by McMahon et al. (1994). This revealed that positive outcome expectancies were relatively weak predictors of alcohol consumption, yet proximal negative expectancies were much stronger predictors. This study has, however, been critiqued for its use of multiple and incompatible measurement items (Lee, Greeley, & Oei, 1999). Nonetheless, further development of this methodology could be advantageous for future research.

## **2.8 The role of context**

The effect of environmental context on drinking behaviour has been asserted to be both important and complex (Harford, 1979; Holyfield et al., 1995; Quigley & Collins, 1999). As such, it is perhaps unsurprising that certain groups of people prefer particular drinking environments to others (Nyaronga et al., 2009; Straus & Bacon, 1995) and that differing contexts are characterised by varying drinking patterns (c.f. Wechsler & Nelson, 2008). Resultantly, a number of contexts have been found to be significant predictors of both the frequency and quantity of alcohol consumption (c.f. Holyfield et al., 1995). These include the pub (Clapp, Reed, Holmes, Lange & Voas, 2006) and other 'wet' contexts where alcohol is cheap and easily accessible (Weitzman, Nelson, & Wechsler, 2003). Other environments associated with increased consumption are student parties and drinking games (Clapp, Shillington, & Segars, 2000), bars, pubs and mealtimes (Clark, 1988; Demers et al., 2002; Treno, Alaniz, & Gruenewald, 2000), fraternity/sorority parties (Paschall & Saltz, 2007) and after campus parties (Paschall & Saltz, 2007). Alcohol consumption has also been found to be preferred (O'Hare, 1990) and to be more favourably perceived when occurring in social groups, rather than when alone (Lo Monaco, Piermattéo, Guimelli, & Ernst-Vintila, 2011).

Numerous social contexts have been associated with increased consumption (Barry & Goodson, 2012; Beck, Thombs, & Summons, 1993; Beck & Treiman, 1996), including drinking whilst in groups (Demers et al., 2002)

and with friends (Clapp & Shillington, 2001a; Clapp & Shillington, 2001b; Clapp et al., 2003; Thombs, Wolcott, & Farkash, 1997). Membership of social groups such as sororities or fraternities (Park, Sher, & Krull, 2008) and drinking in mixed gender groups (Senchak, Leonard, & Greene, 1998) have both also been associated with increased consumption. Real-time observations of consumption also support these findings. In a recent study, Larsen et al., (2012) placed participants in a staged university bar and found that up to seventy per cent of variance observed in alcohol consumption here could be explained by group effects – being with peers or friends during testing. Additionally, participants in the presence of peer confederates have been found to drink twice as much when confederates consumed large quantities of alcohol (three or four drinks) as opposed to when the confederate consumed only fizzy drinks. Positive outcome expectancies have also been associated with increased alcohol consumption in staged bar environments with one’s friends/peers (Bot et al., 2005; Larsen et al., 2012), whilst negative expectancies were not found to be associated with consumption here (ibid). This suggests that the association between expectancies and consumption is specific to certain social contexts (Bot et al., 2005). Coupled with observed environmental variations in alcohol consumption, this suggests that the cognitive processes which mediate consumption vary across contexts.

Abrams and Niaura (1987) note that context and outcome expectancies are the determinants of people’s drinking behaviour, and evidence of

contextually driven deviations in drinking motives would seem to support this assertion (Kairouz, Gilksman, Demers, & Adlaf, 2002). Similarly, Reich et al. (2005) postulate that “*memories of previously experienced outcomes in the presence of particular contexts guide ongoing behaviour*” (pg 65). Environmental contexts may thus activate associated expectancies via a process of subconscious, spreading neurological activations (Reder, Park, & Kieffaber, 2009; Wiers et al., 2003). Accordingly, changes in physiological responses to visual cues of alcohol-related contexts and paraphernalia have been demonstrated (Nees, Diener, Smolka, & Flor, 2012). A meta analysis by McKay and Schare (1999) further suggest that naturalistic cues in experimental settings provoke physiological responses and that the lab environment may be an important mediator of both physiological reactivity and expectancies. Such findings seemingly support the contention that context determines cue reactivity and offers an explanation for the prevalence of alcohol consumption in certain environments.

Priming research is also intended to investigate the effects of context on behaviour (Bargh & Chartrand, 2000) by examining how environments can trigger automatic processes. Reich et al. (2005) found support for their synergistic or hybrid cueing hypothesis when it was observed that more alcohol expectancy words were recalled when the word list began with an alcohol-related word (beer), as opposed to a non alcohol-related word (milk). This suggests that the alcohol-related word combines with the

alcohol expectancy words to activate further alcohol expectancies, leading to greater recall (ibid). Similarly, it has been observed that heavy drinkers in a staged bar showed significantly greater falsely recalled expectancy words than did those who completed that task in an alcohol-neutral condition (Reich, Goldman, & Noll, 2004). Such findings therefore, again, support the suggestion that context may activate alcohol-related cognitions. Roehrich and Goldman's priming research (1995) also acknowledges the potential role of context with regards to alcohol consumption, by exposing participants to either a pub or a neutral video prior to the measurement of alcohol consumption. Here it was found that participants primed with the pub video consumed significantly more than those primed with the neutral video. Similarly, those primed with a simulated bar as opposed to a neutral context have demonstrated both significantly greater alcohol-related memories and alcohol consumption (Lau-Barraco & Dunn, 2009). Furthermore, those primed with positive alcohol expectancies have been found to drink more subsequently than those neutrally primed (Friedman, McCarthy, Pedersen, & Hicks, 2009). It is thus probable that contexts impact expectancies which, in turn, may mediate alcohol consumption (c.f. Cox & Klinger, 1990). For example, research conducted by Paschall and Saltz (2007) investigated the changing impact of context on alcohol consumption, but did not assess how participants' alcohol expectancies varied across these contexts. Accordingly, research in the field of outcome expectancies has been criticised for a lack of detail regarding models of drinking and for confounding the effect of context and expectancies within

their research (Holyfield et al., 1995). These issues need to be addressed by future research.

It has been found that high positive outcome expectancies are associated with significant increases in alcohol consumption in a number of social contexts, including parties and dates (O'Hare & Sherrer, 2001). Similarly, negative outcome expectancies have been found to increase in public and large group settings in comparison to small group settings (Mustonen & Makela, 1999). O'Hare (1998) also found that outcome expectancies varied significantly and in direct accordance with social drinking contexts. Here, participants who rated themselves to be more likely to drink in these social contexts demonstrated significantly higher positive outcome expectancies (ibid). Similarly, those who reported heavy drinking in social groups display significantly higher expectancies (and lower drink refusal self-efficacy) relative to those who reported lone heavy drinking (Christiansen, Vik, & Jarchow, 2002). The context of social facilitation (including drinking at a bar, with friends, and to celebrate victory) has also been found to account for 48 % of variance in outcome expectancies (Thombs, Beck, & Pleace, 1993). Holyfield et al. (1995) further demonstrate that context (particularly social contexts) and outcome expectancies are significant predictors of alcohol consumption.

Nevertheless, such research does not assess participants' cognitions in-vivo - when they are within differing contexts. Instead, participants are typically



recruited on a university campus (e.g. Thombs et al., 1993) or as part of a large community survey (e.g. Holyfield et al., 1995) and required to make judgements about the frequency or likelihood of their drinking in a number of presented contexts, with only one measure of outcome expectancies being recorded. As outcome expectancies could differ as a function of being in varying environments and having different social interactions, this appears problematic. Furthermore, findings are typically based on a form of retrospective self-report which may be subject to biased recall (Kuntsche & Kuendig, 2012). Response bias or inaccuracy is evident when participants are tasked with recalling the number of drinks they have consumed on past occasions (Ekholm, 2004). When this task is made more complicated by attempting to recall drinking in different contexts it would seem surprising if errors in recall did not also occur here, if indeed errors do not increase as a result of the increased difficulty of the task. These results may also be impacted by procedural signalling, where the task implies a certain response is desired (c.f. Melson, Davies, & Martinus, 2011). Research based on such methodologies would therefore appear to warrant careful consideration. They do not seem to present a true examination of the in-vivo effects of context on outcome expectancies and may thus be limited in terms of their ecological validity.

A study which attempts to make such an in-vivo assessment of social context was conducted by Larsen et al. (2012) which observed an interactive effect of positive outcome expectancies and social context on alcohol

consumption within a (semi) naturalistic bar environment. Here, participants were placed in the staged bar with a university peer (a confederate). Participants who scored highly on a measure of positive outcome expectancies and were in the presence of a peer, who consumed large amounts (three or four drinks) consumed more than twice as much as those scored low on outcome expectancies in the same conditions. Such results indicate that one's present social context and outcome expectancies may moderate consumption. They may even suggest that social context may shape outcome expectancies which, in turn, may moderate consumption. However, whilst attempting to examine the effect of context on alcohol consumption, the absence of a control condition with which to compare these findings seems to limit the conclusions which can be drawn from this study. The generalisability of results from a bar staged within the participants' university building may also be questioned (Larsen et al., 2012). Furthermore, measuring alcohol consumption within an alcohol-related environment avoids the problems of biased self-report measures and the potential difficulty of speculating about one's consumption whilst in a non alcohol-related context. However, whilst alcohol consumption was measured within an alcohol-related environment, explicit and implicit outcome expectancy measures were taken prior to the participants' entry into this bar. This study therefore did not appear to measure the effect of one's present social or environmental context on in-vivo outcome expectancies, as is a problem in a many of the aforementioned studies.

Research conducted by MacLatchy-Gaudet and Stewart (2001) may be asserted to address these issues by utilising a method which assessed context-specific outcome expectancies. Here it was also revealed that context impacted outcome expectancies, which in turn predicted alcohol consumption. For instance, alcohol consumption in social and sexual contexts was associated with increased outcome expectancies, whilst relaxation expectancies predicted alcohol consumption in social contexts (ibid). Similarly, Mulligan-Rauch and Bryant (2000) demonstrated that participants scored more highly on measures of tension reduction outcome expectancies in a relationship context than in a blind date context. Further, men demonstrated no difference in sexual enhancement outcome expectancies in a long term relationship or blind date contexts (ibid). Women, on the other hand, demonstrated significantly greater expectancies in the former than in the latter context (ibid). However, this research by MacLatchy-Gaudet and Stewart (2001) and Mulligan-Rauch and Bryant (2000) utilises a task which requires participants to imagine themselves in a context (for example, a bar context, studying for an exam, a blind date) before outlining their expectancies. It is thus apparent that this task, again, does not assess participants in-vivo. Participants are not actually in different environments and resultantly there may not be the same environmental cues which would be present in a real life context.

The validity of using such an imagination task to replicate real life context effects also seems questionable for a number of additional reasons. First,

mental images are produced via tacit knowledge – sub-conscious knowledge of the way the world is and functions (Pylshyn, 2002). Therefore, as mental images have no intrinsic properties (ibid) it appears difficult to assert that this imagined context would consistently replicate the processes occurring in a corresponding real life context. Second, participants are left to envisage/create the mental image without any direction or instruction from the researchers. Resultantly, there may be any number of variations for the same task (ibid) and each of these variations could impact the holder differently. Third, few published studies have reported using this method and those that have done so report relatively low coefficient alphas (c.f. MacLatchy-Gaudet & Stewart, 2001). Fourth, even if the validity of this approach were to be accepted, this task still appears relatively demanding for participants and is likely to be subject to individual differences in mental imagery ability (Kosslyn, Brunn, Cave, & Wallach, 1984). Consequently, variations in the mental imagery may moderate the effects observed, leading to questions regarding the validity and reliability of the findings. Finally, this task may also be open to signalling effects (Davies, & Best, 1996; Melson et al., 2011) and thus findings may be limited as participants' responses may be a reflection of demand characteristics as opposed to a real effect of (imagined) contextual cues.

There has, been some field research into the the mediatory role of context in alcohol expectancies – termed the “situational-specificity hypothesis” (Wall et al., 2000). It has been found that placing participants in a bar as opposed

to a neutral context, has been shown to increase positive outcome expectancies in small within (Wall, Hinson, McKee, & Goldstein, 2001) and between subject designs (Wall et al., 2000), in accordance with the cognitive model of alcohol consumption proposed by Cox and Klinger (1990). Similarly, recent findings suggest that positive sexual expectancies are endorsed more strongly in college social settings than when questioned later (LaBrie et al., 2011). Significant increases in negative expectancies in a bar context, relative to neutral or pre-bar contexts, have also been observed, albeit it in a small sample of college students (Wiers et al., 2003). Such results represent in-vivo examinations of context and have, thus, increased ecological validity. However, it may be noted that placing individuals in artificially constructed groups and restricting their interaction with the environment (e.g. Wall et al., 2000), may limit generalisability of such findings to real life contexts. A need is therefore apparent for larger, more ecologically valid examinations of contextual effects of cognition with more diverse samples.

The underestimation of the role of context is a common phenomenon (Ross & Nisbett, 1991). Yet, to the author's knowledge, with a few noted exceptions (Larsen et al., 2012; Wall et al., 2000; 2001; Wiers et al., 2003), research in this area, instead, favours the administration of expectancy questionnaires to all participants in single context, usually a laboratory or classroom. The potentially mediating effect of context on expectancies has been proposed (e.g. Abrams & Niaura, 1987). However, the process of this

literature review has highlighted a preponderant lack of research examining such contextual effects. There is therefore an apparent need to expand upon the diminutive existent context based research.

## **2.9 Conclusions**

Overall, the research on outcome expectancies has developed in a somewhat fragmented fashion. Different strands have emphasised positive or negative outcome expectancies (or both). In view of conflicting findings, their relative importance remains in need of further clarification. The proximity of the outcomes in question and the possible inclusion of self-efficacy as a factor complicates matters further. There is also an apparent need for a more standardised quantity-frequency measure in this area of research as the diverse measures of alcohol intake appear to additionally cloud the extent to which conclusions are comparable between studies. Furthermore, a greater examination of age and gender effects on expectancies seems appropriate, and suggestions of an interaction between age/gender and differing alcohol consumption measures indicates that further attention to these variables is required in order to increase research validity. Finally, this review highlights that context is a variable almost entirely overlooked within this area of research. Researchers predominantly administer questionnaires in non alcohol-related contexts such as laboratories or classrooms, which may limit our insight into real word (in-vivo) expectancies and how they may change across contexts. The approach of asking participants to imagine themselves as being in a particular context also seems dubious. Indeed, this review questions whether such an approach has the necessary research backing to

support its validity as an equivalent method of examining real life context effects. Rather, such results may present the product of an unusual and artificial task where heavy participant signalling may have caused the observed changes in participant responses. It is therefore proposed that present literature be expanded by examining how context, specifically one's present environmental context, impacts study findings. This would more clearly elucidate the effect of outcome expectancies on alcohol consumption. It is believed that standardising both the methodology and outcome measures used, as well as examining contextual mediators, will allow for a more dynamic model of alcohol consumption with which to better inform therapeutic interventions.

### 3. CHAPTER 3 – A SYSTEMATIC REVIEW OF NORMATIVE BELIEFS

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### **3.1 Introduction to the norms literature**

#### **3.1.1 Normative beliefs**

Normative beliefs are described as beliefs about what is the normal or prevailing behaviour or attitude within a group (McAlaney & McMahon, 2007a; McAlaney & McMahon, 2007b). Injunctive norms pertain to perceived common attitudes, whilst descriptive norms refer to perceived shared behaviour. These shared social norms are a strong indication of the commonly accepted behaviour and a powerful predictor of behaviour (Berkowitz, 2004). Festinger's (1954) theory of social comparison processes asserts that the innate human drive for personal evaluation results in self comparison with alike others in order to judge what is appropriate. However, according to social norms theory, people incorrectly perceive their own attitudes/behaviours to be different to those of others; a phenomenon known as pluralistic ignorance (Berkowitz, 2004).

Such misperceptions of the norm can be the product of a specific context or they can be more enduring, as in cases where minority or prototypical beliefs are taken to be the norm or where personally changing beliefs are not believed to be shared by others ('conservative lag') (Prentice & Miller, 1994). However, whatever the source, the study of many human behaviours, whether it be bystander responses or classroom behaviour, has demonstrated that norm misperceptions may drive behaviour, even if it means acting in a way that is inconsistent with internal beliefs (ibid). Indeed, such beliefs, or norm misperceptions, appear self-perpetuating and can create self-fulfilling

prophecies (ibid) in that people will alter their behaviour to fit the perceived norm, the desire to conform to a perceived social norm being highly pervasive (c.f. Asch, 1951). The errors people make in judging others' beliefs thus not only demonstrate the importance of 'the collective' but have clear implications for behaviours (ibid).

Alcohol consumption is one behaviour to which norm misperceptions are a popularly attributed antecedent (McAlanley & McMahon, 2007a). Perkins (2007) suggests that norms create a "reign of error". Here, a sense of cognitive dissonance is proposed to result from believing one's own consumption to be different from typical consumption (the norm). Resultantly, it is suggested that behaviour is adjusted to attempt to redress this imbalance (Berkowitz, 2004). Believing one's alcohol intake to be lower than the norm ('positive self-other differences'), is therefore asserted to create an increase in consumption, whilst the converse perception of 'negative self-other differences' is proposed to reduce such (Carey, Borsari, Carey, & Maisto, 2006). Accordingly, normative beliefs regarding alcohol consumptions are reliably found to predict consumption (e.g. Clapp & McDonnell, 2000). This norm misperception regarding alcohol consumption has been attributed to three factors (Carey et al., 2006; Perkins, 2002). First, observers assume that drunken behaviour is the result of dispositional traits of the drinker, an effect resultant from a natural inclination to attribute dispositional traits to behaviour, referred to as the fundamental attribution bias (Noar, Nisbett, Caputo, Legant, & Marecek, 1973). Second, the highly

memorable and distinctive nature of drunken behaviour results in a perception that this is commonplace, an assumption based on the availability heuristic (Tversky & Kahneman, 1974). Finally, the media representation of student drinking and binge drinking in general reinforces stereotypes, a form of social modelling that has been referred to by Bandura (1971).

Accordingly, Perkins and Berkowitz (1986) and Perkins, Meilman, Leichter, Cashin, and Presley (1999) found that college students misperceived the level of peer alcohol consumption, and subsequent studies have consistently found that students overestimate the drinking of peers relative to their own (e.g. Borsari & Carey, 2001; Carey et al., 2006; Miley & Frank 2006; Perkins, 2002; Perkins, 2007; Perkins, Haines, & Rice, 2005; Wechsler & Kuo, 2000). More than forty five studies document a norm misperception (Berkowitz, 2004), and overestimation of drinks per week, frequency of consumption and consumption in a typical session are prevalent findings (Lewis & Neighbors, 2004; Thombs, Wolcott, & Farkash, 1997). As many as 91% of students have been found to believe that their peers drink more than they do (Broadwater, Curtin, Martz, & Zrull, 2006) and a meta analysis by Borsari and Carey (2003) supports the high rate of student alcohol norm misperception. A misperception of injunctive norms regarding perceived acceptability of alcohol consumption has also been observed in student (over) estimations of peer alcohol consumption (Perkins & Wechsler, 1996).

### ***3.1.2 Norm misperception – Truth or methodological artefact?***

Recently, a debate has arisen over whether norm misperceptions demonstrated within the literature are the product of research methodology, as opposed to an intrinsic truth. This is not a new thought. The notion that ‘addiction’ may represent a functional use language as opposed to a consistent truth is one which has been explored previously. Indeed, there is substantial research which has shown that reports about one’s own consumption are the product of a number of personal biases and vary depending on the perceived demands of the task (Davies & Baker, 1987; Davies, & Best, 1996; Newham & Davies, 2007). More recently, Melson et al. (2011) demonstrated that the use of multiple target questionnaire items may at least in part account for norm misperceptions demonstrated within the literature. Here, students who were asked both about their own and others’ drinking showed more permissive attitudes towards consumption and were more likely to report drinking with their peers than were those who were asked only about their own or others consumption. This being the case, the previously highlighted norms research may be exaggerated or distorted by the methodology used. Conversely, Perkins (2012) critiques Melson et al.’s (2011) study, stating that without a personal consumption question one is likely to base their estimates of others’ consumption on their own behaviour, which becomes overly weighted.

Yet, a review by Pape (2012a) makes a number of arguments to support the view that the norm ‘phenomenon’ may be exaggerated. First, it is asserted

that the challenging process of providing estimates regarding the consumption of multiple target groups may be the cause of the observed discrepancy, rather than a genuine misperception. Second, it is argued that deliberate or unconscious self-deception may occur, either as a result of the desire to manage how one is perceived, to avoid disapproval, or a result of fears about the confidentiality of answers. Third, 'signalling' (c.f. Davies, 1998) may account for these findings. Here, students assume that peer drinking must be frequent or else the question would not have been posed or would have been phrased differently. Fourth, there are problems with the reference group used within the literature. Using "other adolescents", rather than close friends, as the reference group may create over-estimation owing to the lack of proximity (discussed further subsequently). Using one's 'friendship' group as a reference group during questioning may also be problematic, however, if friendship is not reciprocated and thus the participant is not as representative of the reference group in question, as they ought to be. Another frequently used reference group is 'the typical student'. However, Pape (2012a) notes that there are multiple possible interpretations of this phrase, each of which could cause different answers. Fifth, if the question is deemed confusing/unclear, there is no option to signal one's uncertainty. Resultantly, answers may be left blank or be selected only to satisfy the perceived demand of the researcher. Finally, there appears to be a potential file draw effect in which it is mainly studies showing over rather than under reporting which are published. Whilst Pape's (2012a) review does not dispute the existence of this

phenomenon, it does, however, suggest that the disparity may be exaggerated by methodological bias (Simons-Morton & Kuntsche, 2012).

In opposition to Pape (2012a), Hannigan and Delaney-Black (2012) argue that adolescents are in fact more reliable or “more faithful” in their reports about peers’ consumption than about their own consumption. Indeed, biological testing indicates that self-report measures are underestimates (ibid). Also in critique of Pape’s (2012a) review, Borsari and Carey (2012) argue that norm misperception is the natural product of human decision making, where complex assessments must be made from the available information. Thus, even though these perceptions may be inaccurate they are argued to exist and to have an impact on alcohol consumption. Similarly, Perkins (2012) critiques Pape’s (2012a) assertions in light of evidence of norm misperceptions which have been demonstrated within large nationwide (representative) samples of those of legal drinking age, where the ‘biasing downward’ of personal consumption is not an issue. Extensive assessment of this area is beyond the scope of this review. However, it is believed that the findings of this thesis may contribute to this debate. It is not this work’s intention to suggest that normative perceptions are not important to consumption. Yet, if context is found to impact beliefs about one’s own and/or others’ alcohol consumption then there may be a case for more research examining the possibility that research practices/locations may also impact these ‘normative misperceptions’ (Pape, 2012a; 2012b). If norm misperceptions change depending on one’s present

environment, then this could potentially provide further scope to adopt therapeutic interventions which target these changing beliefs in context specific ways.

### **3.2 Rationale of review**

As discussed in Chapter 1, it is suggested that the specific context of an event is highly important to an understanding of the world (Pepper, 1942). This is a fundamental feature of functional contextualism – a philosophy which extols the critical importance of considering the environments in which behaviour occurs (Biglan, 2001; Hayes, 2004). There are numerous theories which suggest that contextual factors can control or alter behaviours, beliefs and cognitions, in accordance with the functional contextualist approach. These are explored in greater detail in Chapter 1. However, in essence, these theories posit a theoretical basis to assume that context may impact behaviour and beliefs. Yet, the extent to which research in this field considers and controls for these factors remains a key concern.

This chapter reports a systematic review of articles published between 1970 and 2013, focusing specifically on alcohol-related normative beliefs – that is people’s beliefs about their own and others’ drinking. The purpose of this review is to assess the validity of the research into alcohol-related normative beliefs, highlighting conflicting findings and sampling and methodological variations and limitations. Guided by theories of contextual influence, a particular focus is to examine systematically the extent to which context is considered within the norms literature. Specifically, it is examined whether

research has hitherto examined how the experimental environment may have affected normative beliefs, or whether research has compared laboratory-based responses with in-vivo assessments in alcohol-related contexts. The first research question was therefore, ‘is context an area which has been researched within the norms literature and, if so, what effects do contexts exert on alcohol expectancies?’ Additional research questions were also constructed to further examine the literature in this area. The second research question guiding this work was based on the common observation that much of the research in this area is based on American student samples. Since experiences of alcohol are said to determine alcohol-related beliefs (Carey et al., 2006), it may be queried how experiences of alcohol generalise between populations with substantially different experiences of consumption. It was therefore questioned ‘how do demographic factors such as age, gender and culture impact normative beliefs?’. Finally, the review questioned, ‘does the proximity of the target used within research questions impact normative beliefs?’ and ‘how does the alcohol consumption measure used impact research finding?’, in light of the variations observed in these areas during the author’s preliminary searches.

### ***3.3 Method of review***

The inclusion of research papers, and the synthesis of the studies into appropriate categories (context, target population, proximal distance and alcohol measure), was conducted after detailed analyses and a summary of this review process is presented in a flow diagram in Figure 2. In line with recommendations (Wright et al., 2007) the minimum threshold for inclusion



were that the full text of articles were available in English and that publications were peer reviewed and published within the set time constraints (1970-2013), which were selected in order to restrict the search but enable a broad analysis of the research conducted over time. The quality criteria selected were that studies consider internal and external validity, have methodological rigor and broad measurement items (Khan et al., 2005). However, in line with recommendations, these were not used as exclusion criteria. Instead, these areas formed the basis of guiding our analyses and interpretation (Khan et al., 2005; Wells, & Littell, 2009). This action was taken as studies of varying methodological quality may help explain variations in results (Wilson & Lipsey, 2001)

Limiting inclusion to those studies which utilise diverse measures and demographics may also exclude information which is pertinent to the proposed research questions. Initial assessments showed that few of the normative belief studies met the external validity requirements (see Table 2). This also offered an early insight into the research question concerning the effect of context. This methodology is in accordance with a similar systematic review of the expectancies literature (Monk & Heim, 2013a)

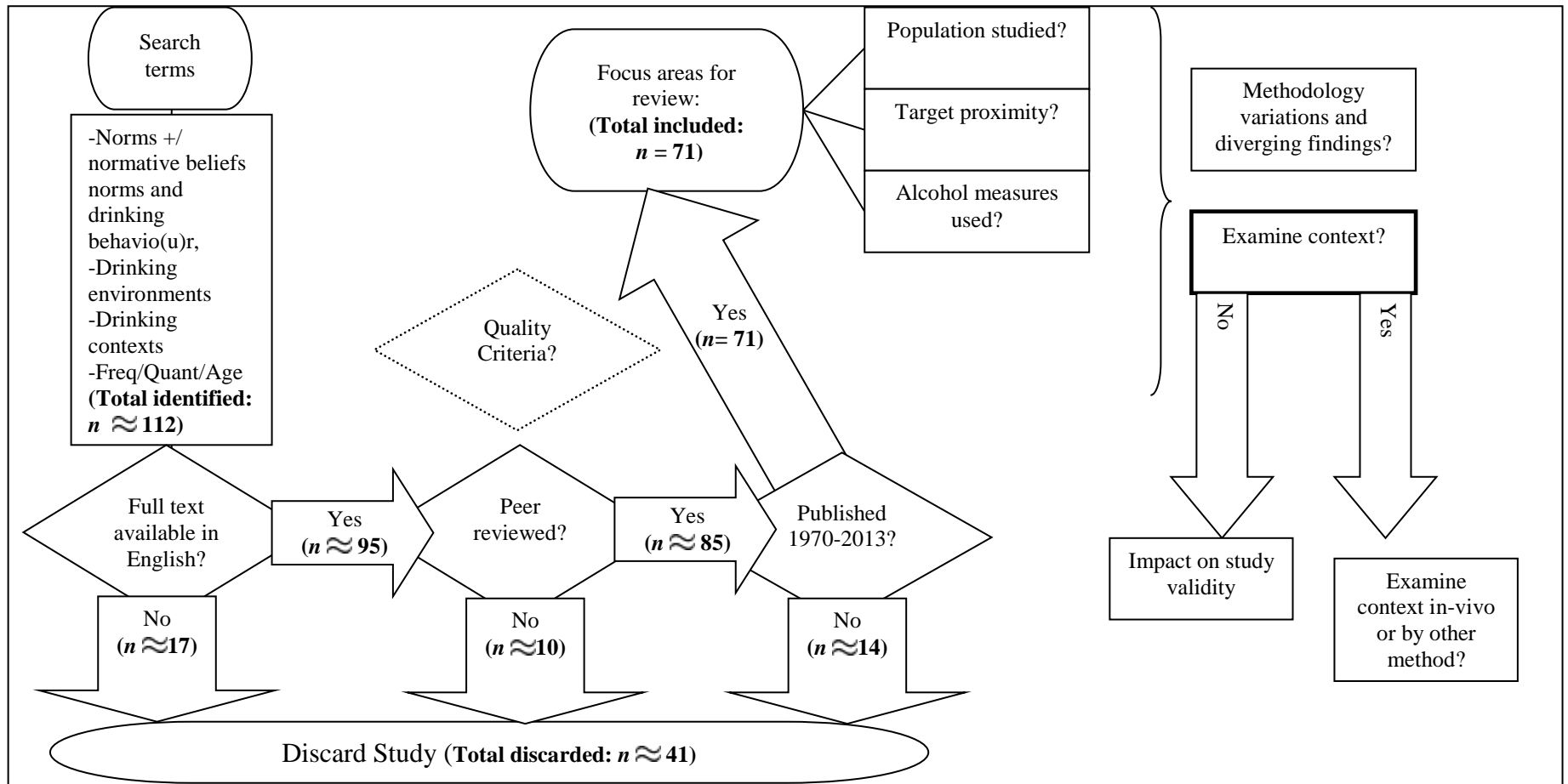


Figure 2 Flow diagram depicting the process of the systematic review of the Norms literature.

Published empirical (71) work on alcohol norms was, therefore, identified. Articles published between 1950 and 2013 and written in English were located searching JSTOR, PsycARTICLES, PsychINFO, ScienceDirect and Web of Knowledge. Search terms utilised were: “alcohol norms/normative beliefs”; “drinking environments”; “drinking contexts”. Particular effort was made to identify any papers with titles which simultaneously referenced norms and contexts/environment. Articles which focussed specifically on implementing norm based therapeutic interventions were excluded, unless they contributed to the examination of context effects. Additional articles and academic texts were located by reading the references of retrieved articles. 11 reviews (Berkowitz, 2004; Borsari & Carey, 2001; Foxcroft, Lister-Sharp, & Lowe, 1997; 2001; McAlaney & McMahon, 2007a; Moreira, Smith, & Foxcroft, 2009; Oei & Morawska, 2004; Perkins, 2002; Quigley & Leonard, 2006; Ward, 2011; Wechsler & Nelson, 2006) and two meta analyses (Borsari, & Carey, 2003; Quigley & Collins, 1999) which fit these search criteria were also identified. The majority (n = 43) of work uncovered was published in North America. However, articles were also identified from the UK (n = 4), France (n = 2), Norway (n = 1), Czechoslovakia (n = 1), Finland (n = 2), Australia (n = 2), Switzerland (n = 1), Latin America (n = 1) and one cross continental piece of research. Table 2 summarises the articles considered. Key findings from each article were ascertained and are considered with regards to variant methodologies and the context in which studies were conducted.

### **3.4 Measuring alcohol consumption**

The measurement of alcohol consumption is anything but clear and there is even significant discrepancy in how, for example, the term 'binge drinking' is operationalised and measured (Gmel et al., 2003). As a result of this variation, the *Journal of Studies on Alcohol and Drugs* will not accept articles utilising the term (McAlaney & McMahon, 2007a). Where alcohol intake in a drinking session exceeds six units by women, or eight for men, the classification of binge drinking is often used (ibid). Other studies examining alcohol norms however, define binge drinking as the consumption of four or more drinks per session for women and five or more for men (e.g. D'Alessio et al., 2006; Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). There are also examples in the norms literature where the same binge drinking classification criteria has been utilised for both males and females (Calahan, Cisin, & Crossley, 1969; Johnson & White, 2003). Norman, Bennett, and Lewis (1998) also operationalised binge drinkers as any participant who has consumed half or more of their weekly allowance in a single session.

**Table 2**  
*Summary of the norms literature reviewed with key methodologies and findings.*

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Barry & Goodson	2012	Context	America	Qualitative Study 1 (Non specified) Quantitative Study 2 (M = 22)	Qualitative study 1 – 85 Quantitative study 2 – 55	University Students (Non clinical)	Interview and Questionnaire	N/A	NAR (University building)	Social and environmental contextual factors found to be associated with drinking Alcohol consumption associated with context
Beck & Thombs	1993	Context	America	High School (age not specified)	50	Students (Non clinical)	Questionnaire	RSR (Frequency and quantity across contexts)	NAR (Classrooms)	Alcohol consumption associated with context
Beck & Treinman	1996	Context	America	High School (age not specified)	54	Students (Non clinical)	Questionnaire	RSR (Frequency and quantity across contexts)	NAR (Classrooms)	Alcohol consumption associated with context
Berkowitz	2004	N	-	-	-	-	Review	-	-	Over forty five studies document a norm misperception

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years)</i> <i>M = Mean</i>	<i>Sample Gender (% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Bond et al	2010	Context	22 Countries in Europe (8); the Americas (7); Asia (3); Australasia (2), and Africa (2)	Majority 18 – 75	Nos. Male and Female (n varied cross country variation c.f. Bond, pg. 2141)	Adults (Non clinical)	Survey (Face to face, telephone +/- or post)	RSR (Frequency and quantity of public and private)	NAR (Lab or home)	Gender and context (Private vs public) variations in the frequency and quantity of alcohol consumed
Borsari & Carey	2001	N	-	-	-	Students (Non clinical)	Review	-	-	Perceived social norms make excessive alcohol use appear common/ acceptable
Borsari & Carey	2003	N	-	-	-	Students (Non clinical)	Meta Analysis	-	-	High rate of student alcohol norm misperception
Broadwater et al	2006	N	America	M = 18.66	59.1	Students (Non clinical)	Questionnaire	RSR (Personal and close friends' average drinking and desired drinking)	NAR (On Campus)	High rate of student alcohol norm misperception

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Bustamante et al	2009	N	Latin America	18-24	75.7	Students (Non clinical)	Questionnaire	RSR (Frequency of personal and peers' alcohol consumption)	NAR (Unspecified)	Students correctly assessed or under estimated alcohol use in peers.
Carey et al	2006	N	America	Freshmen or sophomores (Unspecified)	64	Students (Non clinical)	Questionnaire	RSR (What type of alcohol, number of standard drinks consumed: Personal, close friends', typical same gender student at their college, typical same gender college student)	NAR (Unspecified)	'Reference group specificity' (Target proximity) and interaction with gender)
Clapp et al	2000	Context	America	M = 24.0	44.5	Students (Non clinical)	Phone Survey	RSR (Quantity of drinks across provided contexts)	NAR (Participant's home)	Social context impacts alcohol consumption
Clapp et al	2006	Context	America	18-20 (M = 24.58)	54.8	Students (Non clinical)	Phone Survey	RSR (Quantity of drinks across provided contexts)	NAR (Participant's home)	'Wet' environment such as pub associated with higher alcohol consumption

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Clapp & Shillington	2001a	Context	America	M = 23.8	56.2	Students (Non clinical)	Telephone Survey	RSR (Quantity in differing contexts)	NAR (Participant's home)	Context variation in consumption
Clapp & Shillington	2001b	Context	America	14-21 (M = 16.3)	51.5	Teenagers (Non clinical)	Longitudinal Youth Survey data	RSR (Quantity in differing contexts))	NAR (Participant's home)	Context variation in consumption
Clapp et al	200	Context	America	Study 1 = 18-61 (M = 24.4) Study 2 (M = 25.4)	Study 1 = 55 Study 2 = not specified	Students (Non clinical)	Telephone Survey	RSR (Quantity in differing contexts)	NAR (Participant's home)	Context variation in consumption
Clapp & McDonnell	2000	N	America	M = 24	55.8	Students (Non clinical)	Telephone Interview	RSR (Number of days in last 30 that alcohol was consumed)	NAR (Participant's home)	Normative beliefs predicted consumption
Clark	1988	Context	America	18-22 yrs 18-40+	48.6	Adult Sample	Questionnaire	RSR (Frequency, quantity and types)	NAR (Place questionnaire received)	Context variation in consumption
Cox & Bates	2011	N	America	18-25+	63.4	Students (Non clinical)	Online Questionnaire	RSR (Average number of personal drinks and friends and student cohort)	NAR (Place of email response)	Effect of target proximity on consumption
Cooke & French	2011	N and Context	UK	University students (Exact age unspecified)	37.6	Students (Non clinical)	Questionnaire	RSR (No. of differently specified drinks)	Pub or Library Context	Effect of context and norms on consumption



<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years) M = Mean</i>	<i>Sample Gender (% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Cullum et al.	2012	N	America	College Students (M = 20.70)	56	Students (Non clinical)	Questionnaire (Online)	RSR (Quantity of own consumption and no. of drinking partners)	NAR (Place of computer)	Larger groups were associated with greater quantities of self-reported drinking when context-specific norms were high
Demers et al	2002	Context	Canada	Undergraduate (Unspecified)	57.2	Students (Non clinical)	Multilevel Analysis of questionnaire (postal)	RSR (No. of drinks per occasion)	NAR (Personal residence unspecified)	Alcohol consumption higher in the contexts of: social groups, bars, pubs, parties, meal.
Foxcroft et al	1997	N	-	-	-	-	Review	-	-	91% of normative belief studies reviewed took place within a school context
Franca et al	2010	N	France	18-65	Male & females (no.s unspecified)	College students Non clinical	Questionnaire	RSR (Personal and friends' quantity of alcohol consumed and drunkenness)	NAR (Lecture)	Participants overestimate peer approval/ consumption, positively related heavy episodic drinking

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Harford	1979	Context	America	+ 18 years	Male & Female (no.s unspecified)	Adult	Questionnaire	RSR (Frequency, Quantity and Volume)	NAR (At place questionnaire and interview administered)	Gender and context specific variation in alcohol consumption
Holyfield et al	1995	Context	America	Adult (National Survey Data 18-65+)	Male & Female (no.s unspecified)	Adult (Problem and non-problem)	Interview (Questionnaire based)	RSR (Frequency and alcohol-related impairment measures)	NAR (Place of interview)	Context effects on alcohol-related beliefs
Hughes et al	2008	N	Australia	6-16 (M = 11.66)	Females “slightly under 50%”	High School students (Non clinical)	Questionnaire	RSR (Personal and friends’)	NAR (Unspecified)	Overestimation in peer alcohol approval and consumption
Kuendig,& Kuntsche	2012	Context	Switzerland	18 - 25	Not specified	University students (Non clinical)	Simulated wine-tasting event	RSR (Frequency and quantity of past consumption) and direct observation of grams consumed during testing	Staged wine-tasting event	Consumption influences by social context (hypotheses made regarding links to normative beliefs)
Labrie et al	2010	N	America	M = 19.88	61	College Students (Non clinical)	Questionnaire (Online)	RSR (No. of drinks consumed per week)	College Campuses (online)	Reference group specificity in injunctive norms

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Larimer et al	2011	N	America	18-25 (M = 19.8)	47.8	University Students (Non clinical)	Questionnaire (Online)	RSR (No. of drinks consumed in a month)	NAR (Personal residence unspecified)	Reference group specificity of norm misperception
Larimer et al	2009	N	America	17-24 (M = 18.49)	58	University Students (Non clinical)	Questionnaire (Online)	RSR (No. of drinks consumed in 3 months)	NAR (Personal residence unspecified)	Reference groups specificity of norm misperception
Lau-Barraco & Dunn	2009	Context	America	M = 24.04	All Male	University Students (Non clinical)	Questionnaire and Lab/simulated context bar assessments	RSR (Frequency and total & Alcohol consumed in lab measured)	In Lab, in presence of alcohol	Primed with a simulated bar showed significantly greater alcohol-related memory associations and consumed significantly more
Lewis et al	2011	N Context	America	18-2yrs (M = 19.90)	56.4	University Students (Non clinical)	Questionnaire (Online)	RSR (Number of drinks across contexts)	NAR (Personal residence unspecified)	Reference groups specificity of norm misperception

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Lewis & Neighbors	2004	N	America	M =19.85	51	University Students (Non clinical)	Questionnaire	RSR (Personal and 'typical student quantity and frequency)	NAR (Individually or in groups on campus)	Gender specific norm misperception
Lintonen & Konu	2004	N	Finland	14 year olds only	53.7 (total across 3 years of sampling)	Adolescents (Non clinical)	Questionnaire (Postal - Adolescent Health and Lifestyle Survey)	RSR (personal and same sex peer drinking and drunkenness frequencies)	NAR (Personal residence unspecified)	Overestimation in peer alcohol consumption positively associated increase consumption
Lo Monaco et al	2011	N	France	M = 20.16	41.25	University Students (Non clinical)	Questionnaire and vignette	N/A	NAR (Unspecified)	Alcohol consumption is more favourably perceived when occurring in social groups than when alone
Martinus et al	2012	N	UK	12-18	46	High School Students (Non clinical)	Questionnaire	RSE (Personal and Peer frequency of drinking and drunkenness)	NAR (Classroom)	Alcohol consumption perceived as more frequent and occurring in greater quantity with one's peers

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
McAlaney & McMahon	2007a	N	-	-	-	-	Review	-	-	Variation in how the term binge is defines
McAlaney & McMahon	2007b	N	UK	M = 28	65	Students (Non clinical)	Questionnaire (Internet)	RSR (Frequency of drinking and drunkenness and quantity of alcohol: personal, friends, student cohort, demographic cohort)	NAR (Online)	Significant correlations between the respondents' behaviour and the perception of that behaviour in others -Reference group specificity -Older participants exhibit smaller normative misperception of alcohol consumption
Melson et al	2011	N	UK	12-18	47.5	High School Students (Non clinical)	Questionnaire	RSR (Personal and 'typical pupil' Frequency of consumption and drunkenness)	NAR (Classroom)	Multiple-target surveys may increase peer 'over-overestimate' of drinking

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Miley & Frank	2006	N	America	M = 20	58	College Students (Non clinical)	Questionnaire	RSR (Frequency of personal and students in general, college males, college females, on and off campus students, fraternity and sorority members and intercollegiate athletes)	NAR (Unspecified)	Students overestimate peer alcohol consumption
Moreira et al	2009	N	-	-	-	-	Review	-	-	Variation in the effectiveness of norm based interventions -Preponderant use of students and American samples
Morawska & oei	2005	Binge Drinking	Australia	Sample 1 M = 18.93 Sample 2 M = 18.48	Sample 1 - 62 Sample 2 - 73	University Students (Non clinical)	Questionnaire	RSR (Frequency & quantity)	NAR- in groups (Unspecified location)	Validated model of alcohol consumption (O.E and efficacy important)

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Mustonen et al	1999	O.E <b>pos and neg</b> And context	Finland	15-69	48	Population survey (Non clinical)	Interview	RSR (Frequency & quantity)	NAR (Unspecified location)	Variation in O.E across social contexts
Neighbors et al.	2006 <b>b</b>	Norms and Context	America	Sample 1 = 21 yrs Sample 2 = some under 21 yrs, 69% over 21 yrs	Sample 1 - 56 Sample 2 - 48	University Students (Non clinical)	Questionnaire (Post and online)	RSR (Frequency & quantity)	NAR (Place in which questionnaire received)	Context specific norm misperception
Nyaronga et al	2009	<b>Context</b>	America	Age 18 +	Not specified	Population (Non clinical)	National Survey Data	RSR (Frequency, quantity, volume across contexts)	NAR (Place questions answered)	People categorised by preferred drinking context
O'Hare	1990	Context	America	Undergraduates (Age unspecified)	56.1	University Students (Non clinical)	Questionnaire (Postal)	RSR (Quantity and frequency)	NAR (Participant's own home or place questionnaire received)	Context, sex and gender differences in consumption
Page et al	2008	N	Czechosl- ovakia	13-23 (M = 16.5)	55.9	Adolescents (Non clinical)	Questionnaire	RSR (Frequency of personal, friends' and schoolmates' consumption)	NAR (School, not clearly specified)	Peer alcohol consumption related to norm misperception

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Pape	2012	N	-	-	-	-	Review	-	-	Norm misperception findings exaggerated
Park et al	2008	Context	America	M = 17.9	58	College Students (Non clinical)	Questionnaire	RSR (Frequency and quantity of personal consumption)	NAR (College campus)	Social context associated with consumption
Paschall et al	2007	Context	America	18 – 26 (M = 20.25)	58	University Students (Non clinical)	Questionnaire (Mail or online)	RSR (total 28 day quantity)	NAR (Place in which questionnaire received participants asked to give a report for different contexts)	Context related variation on alcohol consumption
Pedersen et al	2008	Norms and Social Context	America	64.1	M = 1.13	University Students (Non clinical)	Questionnaire (Mail and paper)	RSR (Frequency and quantity of personal and college cohort consumption)	NAR (University hall)	Social Context impacts injunctive and descriptive norms



<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Perkins	2002	N	-	-	-	-	Review	-	-	Students overestimate the drinking of peers relative to their own which impacts alcohol consumption
Perkins	2007	N	Canada	19 – 25 +	63	College Students (Non clinical)	Questionnaire (Postal)	RSR (Frequency and quantity of personal and college cohort consumption)	NAR (Personal residence unspecified)	Students overestimate the drinking of peers relative to their own
Perkins & Berkowitz	1986	N	America	18+	50	High School students (Non clinical)	Questionnaire	RSR (Frequency of personal and school cohort consumption)	NAR (Unspecified)	Perceived Consistency/d iscrepancy between personal consumption and perceived norm significantly associated with drinking

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Perkins & Craig	2003	N	America	9 – 21 (M = 15.0)	51	School/High School students (Non clinical)	Questionnaire (Online)	RSR (Frequency of personal and school cohort consumption)	NAR (Unspecified)	Perception of peer consumption is significantly correlated with alcohol consumption
Perkins et al	2005	N	America	18+	57.1	High School students (Non clinical)	Questionnaire (National survey)	RSR (personal quantity and peers' on that campus)	NAR (Unspecified)	Students' perception of their campus drinking norm was the strongest predictor of alcohol consumed
Perkins et al	1999	N	America	Unspecified	Unspecified	University Students (multiple institutions)	Questionnaire	RSR (Personal and peer consumption)	NAR (Unspecified)	Norm misperception in consumption
Perkins et al	2010	N	America	21-34 (M = 27.4 - 29.5) [4 assessments]	50.0–54.6	Young Adults (Non clinical)	Questionnaire and media intervention programmes	RSR (Personal quantity and that of the average person of their age and location cohort)	NAR (Home-unspecified)	Campaign reduced normative misperception and alcohol consumption

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years)</i> <i>M = Mean</i>	<i>Sample Gender</i> <i>(% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Perkins & Wechsler	1996	N	America	45% = 21 38% = 21-23 17% = 24 +	58	College and university students (Non clinical)	Questionnaire	Personal attitudes to alcohol consumption (multiple situations) and perceptions of college cohort views.	NAR (Unspecified)	Misperception of alcohol-related injunctive norms
Prince & Carey	2010	N	America	18+ (M = 19)	57	University Students-Undergrad (Non clinical)	Questionnaire (Online)	RSR (Personal quantity and frequency and of close friends and typical students)	NAR (Campus computer labs)	Traditional masculine identification associated with elevated permissive injunctive norms and alcohol consumption
Thombs et al	1997	N and social context	America	11-20 (M = 14.5 (girls) 18-23 (M = 20 women)	50.8 (girls) 53.8 (women)	Middle/High School students (Non clinical)	Questionnaire	RSR (Frequency and quantity of drinking)	NAR (Classroom)	Norm misperception -Norm misperception and social context associated with alcohol consumption

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years) M = Mean</i>	<i>Sample Gender (% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Treno et al	2000	Context	America	14yrs + (55.93 % below 41 yrs)	Approx 50	Community sample (Non clinical)-	Telephone Survey	RSR (Frequencies of use, average drinks per occasion and a measure of the variance of drinking levels (across different contexts)	NAR (Home)	Context variation on alcohol consumption
Quigley & Collins	1999	Alcohol Consumption and Context	-	-	-	-	Meta Analysis	-	-	Consumption of alcohol is situation specific
Ward	2011	Norms and Context	-	-	-	-	Review/model development	-	-	Proposed a socio-environmental context model
Wechsler & Kuo	2000	N	America	Unspecified	Unspecified	College Students (Non clinical)	Questionnaire	RSR (Quantity and frequency of bingeing)	NAR (Unspecified)	Students overestimate (47%) the drinking of peers relative to their own (29% overestimated it, and 13% were accurate)

<i>Authors</i>	<i>Year</i>	<i>Focus</i>	<i>Sample Location</i>	<i>Sample Age (Years) M = Mean</i>	<i>Sample Gender (% Female)</i>	<i>Target Population</i>	<i>Method</i>	<i>Alcohol Consumption Measure</i>	<i>Context</i>	<i>Key Findings</i>
Weitzman et al	2003	Context	America	Unspecified (Previous research cohort)	Unspecified (Previous research cohort)	1 <sup>st</sup> year college students	Questionnaire Postal)	RSR (Number of drinks)	NAR (Personal residence unspecified)	Context important in consumption
Weschsler & Nelson	2008	Context	America	-	-	-	Review	-		Context important in consumption

\* N – Norms: RSR = Retrospective Self-report; NAR = NAR

The variation in the operationalisation of drinking patterns calls into question the reliability of research in this area, as studies may incorrectly homogenise participants whose drinking, and associated expectancies, may differ considerably. For example, those who report consuming eight units in a single session may be measured alongside those who do so frequently (McAlaney & McMahon, 2007a) when in fact such frequent drinkers may vary in their alcohol-related cognitions. A study by Wright (2006) further illustrates how the term binge drinking could misleadingly homogenise drinking behaviours. Here, the amount of alcohol they consumed at a cricket test match could have caused all participants to be classified as binge drinkers. However, three substantially different drinking patterns emerged which distinguished the drinkers with regards to the speed and brevity of the alcohol consumed (ibid).

Overall it is therefore questionable whether alcohol quantities alone are a sufficient measure to allow valid assessments of consumption. Conflicting findings may indeed be a result of the alcohol consumption measure utilised. The AUDIT measure (Saunders, Aasland, Babor, De la Fuentem, & Grant, 1993) for example, takes into account factors including frequency and quantity which can differentially impact on results. It is thus advisable that norms research should adopt such quantity-frequency measures as standard, although (as is evident in Table 2) this is presently not the case within research into alcohol norms. Indeed, it may be noted that those studies which only record participants' self-reported alcohol consumption quantities (e.g. Franca, Dautzenberg, & Reynaud, 2010) may offer a less illustrative account of the effect of norm misperceptions on consumption in comparison to those which measure both the frequency and quantity of consumption (e.g. Broadwater et al., 2006; Pedersen, LaBrie, & Lac, 2008).

### **3.5 The proximity of the target**

The 'reference group specificity' is a noted mediator of norm perceptions (Borsari & Carey, 2003; LaBrie, Hummer, Neighbors, & Larimer, 2010). This refers to the observation that the participants' social proximity to the targeted reference group may influence misperceptions (Larimer et al., 2011). Indeed, it has been found that greater misperceptions are found when the target group is more distal to the participant (Larimer et al., 2009; Lewis & Neighbors, 2004). Such findings are believed to result from the fact that distal reference groups require generalisations from relatively few direct observations. Increasing group proximity has therefore been shown to impact normative reports. Here, heavy drinking sub-groups (e.g. American sororities/fraternities groups) were consistently found to report higher estimates of alcohol consumption when they were asked to rate the drinking of their fellow sorority members (Larimer et al., 2011). The association between perceived consumption and personal consumption may also be stronger when close friends, as opposed to general peers, are the reference group in question (Carey et al., 2006; Labrie et al. 2010; McAlaney & McMahan, 2007b). This has also been found to be the case in university students whose alcohol use is low, relative to other student populations (Cox & Bates, 2011). It, therefore, appears evident that people place more importance on the perceived norms of close others (Perkins & Craig, 2003; 2006) and are thus more likely to attempt to match their drinking. Therefore, whilst norm misperceptions, and their effect on consumption, have been demonstrated at all levels of group specificity (Larimer et al., 2009; 2011), reference group specificity is a factor which should seemingly be considered in all norms research.

### **3.6 *The target population studied***

Participant age is a further factor that may impact research findings however there is a marked discrepancy between studies utilising student samples and studies which survey wider age ranges. Indeed, the majority of the research examining the contexts associated with alcohol consumption (e.g. Treno et al., 2000) and alcohol norms (Foxcroft et al., 1997; McAlaney & McMahon 2007b) is based solely on university and college student samples. The prevalence of heavy drinking in younger people relative to older people (e.g. Jarvinen & Room, 2007; Wechsler, Dowdall, Davenport, & Castillo, 1995) and the comparative ease of student recruitment may account for this lack of more varied samples. However, the prevalence of alcohol consumption in younger samples may reflect variations between adults' and adolescents' alcohol-related cognitions. Indeed, research which has examined age as a variable within norms research points to age-related deviations in perceptions, albeit with a student sample (McAlaney & McMahon, 2007b). For instance, older participants were found to exhibit smaller normative misperceptions of alcohol consumption (McAlaney & McMahon, 2007b). As alcohol norm misperceptions appear to increase when there is reduced proximity from the alcohol use in question (Carey et al., 2006), there is reason to believe that exposure to alcohol use may alter normative beliefs. Indeed, if alcohol norms are based, at least in part, on actual experiences of alcohol, variance in norms across age categories may be the expected result of age-related increases in exposure to and experience of alcohol consumption (McAlaney & McMahon, 2007b). There may therefore be a limit to the generalisability of present research owing to its preponderant use of students samples (Moreira et al., 2009). Resultantly, future research may be improved by the expansion of sample ages, thus also considering the effects of psychosocial context on alcohol norms and expectancies.



There have also been internationally observed variations between males and females in both the frequency and quantity of alcohol consumed privately and in public (Bond, et al., 2010). Indeed, gender and preferred drinking contexts (as well as ethnicity) have been found to be interactively associated with different levels of consumption (Nyaronga et al., 2009). Accordingly, gender of participants is a further participant variable which impacts on alcohol norms. Indeed, ‘Gender specific norm misperception’ (Lewis & Neighbors, 2004) has been observed in research. Lewis et al. (2011) observed that the drinking of the typical same sex student was consistently overestimated by participants. Furthermore, whilst both male and female students have been found to misperceive the frequency and quantity of male drinking, other research found male misperceptions to be higher than those of females (Lewis et al., 2004; Page, Ihasz, Hantiu, Simoneck, & Khan, 2008). Additionally, traditional masculine identification has also been found to be associated with elevated permissive injunctive norms and alcohol consumption (Prince & Carey, 2010), although such findings have not been found in UK student samples (McAlaney & McMahon, 2007a). Gender of the participant is, thus, a variable which should be considered in all research within this area, and studies which do not control for gender may be ignoring a potentially important variable. Previously highlighted studies, where a high proportion of the students utilised were female (e.g. Broadwater et al., 2006; Bustamante et al., 2009; Perkins, 2007), may demonstrate non representative results and thus must be considered cautiously (Carey et al., 2006). Female students have also been found to perceive smaller self-other differences when the comparison target was a close friend, but larger self-other differences when the target was a ‘typical female student’. Males, however, indicated larger self-other differences when

assessing friends, but smaller differences when assessing a 'typical male student' (ibid). Not only do such findings suggest that normative feedback may be more effective for female students, but they again highlight gender differences which are hitherto largely unexamined in this area but which may be illuminated by future research.

As discussed in Chapter 2, the norms literature is also largely based on studies conducted using North American samples (McAlaney & McMahon, 2007a; McAlaney & McMahon, 2007b; Moreira et al., 2009). Misperceptions are noted to increase when there is reduced proximity from the alcohol use in question (Carey et al., 2006), American samples may therefore exhibit greater misperceptions than their international counterparts (McAlaney & McMahon, 2007a), owing to the restricted access which results from the extended legal drinking age in America (Degenhardt et al., 2008). A British study utilising a student sample found that respondents estimated others' alcohol consumption to be significantly more frequent and greater in quantity than their personal consumption (McAlaney & McMahon, 2007b). Similarly, Scottish students have been found to overestimate how much and how often their peers consume alcohol (Martinus, Melson, Davies, & Mclaughlin, 2012) and French students showed a 56% overestimation in peer alcohol approval and consumption, such also being positively associated with heavy episodic drinking (Franca, et al., 2010). Studies in Czechoslovakia (Page et al., 2008), Finland (Lintonen & Konu, 2004) and Australia (Hughes, Julian, Richman, Mason, & Lang, 2008) also showed similar findings.

Such research therefore suggests that there is a degree of cross-cultural replication in findings which indicate that students display a general tendency to overestimate peer alcohol consumption (Carey et al., 2006). On the other hand, students across Latin America, including Brazil and Peru (Bustamante et al., 2009), whilst overestimating cocaine, marijuana and tobacco use in peers, were largely found to either correctly assess or under-estimate alcohol use in their peers. Differences in the alcohol exposure of these students may be the source of these findings (McAlaney & McMahon, 2007b), suggesting that geographic location of studies may be a potentially important mediating variable. However, the finding of this study may also be attributable to methodological variations. Unlike other studies in this area, students were asked to estimate the percentage of their peers they believed to consume alcohol. This task may be more difficult for participants, when compared to the task of recording perceived quantities (e.g. Perkins et al., 2005) or frequency (e.g. McAlaney & McMahon, 2007b), which is more typical of research in this area.

Research therefore suggests there are good foundations on which to assert a general tendency of students to overestimate the amount of alcohol consumed by others, and that these norms are associated with alcohol consumption (Carey et al., 2006). Further examination of demographic variables would, however, seem appropriate. Specifically, the legal restrictions often placed on drinking mean it is possible that geographic locality/social-cultural environmental and age may have an interactive role in determining the context of alcohol consumption. This is suggested by findings from Clapp et al., (2006) which showed that, whilst American students of legal drinking age reported being equally likely to consume alcohol in a bar or a private party, those under the legal drinking age were significantly more likely to drink at a

private party or prior to going out. Similarly, US American students of legal drinking age appear less likely to drink before going to an alcohol associated context (Paschall & Saltz, 2007), whilst those under the legal drinking age appear more likely to drink before going out (ibid). Treno et al. (2000) also found, in calculating relative use ratios, that those under 21 years were more likely to drink alcohol at others' homes than any other age group, whilst those over 50 years were more likely than any other age group to drink alcohol at their own home. Furthermore, those 21-30 years of age were more likely to drink at bar than any other age category, whilst those under 21 years were the least likely group to do so (ibid). These findings may, again, be attributed to American legal drinking restrictions (ibid). Such findings support research by O'Hare (1990), suggesting that the legal drinking age has little effect on alcohol consumption levels, although it does appear to impact drinking contexts. Age and culture therefore remain factors which warrant further assessment within the research in this area.

### **3.7 Context effects**

Context refers to the immediate environment of the individual (Nyaronga, et al., 2009) and the notion of a mediating role of context in behaviour is not a new one. Lott (1996) states that behaviour always occurs within one form of context or another and is therefore always influenced by a particular situation. Similarly, Bourdieu (1977) refers to the role of 'social space' in human behaviour and De Haes ('epidemiological triangle', 1987) and Harre, Clake, and De Carlo (1985) note that context is one of the key driving forces of behaviour. As such, Rosnow and Rosenthal (1989) noted that

*“there is a growing awareness in psychology that just about everything under the sun is context dependent in some way or another”* (pg 1290), as discussed in Chapter 1.

Accordingly, a motivational model of alcohol consumption hypothesises that immediate situational contexts could determine alcohol-related beliefs. These in turn may then act as cognitive mediators in the decision to drink (Cox & Klinger, 1990). This is supported by research by Kairouz et al. (2002) which showed contextually varying drinking motivations. This process may work via a series of spreading activations, whereby memories and associated constructs, out of conscious awareness, are triggered by a given context (Reeder et al., 2009). Environmental contexts may thus activate normative beliefs in much the same way that contexts have been found to impact drug withdrawal, tolerance and overdose (e.g. Kenny et al., 2006; Siegel, 2001). In support of this, Marlatt (1990) asserted that alcoholics may experience changes in cognition in high risk environments, which may lead to consumption, and such changes in alcohol-related cognitions have been found in both clinical and non-clinical populations (Cooney, Gillespie, Baker, & Kaplan, 1987). Accordingly, alcohol cravings have been found to significantly increase in a virtual reality party context, in contrast to the cravings reported within a virtual office environment (Traylor, Parrish, Copp, & Bordnick, 2011). Furthermore, changes in physiological responses to visual cues of alcohol-related contexts and paraphernalia have also been demonstrated (Nees et al., 2012). Indeed, pictures manipulating social and physical alcohol consumption contexts, including pictures of full glasses (relative to half full or empty), and social drinking scenes (relative to neutral scenes), have been found to be associated with increases in skin conductance and reduced startle responses (Nees et

al., 2011). Such findings appear to further suggest the potential for context to cue cognitions which may drive intake (ibid).

It is widely acknowledged that the consumption of alcohol is situation specific rather than the sole product of transitional individual factors (Harford, 1979; Quigley & Collins, 1999). There has been long standing attention to the contexts of drinking. Early work examined where students drink most frequently (Straus & Bacon, 1995) and, more recently, people have been classified on the basis of their preferred drinking locations (Nyaronga et al., 2009). As such, certain environments are more commonly associated with consumption than others (c.f. Wechsler & Nelson, 2008) and context has been found to be a significant predictor of both the frequency and quantity of alcohol consumption (e.g. Clapp et al., 2000; 2006; Holyfield et al., 1995; Weitzman et al., 2003), as discussed in Chapters 1 and 2. It has also been stated that this context dependent variation in consumption may be attributable to deviation in drinking norms across contexts (Greenfield & Room, 1997).

Context has been asserted to include not only environmental factors but also the social or interpersonal characteristics of a particular setting or occasion (c.f. Barry, & Goodson, 2012; Thombs et al., 1997). As such, numerous social contexts have also been found to be associated with alcohol consumption (Beck, Thombs, & Summons, 1993; Holyfield et al., 1995). Indeed, social context has been asserted to work as well, if not better, than social norms in predicting problematic adolescent alcohol consumption (Beck & Treiman, 1996). Being at a party with friends (Thombs et al., 1997), drinking as a group (Demers et al., 2002), drinking with close friends and the number of intoxicated people at an event have thus also been demonstrated to be

factors predictive of alcohol consumption (Clapp & Shillington, 2001a; Clapp & Shillington, 2001b; Clapp et al., 2003). Social group membership (sorority/ fraternity) (Park et al., 2008) has also been found to be associated with the quantity and frequency of alcohol consumption in college students. Similarly, heavier drinking has been reported in participants who prefer to drink in larger social contexts of mixed gender groups (Senchak, Leonard, & Greene, 1998). Alcohol consumption is also more preferred (O'Hare, 1990) and more favourably perceived when occurring in social groups than when alone (Lo Monaco, et al., 2011).

Such research corresponds with social impact theory (Latane, 1981) which postulates that other people impact behaviour in social situations. Specifically, the strength, immediacy and number of people are believed to determine the influence observed. Findings of this nature appear to correspond with the focus theory of normative conduct (Kallgren et al., 2000), which states that a behavioural norm may appear more salient in a particular environment and that this in turn may influence behaviour. For instance, a small group of friends surrounded by other drinkers in a pub may be influenced to drink, owing to the salience of the social drinking norm in the pub environment. However, although self-reports regarding alcohol consumption have been suggested to be largely accurate (Giovannucci et al. 1991), there is evidence that heavy alcohol consumption may be significantly under reported via self-report (Northcote & Livingston, 2011) upon which this research is based. Furthermore, the processes driving this context specific alcohol consumption have been under researched.

McAlaney et al. (2010) propose that environments, such as bars and pubs, are “*environments of perceptual distortion*” (pg 82) as, here, risky behaviour, such as excessive drinking, may be perceived as more prevalent (normative). This resultant (mis) perception is in turn asserted to cause a concomitant increase in alcohol consumption (ibid). Ward’s (2011) socio-environmental context model also advocates the importance of considering the ‘physical-geographical dimension’ in regard to alcohol-related norms, specifically that environments may change alcohol norms and thus also consumption as they are the “*stage on which social norms are created and reinforced*” (pg. 504 Ward, 2011). Furthermore, Lo Monaco et al. (2011) propose that drinking contexts may act as “*normative frameworks*” (pg 2). Here it is suggested that one’s environment may determine what is perceived as ‘normative’ alcohol consumption and this in turn may impact alcohol intake. These contextually driven normative perceptions also appear to impact how others’ drinking is perceived. For example, a student drinking alone has been shown to be viewed negatively as opposed to a student drinking in a group of friends (Lo Monaco et al., 2011). Such findings lend support to the ‘Black Sheep Effect’ (Marques & Paez, 1994) whereby actions which fit normative prescriptions are viewed favourably, whilst behaviours which are seen as anti-normative are considered negatively, owing to the environment in which they occur. However, there is little research which examines such a suggestion within alcohol-related cognitions. In an early review it was noted that 91% of normative belief studies reviewed took place within a school context (Foxcroft et al., 1997) and the present review suggests that this area remains under researched.

Neighbors, Oster-Aaland, Bergstrom, and Lewis (2006b) concluded that norm misperceptions were context specific, upon finding that students overestimated norm



alcohol consumption at 21<sup>st</sup> birthday parties and other specifically outlined contexts. However, without a control context it is hard to establish whether such findings suggest the commonly observed norm misperception found in students, or whether misperceptions are indeed heightened by context. Thombs et al. (1997) also indicated that both normative misperceptions and context were associated with, and account for, a large proportion of variance in alcohol consumption. Furthermore, Lewis et al. (2011) recruited university students who were asked to report on the level of alcohol they consumed in 5 settings, including home, bars and college parties. Here, it was found that participants consistently overestimated the alcohol consumption of typical students in all contexts, with overestimations being highest for sorority/fraternity parties. Such results further demonstrate the potentially important and mediatory role of environmental setting on norm misperception (ibid), and offer support for the assertion that certain environments may increase the perceived prevalence of risky behaviour (McAlaney et al., 2010). Similarly, social context and normative beliefs have been suggested to interact. Here, larger groups were found to be associated with greater quantities of self-reported drinking when context-specific norms were high (Cullum, O'Grady, Armeli, & Tennen, 2012).

However, whilst such research offers an initial insight into a largely unexamined area, the design of the research may be questioned. Indeed, research such as that by Neighbors et al. (2006b), Lewis et al. (2011) and Thombs et al. (1997), required students to consider/estimate the number of drinks that they themselves and others consume in a number of different contexts. Similarly, Cullum et al. (2012) required participants to recall the number of people they were with and the quantity of drinks

they consumed in the previous night. However, this would seem problematic for a number of reasons.

First, tasks such as this may encourage fabrication in an effort to satisfy the demands of the researchers. Indeed, it may be asserted that by asking these questions, the researchers may have, in fact, signalled to the participants that variance in estimations would be expected across these contexts (c.f. Melson et al., 2011). Such a possibility would be in line with signalling effects (Davies & Best, 1996). Second, such a task appears highly cognitively demanding. It requires participants to make retrospective judgements about the typical drinking of peers in a variety of contexts. This task is axiomatically dependent on the participant's own memory. However, given the fallibility of memory and the limitations of autobiographic or episodic memory (e.g. Loftus & Hoffman, 1989), such results may have questionable validity. This problem may also be further exacerbated if alcohol consumption occurred during the target period, as alcohol may further impair memory (c.f. Walker & Hunter, 1978). Finally, the difficulty of the task requiring the retrospective recall of multiple occasions may also be heightened, as conducting these assessments in a non alcohol-related environment necessitates recall in absence of any associated environmental stimuli, which may aid recall (c.f. Godden & Baddeley, 1975). Therefore, as well as being methodologically problematic, the highlighted research may not be fulfilling its aims to examine the impact of context on normative beliefs. Arguably, these studies do not represent in-vivo (contextually aware/sensitive) assessments and, as a result, they may lack ecological validity. Instead, the reported contextual variations in alcohol-related cognitions appear, at best, retrospective accounts of alcohol consumption, as opposed to a real life measure of participants' contextually varying cognitions. Indeed, it

would appear likely that context may have a dynamic relationship with normative beliefs, in light of aforementioned research suggesting an effect of context on wider cognitions.

A recent study by Kuendig and Kuntsche (2012) suggests that ‘in situ’ alcohol consumption may indeed be the product of ‘context-specific behavioural norms’. Here, participants’ alcohol consumption in a wine-tasting event was found to be greater during group tasting than in their first wine tasting, which was conducted alone. It therefore appeared that an inhibitive perceptual norm of behaviour governed consumption in this novel environment – i.e. solitary wine-tasting was driven by the belief that it would not be appropriate, or normative, to drink large quantities in this setting. Resultantly, consumption was lower in the solitary condition than in the subsequent group tasting condition, once a more permissive norm had been established amongst the group. However, it was also found that the opposite was true when the order of the conditions was reversed, i.e. when participants’ first tasting experience was as part of a group and their second tasting session was solitary. In this condition, participants’ consumption was higher when they were alone than when they consumed alcohol as part of a group. For these participants, their first experience of this environment involved interacting and drinking as part of a group and it appeared that this was where normative beliefs were formulated/learnt. This meant that in subsequent, solitary testing, a more permissive behavioural norm had developed and ‘overwrote’ the previously more restrictive injunctive norm. This led consumption to be higher in the later, solitary drinking session (ibid). Social context (i.e. who one is with) can, therefore, be seen to interact with experienced-based normative beliefs – an interaction which appears to differentially impact consumption.

Research by Pedersen, Labrie, and Lac (2008) also assessed the effects of social context on normative beliefs in-vivo, participants being assessed either individually or as part of a group. Here, assessment within a group of like peers was associated with higher normative estimates than in individual assessment. The impact of environmental context was not assessed, however. All participants completed their questionnaire in a college lecture theatre meaning that environmental influences cannot be ruled out. Certainly, research has demonstrated that context and normative beliefs have an interactive effect on consumption. Cooke and French (2011) found that subjective norms of participants in a bar were more predictive of their intentions to binge drink, whereas the subjective norms of participants in a library were less predictive of intentions to binge drink. There are therefore indications, particularly from in-vivo research, that one's present context can impact normative beliefs. However, the research examining this remains scarce. The effect of context on normative beliefs is thus an area which seemingly requires more detailed research.

### **3.8 Conclusion**

Alcohol norms appear to vary in accordance with differences in the target group utilised between studies and as such this variable appears to warrant closer attention. Similarly, the diverse measures of alcohol intake appear to cloud the extent to which conclusions are comparable between studies. Furthermore, diminutive evidence of age and gender effects on norms, and suggestions of an interaction between age/gender and differing alcohol consumption measures, also suggest that further attention to these variables is required in order to increase research validity. Finally, the validity and real world applicability of existing norms research may be questioned in light of the findings of this review which show that context is an almost universally neglected variable, despite hypotheses and limited evidence signifying its importance. Indeed,

researchers predominantly administer questionnaires in non alcohol-related contexts such as labs or classrooms, which may limit our insight into real word norms and expectancies. It is therefore proposed that present literature be expanded by examining how contexts impact on study findings so as to more clearly elucidate the effect of normative beliefs on alcohol consumption. By standardising both the methodology and outcome measures used, as well as examining potentially important participant and contextual mediators, a more valid and dynamic model of alcohol consumption may be developed with which to better inform alcohol targeted interventions.

## **4. CHAPTER 4 – A REVIEW OF DRINK REFUSAL SELF-EFFICACY**

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#### **4.1 Introduction to the DRSE literature**

During the systematic literature reviews for Chapters 2 and 3, drink refusal self-efficacy (DRSE) was a concept which was oftentimes found to be included within the norms and expectancy research. Resultantly, some of the literature examining the role of DRSE and consumption has been covered in previous chapters. However, it is important to consider the variables which may impact this relationship in greater detail. With this in mind, the following is a review into DRSE and mediating factors found within the research. Specifically, and in line with the overall aims of this thesis, an effort was made to ascertain the amount of contextually-aware research within the DRSE literature.

#### **4.2 Efficacy and consumption**

In the field of health, Bandura's social cognitive model highlights 'efficacy expectancies' as important determinants of behaviours – that is expectations about one's own ability to refuse alcohol. Indeed these are postulated to be more important in determining action than outcome expectancies (previously highlighted). When reviewing alcohol consumption specifically, the term drink refusal self-efficacy (DRSE) is used to refer to people's perceived ability to resist or refuse alcohol (Baldwin et al., 1993). More specifically, Lee and Oei (1993) state that DRSE refers to the degree of control one feels one has over one's drinking in different situations. As such, Hays and Ellickson (1990) found that refusal efficacy was lowest when the perceived pressure of the situation was highest, and that this association was stronger than the same relationship for cigarette and drug use. The Drinking Expectancy Profile (Young & Knight, 1988; Young & Oei, 1990) and The Drink Refusal Self-

efficacy Scale (Oei, Hasking, & Young, 2005) therefore divide DRSE into three categories: First, social DRSE refers to one's perceived ability to refuse alcohol during social situations, such as being in a pub or with friends. Second, opportunistic DRSE refers to refusing alcohol when given the opportunity to drink, such as when getting in from work or watching T.V. Finally, emotional DRSE refers to refusing alcohol when worried, upset or down, for example (c.f. Oei et al., 2005).

DRSE has been shown to impact intentions to drink (Aas et al., 1995), to play an indirect role in the relationship between social anxiety and alcohol consumption (Ehret, Ghaidarov, Labrie, & Andere, 2012) and to directly affect the amount of alcohol consumed in adolescent samples (Baldwin et al., 1993). Low self-efficacy has also been found to predict alcohol consumption (Baldwin et al., 1993; Gilles, Turk, & Fresco, 2006; Goldsmith et al., 2012; Oei et al., 1998; Oei & Morawska, 2004). Specifically, DRSE appears to be inversely related to drinking, with reductions in DRSE resulting in corresponding increments in consumption (Vik, Carrello, Tate, & Field, 2000). This has been found when examining frequency of drinking (Vik, Cellucci, & Ivers, 2003), quantity of consumption (Oei & Burrow, 2000) and also appears to be true in Asian samples where there has been considerably less research (Oei & Jardim, 2007). Questionnaire research (Baldwin et al., 1993; Gilles et al., 2006; Hasking & Oei, 2002; Lee & Oei, 1993; Von Ah, Ebert, Ngamvitroj, Park, & Duck-Hee, 2004; Young, Connor, Ricciardelli, & Sanders, 2006; Young, Hasking, Oei, & Loveday, 2007) and diary studies (Young & Oei, 2000) also indicate that low DRSE is associated with both heightened consumption quantities and frequencies. Heavy student binge drinking (defined as 4/5 + drinks per episode) in short term (Vik et al., 2003) and longitudinal analyses (Schulenberg, Wadsworth, O'Malley,



Bachman, & Johnston, 1996) has also found consumption to be associated with DRSE. Moreover, research suggests DRSE, assessed in terms of one's confidence to stay within government drinking guidelines, is associated with heavy consumption, measured by the AUDIT (Atwell, Abraham, & Durka, 2011). Given its links to consumption, DRSE has also been found to be a key mediator of the successfulness of school-based drink reduction programmes (Komro et al., 2001), with post intervention increases in DRSE being associated with significant reductions in self-reported consumption, relative to those untreated adolescents (Schinke, Cole, & Fang, 2009).

Low self-efficacy has also been shown to predict increased alcohol consumption in problem, as well as non-problem, samples (Oei et al., 1998; Oei, Hasking, & Phillips, 2007), accounting for 60% of common variance in alcohol consumption (Young, Oei, & Crook, 1991). Research in clinical populations has, however, found lower levels of DRSE than in community or student sample (Oei, Hasking, & Young, 2005). Given that drinking is heavier/more problematic in clinical samples this finding is unsurprising and may offer an explanation for their heightened consumption. Indeed, DRSE has been found to be directly associated with the level of alcohol abuse in clinical populations (Skutle, 1999). Accordingly, DRSE (and outcome expectancy) has been incorporated into models of alcohol consumption (c.f. Oei et al., 1998; Oei & Morawska, 2004) which have been validated by correctly classifying participants as problem or non-problem drinkers (Morawska & Oei, 2005). Problem drinkers, for example, were correctly classified on the basis of their low DRSE and high positive outcome expectancies (Morawska & Oei, 2005).

A review of health behaviour and change, which included alcohol abuse, found that self-efficacy predicts both long and short term treatment success (Strecher, McEvoy, DeVellis, Becker, & Rosenstock, 1986). Low drink-related efficacy at the onset of treatment is also associated with drinking levels post treatment (Solomon & Annis, 1990) and relapse (Burling, Reilly, Moltzen, & Ziff, 1989; Rist & Watzl, 1983). Furthermore, lower DRSE, both during (Greenfield et al., 2000; Trucco, Connery, Griffin, & Greenfield, 2007) and post treatment, have also been found to be a significant predictor of relapse (Blomqvist, Burleson, Ashraf, & Kranzler, 2003; DiClemente, Carbonari, Montgomery, & Hughes, 1994; Heather, Rollnick, & Winton, 1983; McKay, Maisto, & O'Farrell, 1993) and abstinence (Goldbeck, Myatt, & Aitchinson, 1997). Accordingly, post treatment DRSE has been found to be significantly lower in those individuals who relapse than those who abstain (Burling et al., 1989; Miller, McCrady, Abrams, & Labouvie, 1994). DRSE training has also been found to reduce post treatment consumption (Oei & Jackson, 1982; Witkiewitz, Donovan, & Hartzler, 2012) and increase the number of days one is abstinent (Foy, Nunn, & Rychtarik, 1984).

### ***4.3 Consumption measure, outcome expectancies and DRSE***

Psychologists and clinicians have often confused efficacy and outcome expectancies, taking the two to be the same concept (Rollnick & Heather, 1982). However, the two are asserted to be independently important components of consumption, abstinence and relapse (ibid). Yet, much of the research examining DRSE also simultaneously examines outcome expectancies, in an attempt to disentangle their respective roles. With this in mind, any literature review on the topic of DRSE would, resultantly, be incomplete without reference to this body of research. As Chapter 2 has assessed

research on expectancies more fully, the purpose of this section is to briefly highlight research which contrasts the roles of expectancies and DRSE. Findings indicate that self-efficacy has a greater impact on alcohol consumption than do outcome expectancies (Oei & Morawska, 2004). Similarly, Oei and Burrow (2000) found that DRSE predicted 10% of the variance in consumption quantity, whilst outcome expectancies predicted 6% of the variance. Research in this area has, however, been complicated by variations in the alcohol consumption measures used (an issue also highlighted in Chapters 2 and 3). Variations depending on the measure used will also be highlighted in this section.

Gilles et al. (2006) found that positive outcome expectancies and DRSE each predicted a unique and significant proportion of variance in alcohol consumption. Low DRSE and higher positive outcome expectancies were associated with the greatest consumption levels. However, there were variations observed depending on the alcohol consumption measure used. For instance, expectancies and efficacy predicted 22% and 21% of variance respectively when 'alcohol dependence' was the outcome variable. However, when 'alcohol-related problems' (in respect to health and social issues) was the dependent variable, efficacy predicted more variance (32%) than did outcome expectancies (27%) (ibid). Similarly, Aas et al. (1995) found that both DRSE and outcome expectancies were significant predictors of intentions to consume alcohol, but that DRSE was the weaker predictor of the two. The alcohol measure used is, therefore, seemingly important - expectancies and efficacy providing a different, albeit significant, roles in alcohol consumption.

A review by Oei & Morawska (2004) summarises that outcome expectancies appear to primarily determine how often one drinks, while DRSE appears to be more likely to influence both the frequency of consumption and the level of consumption. Similarly, Lee & Oei (1993) found that low DRSE related to frequent drinking and to greater consumption quantities per occasion. Expectancies were related to the frequency, but not to the quantity of alcohol consumption (ibid). Accordingly, Lee et al. (1999) found that DRSE best discriminates high from low drinkers (better than expectancies) – with low social, opportunistic and emotional DRSE being particularly good discriminators. High opportunistic DRSE has also been found to be associated with less frequent, normal (low quantity) drinking episodes (Baldwin et al., 1993). On the other hand, those with low social and emotional DRSE have been found to be particularly likely to partake in heavy episodic drinking (Nitka, Khan, O’Connor, & Stewart, 2012), whilst those with high opportunistic DRSE and stronger social DRSE have less frequent episodes of heavy drinking (Baldwin et al., 1993). This indicates that DRSE and expectancies have different impacts on the quantity and frequency of consumption and research may therefore seemingly benefit from closer attention to such distinctions.

Oei & Baldwin’s (1994) cognitive model of consumption stipulates that alcohol expectancies determine the onset of consumption and DRSE intervenes prior to the behavioural response and, hence, both determine drinking behaviour. In support of this, Hasking and Oei (2002) and Goldsmith et al., (2011) found an interaction between outcome expectancies and DRSE. Here, Hasking and Oei (2002) observed that, in a community sample, those with high DRSE did not differ significantly in the volumes of alcohol they consumed, regardless of whether they had high or low

positive expectancies. Conversely, where DRSE was low, more positive outcome expectancies were associated with significant increases in the volume of alcohol consumed (ibid). Cumulatively utilised, outcome expectancies and perceived self-efficacy have thus been incorporated into a model of alcohol consumption (Oei & Morawska, 2004) which has been validated with regard to its ability to correctly classify correctly participants as problem or non-problem drinkers (Morawska & Oei, 2005). However, the relationship between DRSE and the alcohol measure used becomes more complex when examining problem drinkers.

#### ***4.4 Population studied***

In research with community samples, outcome expectancies and DRSE have been found to be strongly associated with frequency and quantity of alcohol consumption, whilst DRSE, but not expectancies, have been found to be related to consumption in clinical samples (Hasking & Oei, 2002; Hasking & Oei, 2007; Oei et al., 1998; Oei et al., 2007). Accordingly, in a study of relapse in a clinical sample, DRSE was found to predict the quantity and frequency of post treatment drinking whilst positive outcome expectancies did not add significantly to the variance predicted by DRSE (Solomon & Annis, 1990). Conversely, in community samples, both outcome expectancies and DRSE have been found to be associated with, and predictive of, both the quantity and frequency of alcohol consumed (Hasking & Oei, 2004; Oei et al., 2007; Oei et al., 1998). It thus appears that expectancies may be less important in determining the alcohol consumed in clinical samples than in non clinical samples (Oei et al., 1998). More recently, however, an interaction between expectancies, DRSE and study population has also been found which further elucidates this relationship. Here, community samples with low DRSE consumed significantly smaller volumes of

alcohol when they had lower expectations than when they had higher expectancies, whilst those with high DRSE did not differ substantially, regardless of having high or low expectancies (Hasking & Oei, 2002). Expected outcomes therefore had little impact on those with a strong belief that they can refuse alcohol. However, expectations appear important in those with little efficacy (ibid). Conversely, in a clinical sample, those with low DRSE showed little differences in the quantities of alcohol consumed, regardless of whether respondents had high or low expectancies, whereas those with high DRSE consumed greater quantities when they had lower expectancies (Hasking & Oei, 2002). Whilst seemingly counter-intuitive, this finding suggests that once drinking becomes a problem, individuals no longer believe they can refuse a drink and, as such, refusal efficacy is no longer an important variable in the decision. Instead, the expected outcomes become important (ibid). In view of this, research in this area should be considered cautiously before overly ambitious generalisations are made.

Similarly, adolescents who have already started drinking show more positive outcome expectancies and lower DRSE than those without drinking experience (Aas et al., 1995), and females have been found to have higher opportunistic DRSE than males (Baldwin et al., 1993; Williams, Connor, & Ricciardelli, 1998). The variance in alcohol consumption predicted by DRSE has also been found to be moderated by gender and the alcohol consumption measure used. Here, efficacy scores in males accounted for 23 % of the variance in dependent drinking, with only social pressure being a significant contributor to this relationship (Williams et al., 1998). Alternatively, 19% of variance in female dependent drinking was found to be accounted for by efficacy scores, although DRSE sub scores (social pressure,

opportunistic and emotional regulation efficacy) were all found to be significant predictors here (ibid). Further, research demonstrates that both DRSE and outcome expectancies contribute distinctly to the frequency and quantity of alcohol consumption across males and females. DRSE has been found to account for 19% and 22% of variance in the quantity of alcohol consumed for males and females respectively (Williams et al., 1998). Here, social pressure efficacy was a significant predictor in both genders, whilst opportunistic efficacy was significant only to the quantity of alcohol consumed by females (ibid). On the other hand, when considering the frequency of male's and female's consumption, 16% and 21% of the respective variance was accounted for by DRSE. However, whilst only social pressure efficacy was the significant predictor of variance in the frequency of males' consumption, in females it was opportunistic efficacy which was the significant contributor (ibid). Finally, the accumulation of outcome expectancies and DRSE was found to significantly predict both the quantity (38% of variance) and the frequency (29% of variance) of the female respondents' drinking, whilst only the quantity of the males' consumption was found to be accounted for by both expectancies and DRSE - 28% of variance predicted (ibid). There is thus cause to believe that there may be more contributing factors in regard to the drinking of females (ibid). Further, such findings show the dynamic relationship between DRSE, expected outcomes, gender based individual differences, and the alcohol measure used. Researchers must therefore be aware of these variables when considering research in the area of DRSE.

#### **4.5 Context**

Oei & Baldwin (1994) propose a two process model of alcohol use and abuse. Based on the principles of conditioning, it postulates that expectancies (as previously

discussed) and refusal self-efficacy beliefs are learned. First, in the acquisition phase, a process of instrumental learning is seen to occur where drinking decisions are made consciously, as a result of acquired expectancies and beliefs about refusal abilities. Second, in the maintenance phase, it is proposed that over time both internal and external cues become associated with consumption. These cues then become the trigger of efficacy and expectancy beliefs which then unconsciously drive drinking, in accordance with classical conditioning theory (ibid). As such, it is apparent that there may be contextual stimuli which may drive efficacy-related cognitions, and differentially inform drinking decisions, depending on the current environment (Bradizza, Stasiewicz, & Maisto, 1994; DiClemente, 2007). Findings which indicate decreased DRSE when holding and smelling an alcoholic beverage (Cooney et al., 1987) suggest that such a theory of situation-specific DRSE is valid. The results complement those within the smoking literature which indicates that external contexts (for example, seeing others smoke) are negatively associated with self efficacy (Van Zundert, Engels, & Kuntsche, 2011).

Accordingly, amongst the number of recommendations within Marlatt and Gordon's (1985) relapse prevention approach, it is suggested that specific high risk situations be identified and the client's self-efficacy be increased, on the assumption that both environmental and interpersonal contextual factors can trigger increases or decreases in DRSE which, in turn, impacts consumption. Similarly, Abrams and Niaura (1987) propose that DRSE, which stimulates or impairs drinking, is formulated around one's current environment. Accordingly, Lee & Oei's (1993) definition of DRSE highlights that DRSE is not static and that it can vary in different contexts. Indeed, numerous measures of DRSE (c.f. Oei et al., 2005) divide it into various categories to provide a



more specific measure of DRSE. For example, the perceived ability to resist drinking when with friends is differentiated from perceived resistance when getting home from work. However, it may also be questioned whether research into DRSE reflects these hypothesised in-vivo variations in DRSE. A similar problem is highlighted in the previous chapters, with regard to expectancies and norms.

In a review by Oei and Morawska (2004) it is suggested that different levels of DRSE may be associated with different contexts. Oei and Pacey (1988) conducted an early naturalistic study suggesting that alcohol-related cognitions change over the course of a drinking episode. This study did not examine DRSE per se, yet questions such as “I do not find it difficult to refuse alcohol” were asked in order to monitor change over the course of a drinking occasion. Such questions could be classified as a measure of refusal efficacy and, as such, there is at least a minimal initial indication that DRSE may not be static. Instead, such results suggest that efficacy may also change as a function of context, as contested by Abrams & Niauru (1987). However, despite this, the course of this literature review did not reveal any similar research examining DRSE in this way. Indeed, one piece of research (Oei & Pacey, 1988) was conducted in-vivo, in a naturalistic, alcohol-related environment, but this did not explicitly assess DRSE.

Research conducted by Miller et al. (1994) using a clinical population did not find situation-specific variation in DRSE (with a view to linking this to relapse). However, these results were based on retrospective accounts of perceived efficacy in different situations, as opposed to assessment of in-vivo changes in DRSE. Such accounts may be biased or impaired by poor or alcohol impaired memory (see Chapter 2 & 3) and,

as such, they do not exclude the possibility of environmental changes in cognition. Despite the lack of evidence in this area, recent research in the field of alcohol-related interventions appears to support the assertion that self-efficacy changes across environments. It is for this reason that Kleinjan, Strick, Lemmers, and Engels (2012) propose that efficacy based interventions must be implemented in alcohol-related environments. Here, a symbol representing the slogan ‘power on-pressure off’ was displayed to half of the participants, the rationale being that such a cue would remind (or indeed cue) the respondents that the environment can influence their drinking but that they have to power (or efficacy) to refuse this influence (Kleinjan et al., 2012). Resultantly, it was found that cue reminders have the capacity to increase recall of the previously received empowerment information and to lower consumption in alcohol-related environments (ibid). This suggests that environmental cues can trigger feelings of efficacy, which in turn can lower consumption relative (ibid). There is, therefore, a limited research basis to support the assertion that DRSE can be cued by contextual factors.

#### **4.6 Conclusion**

From the present DRSE literature, it appears difficult to disentangle the role of DRSE from that of expectancies. Consequently, it is important to consider both these variables at the same time, in order to further this endeavour. It is also apparent that the population demographics and alcohol consumption measures used within this area of research are important variables which can impact results and should be closely scrutinised. As with the expectancy and norms research, there is also an apparent lack of research utilising in-vivo methodologies. The effect of contextual variables is largely under estimated or ignored as a result, although popular tools for measuring

DRSE consist of sub-categories which suggest that efficacy is expected to vary between contexts, for example the ‘Drinking Refusal Efficacy-Revisited’ Scale (c.f. Oei et al., 2005). The present DRSE literature should therefore be expanded in order to increase our theoretical understanding of the impact of social and environmental context and contribute to improved (context-aware) treatment approaches.

## 5. CHAPTER 5 – STUDY ONE

### Environmental context effects on alcohol-related outcome expectancies, efficacy and norms: A field study

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## 5.1 Study 1 Abstract

**Aim:** To examine the effect of environmental contexts on alcohol norms, expectancies and efficacy ratings. **Method:** University students (N =177) recruited via opportunity sampling completed questionnaires in either a university lecture theatre or in a student union bar. **Results:** Positive social, fun and tension reduction outcome expectancies were higher and social drink refusal self-efficacy (DRSE) was lower in those participants questioned in a student bar relative to those questioned in a university lecture theatre. These differences were found whilst controlling for between-group variations in the typical quantity of alcohol consumption. Results regarding normative alcohol consumption ratings were less clear and require further examination. **Conclusions:** Whilst hitherto largely unexamined by research, context appears to be a potentially important moderator of alcohol-related cognitions. Such findings require further exploration in order to inform more effective intervention approaches and have implications for the validity of existing literature.

## **5.2 Introduction**

Judgments about others' substance use have been shown to be contextually specific (Heim et al., 2001; Monk & Heim, 2011) and a motivational model of alcohol consumption hypothesises that one's current situational context determines personal alcohol-related cognitions (Abrams & Niaura, 1987; Cox & Klinger, 1990). This process may work via a series of spreading activations, whereby memories and associated constructs are triggered by a given environment (Reder et al., 2009; Wiers et al., 2003). Environmental context may, therefore, activate alcohol-related cognitions in much the same way that context has been found to impact drug withdrawal, tolerance and overdose (e.g. Kenny et al., 2006; Siegel, 2001).

Accordingly, Wall et al. (2000) propose the "situational-specificity hypothesis" in regard to outcome expectancies, suggesting that expectancies are moderated by context. Similarly, McAlaney et al. (2010) propose that environments, such as bars and pubs, are "environments of perceptual distortion" - places where drinking is perceived as more normative and is therefore more likely. In support of this, placing participants in a bar, as opposed to a neutral context, has been shown to increase both negative (Wiers et al., 2003) and positive outcome expectancies in small within (Wall et al., 2001) and between participant investigations (Wall et al., 2000). This research placed individuals in artificially constructed contexts and restricted their interaction with the environment. However, field research has also shown that expectancies may change in-vivo (LaBrie et al., 2011). Here, sexual expectancies assessed upon exiting a college social event were found to be higher than expectancies assessed via an email-based questionnaire which was administered within 48 hours of initial testing (ibid). Pedersen et al., (2008) also assessed normative beliefs in different social

contexts and found that participants assessed in a group of alike peers provided higher normative estimates than those who were assessed alone, suggesting a variable effect of one's present social context on normative responses.

With the few noted exceptions, most research in the field of alcohol-related cognitions is based on participants that are recruited on university campuses or in laboratory rooms. This investigation, therefore, systematically investigated how responses to alcohol expectancy, efficacy and normative belief questionnaires varied depending on the environmental context in which the survey was administered. Specifically, pub and lecture theatre environmental contexts were investigated. It was predicted that, in line with assertions by Abrams and Niaura (1987), greater positive alcohol expectancies would be reported within the bar than in the neutral surroundings. Such a prediction is also in line with research previously highlighted (Wall et al., 2000; 2001). Furthermore, it was predicted that negative expectancies would be more pronounced in the bar, as opposed to the lecture (c.f. Wiers et al., 2003). It was also hypothesised that perceptions of others' drinking would be more extensive within the bar context, in accordance with McAlaney et al.'s (2010) notion of environments of perceptual distortion. No predictions were made regarding participant efficacy ratings across context, reflecting the paucity of research in this area on which to base hypotheses.

## **5.3 Method**

### **5.3.1 Design**

This study examined the impact of locality (Between participant, 2 levels: Student bar or university lecture theatre) on participants' expectancy, efficacy and normative consumption ratings.

### **5.3.2 Participants**

177 UK University student participants (Age  $M = 20$ ,  $S.D. = 3.74$ ) were recruited via opportunity sampling (67% female, 71% in their first year of study). 95 students completed questionnaires within the lecture context and 82 did so in the bar context. Those who reported that they did not consume alcohol ( $n = 9$ ) were classified as non-alcohol users and removed prior to any analyses (as detailed in the results section).

### **5.3.3 Measures**

Each questionnaire consisted of counterbalanced items to measure outcome expectancies, DRSE and normative beliefs.

#### ***Alcohol outcome expectancies***

The Alcohol Outcomes Expectancy Questionnaire (c.f. Leigh & Stacy, 1993) was utilised to assess both positive and negative expectancies on a 6 point likert scale (where 1 = no chance of happening, and 6 = certain to happen). Analyses indicated items on this questionnaire to have overall high internal consistency (Cronbach's Alpha = .92). Participant responses were analysed in terms of responses to positive expectancy (Cronbach's Alpha = .92) and negative outcome expectancy items (Cronbach's Alpha = .84), both of which showed high internal consistency. Furthermore, all but two of the subcategories of this questionnaire showed high internal consistency<sup>3</sup>. For a full copy of this questionnaire see Appendix A.

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<sup>3</sup> Positive Social (Cronbach's Alpha = .87), Fun (Cronbach's Alpha = .86), Sex (Cronbach's Alpha = .91), Tension Reduction/Negative Reinforcement (Cronbach's Alpha = .78), Negative Social (Cronbach's Alpha = .82), Emotional (Cronbach's Alpha = .58), Physical (Cronbach's Alpha = .72), Cognitive/Performance (Cronbach's Alpha = .66).



### ***Drink refusal self-efficacy***

The 'Drinking Refusal Efficacy-Revisited' scale (c.f. Oei et al., 2005) was used to assess participants' perceived ability to refuse alcohol on a 6 point likert scale (where 1 = I am very sure I could not resist drinking and 6 = I am very sure I could resist drinking) and was found to have high internal consistency (Cronbach's Alpha = .95). The sub-categories of social (Cronbach's Alpha = .89), emotional (Cronbach's Alpha = .97) and opportunistic (Cronbach's Alpha = .87) efficacy also showed a high level of consistency. For a full copy of this questionnaire see Appendix B.

### ***Normative beliefs***

Normative beliefs were assessed utilising items as described by McAlaney and McMahon (2007b). Here, participants were questioned regarding the frequency of their own alcohol consumption and that of other students at the university, other people the same age in the UK and friends (on an 8 point scale, from 1 'not at all' to 8 'every day'). Items pertaining to the frequency of one's own alcohol consumption were separated from norm questions and presented after demographic questions, in consideration of findings from Melson et al. (2011) which indicate the potential for signalling when these questions are asked consecutively. For a full copy of this questionnaire see Appendix C.

### ***Demographics and alcohol consumption***

Demographic questions were included within the questionnaire, as were questions enquiring as to whether the participant consumed alcohol (yes/no) and how many drinks they typically consumed when they consumed alcohol. These remained the final component in the questionnaire, and were separated from questions regarding the

consumption of others. This method was utilised in order to limit the signal strength of the study (Davies & Best, 1996).

#### ***5.3.4 Procedure***

Following ethical approval, students were unsystematically approached in a lecture theatre and student bar between 1 pm and 6 pm. Although present consumption was not an exclusion factor (in line with similar research - c.f. Labrie et al., 2011), this time period was selected to reduce the likelihood of high levels of intoxication – which was not explicitly measured in order to limit the study’s invasiveness. Those who indicated that they would be willing to participate were given a randomized questionnaire and asked not to discuss their responses before being left to respond in private. Sealed questionnaires were returned to the researcher on completion.

#### ***5.3.5 Analytic Strategy***

The raw data collated for this investigation were the participants’ responses to questionnaires containing alcohol expectancy (c.f. Leigh & Stacy, 1993), drink refusal self-efficacy (c.f. DRSE-R, Oei et al., 2005) and normative beliefs questions (McAlaney & McMahon, 2007a), as previously specified. These responses were collected whilst participants were situated in a pub or a lecture theatre – in vivo measures. However, given the between participant nature of this research, ANCOVA analyses were conducted in order to control for potential between-context variations in participants’ alcohol consumption. Full analyses were therefore conducted by way of a series of ANCOVAS, reviewing expectancies, DRSE and normative beliefs. Analysis of the positive expectancy and DRSE sub categories were also conducted via ANOCOVA, upon finding that overall positive expectancies and DRSE appeared to vary between contexts. Tabachnik and Fidell (2001) suggest that MANCOVA should

be used when constructs are conceptually related and scores are correlated. As neither of these points consistently applied to expectancy sub categories, ANCOVAS were preferred. ANCOVA was also preferred for analyses of the DRSE sub categories, for the same reasons.

## **5.4 Results**

### **5.4.1 Preliminary analyses**

Preliminary exploration of the data showed one case with substantial amounts of missing data (case 21) and, consequently, it was removed. Missing values analyses revealed no apparent visual patterns to the missing data, with the exception that a number of cases consistently had missing data for questions of personal alcohol consumption (e.g. how frequently do you drink? How do you feel about drinking enough to become drunk?). Accordingly, Little's MCAR test (see Tabachnik & Fidell, 2001) indicated that the missing data was not missing completely at random but followed some pattern ( $X^2(2588) = 2911.48, p < .001$ ). In the main, it was students who did not drink who left these questions blank (8 in the lecture condition, 1 in the bar context). It would seem counterproductive to utilise the answers of those participants whom we have asked to speculate about their expectancies and beliefs around drinking when they appear in fact to be non-drinkers. Non-drinkers were thus excluded prior to subsequent analyses (this also re-solved the issue of missing data). Further data analyses thus consisted of 168 participants (lecture  $n = 87$ ). Missing values analyses also revealed that there was no variable with greater than 5 missing data cases, with the exception of the item measuring expected problems driving on the outcome expectancy scale ( $n = 13$ ). This driving item was therefore removed but it was not considered necessary to review or remove any of the other measures prior to further analysis. Furthermore, Estimation Maximisation was utilised to estimate and

replace those missing values indicated by missing values analysis, with the exception of demographic details and the personal alcohol use items highlighted above.

#### **5.4.2 Demographics and alcohol consumption**

Analyses revealed that there were no significant differences in gender ( $X^2 (1) = 1.33$ ,  $p = .25$ ) between the samples, with 70% and 63% of the sample being female in the lecture and pub cohorts respectively. Further, neither age ( $t (165) = .49$ ,  $p = .62$ ) nor ethnic make-up ( $X^2 (11) = 14.02$ ,  $p = .23$ ) differed between the pub (87% White British, Mean age = 20.00 years, S.D = 1.93) and lecture samples (93% White British, Mean age = 20.26 years, S.D = 2.34). The between-group demographics therefore seemed comparable across contexts. Participants' self-reported attitudes towards drinking ( $t (165) = -.65$ ,  $p = .52$ ), drunkenness ( $t (165) = -.81$ ,  $p = .42$ ), frequency of drinking ( $t (165) = -.36$ ,  $p = .72$ ) and frequency of intoxication ( $t (165) = -.61$ ,  $p = .54$ ) also did not differ significantly between the pub (M = 3.65, S.D = .67: M = 3.37, S.D = .89: M = 4.43, S.D = 1.42: M = 3.62, S.D = 1.32 respectively) and the lecture samples (M = 3.59, S.D = .64: M = 3.26, S.D = .89: M = 4.35, S.D = 1.43: M = 3.87, S.D = 3.52 respectively).

The samples did however differ in their year of study ( $X^2 (2) = 62.19$ ,  $p < .001$ ), with students surveyed in the bar being further ahead in their studies (44% first year students) than those surveyed in the lecture context (98% first year students). Participants in the pub also reported drinking a significantly greater quantity of drinks on a typical drinking occasion (M = 7.98, S.D = 3.41) than did the lecture sample (M = 6.47, S.D = 2.73) ( $t (165) = -.3.14$ ,  $p < .01$ ). The decision was therefore made to control for drinking quantity (self-reported typical number of drinks consumed) in all

subsequent analyses in order to control for between-subject variations in consumption, which could otherwise skew results.

### 5.4.3 Outcome expectancies

SPSS was utilised to calculate summary measures of overall positive and negative expectancy scores. Further analyses also calculated scores across the eight sub-categories previously outlined. These categories were standardised by the calculation of an average score in order to ensure a consistent minimum and maximum score on each sub-category. Table 3 displays the average means and standard deviations of participants' positive and negative outcome expectancies, as measured in the environment of either a university lecture theatre or a student bar, where expectancies were rated on a 6 point likert scale (1 = no chance of happening, and 6 = certain to happen).

ANCOVA results controlling for self-reported typical number of drinks consumed indicated a significant main effect of context on positive outcome expectancies after controlling for consumption ( $F(1,165) = 4.52, p < .05, \text{partial } n^2 = .03$ ).

**Table 3**  
*Participants' standardised positive and negative outcome expectancies in bar or lecture theatre contexts.*

	Outcome Expectancy							
	Positive			Negative				
	<i>Social</i>	<i>Fun</i>	<i>Sex</i>	<i>Tension</i>	<i>Social</i>	<i>Emotion</i>	<i>Physical</i>	<i>Cognitive</i>
<b>Context</b>	4.19 (.77)	4.33 (.78)	3.65 (1.15)	3.83 (.95)	2.19 (1.03)	2.64 (.86)	2.54 (.69)	3.91 (.96)
<b>Lecture</b>	16.00 (3.88)			11.28 (2.62)				
<b>Bar</b>	4.37 (.81)	4.59 (1.07)	3.72 (1.04)	4.00 (.95)	2.23 (1.01)	2.55 (.86)	2.50 (.74)	3.92 (.91)
	17.32 (2.87)			11.12 (2.55)				

This suggests that positive outcome expectancies were higher in the pub than in the lecture context, after controlling for potential individual differences in consumption. It has been asserted that using a composite measure of outcome expectancies may

masque relationships between context and expectancy sub-categories (MacLatchy-Gaudet & Stewart, 2001). For this reason and in light of the significant effect of context on overall positive expectancies, analyses of the sub-categories (social, fun, sex & tension) were subsequently conducted. ANCOVA indicated a significant main effect of context for social ( $F(1,162) = 7.85, p < .01, \text{partial } n^2 = .05$ ), fun ( $F(1,162) = 12.63, p < .05, \text{partial } n^2 = .02$ ) and tension reduction outcome expectancies ( $F(1,162) = 13.63, p < .05, \text{partial } n^2 = .03$ ) after controlling for self-reported consumption, suggesting that said outcome expectancies were higher in the pub context after controlling for potential individual differences in consumption. However, positive sex expectancies did not differ between contexts after again controlling for self-reported differences in the typical number of drinks consumed ( $F(1,162) = .03, p = .25, \text{partial } n^2 = .00$ ). There was no effect of context on negative overall expectancies when controlling for differences in self-reported quantity of drinks consumed ( $F(1,162) = 1.36, p = .25, \text{partial } n^2 = .01$ ). Further analyses of negative outcome expectancies were therefore not conducted as it was assumed that there would be no effect at the sub-category level.

#### ***5.4.4 Drink refusal self-efficacy***

SPSS was utilised to examine overall efficacy scores and participant refusal efficacy in social pressure, emotional relief and opportunistic situations. These categories were standardised by the calculation of an average score, in order to ensure a consistent minimum and maximum score on each sub-category. Table 4 displays the averaged means and standard deviations of participants' DRSE ratings in either a lecture theatre or a bar, where refusal efficacy was rated on a six point likert scale (1 = I am very sure I could not resist drinking, and 6 = I am very sure I could resist drinking).

ANCOVA results revealed a significant main effect of context on overall DRSE ( $F(1,162) = 3.28, p < .05, \text{partial } n^2 = .03$ ), suggesting that DRSE is lower in the pub context after controlling for typical number of drinks consumed. Further analyses of efficacy sub-categories suggested that it was social DRSE driving this difference as only social DRSE ( $F(1,162) = 10.00, p < .05, \text{partial } n^2 = .06$ ) differed significantly after again controlling for typical number of drinks consumed. Social DRSE thus appeared to be lower in the pub context after controlling for potential individual differences in consumption, whilst opportunistic ( $F(1,162) = .75, p = .09, \text{partial } n^2 = .01$ ) and emotional relief DRSE ( $F(1,162) = .81, p = .37, \text{partial } n^2 = .01$ ) did not appear to differ between contexts after these same controls.

**Table 4**  
*Drink refusal efficacy ratings across context (bar vs. lecture).*

Context	Efficacy Ratings		
	<i>Social Pressure</i>	<i>Emotional Relief</i>	<i>Opportunistic</i>
<i>Bar</i>	4.14 (1.13)	5.18 (.98)	5.72 (1.14)
<i>Lecture</i>	3.77 (1.29)	4.89 (1.67)	5.72 (1.99)

#### 5.4.5 Normative beliefs

Participants were asked to rate the frequency of their alcohol consumption and that of other students at the university, other people the same age in the UK, and friends (1 = not at all, and 8 = every day). Table 5 displays the means and standard deviations of participants' responses regarding alcohol consumption frequency, divided by the environment of questioning (bar/lecture context) and the group being rated (personal, friend, student cohort, UK cohort).

**Table 5**

*Participants' alcohol consumption ratings (personal, friend, student cohort, UK cohort) between contexts (bar vs. lecture).*

<b>Context</b>	<b>Frequency of Alcohol Consumption Ratings</b>			
	<i>Personal</i>	<i>Friends</i>	<i>Student Cohort</i>	<i>UK Cohort</i>
<i>Bar</i>	4.39 (1.41)	5.11 (1.30)	5.92 (1.11)	5.58 (1.15)
<i>Lecture</i>	4.28 (1.51)	5.07 (1.07)	6.11 (.67)	5.60 (.80)

ANCOVA results suggested that student cohort ratings did not differ significantly between contexts after controlling for self-reported consumption ( $F(1,162) = .02, p = .02$ , partial  $n^2 = .00$ ). Self-reported consumption was also not revealed to be significantly associated with student cohort ratings ( $F(1,162) = .98, p = .32$ , partial  $n^2 = .01$ ) indicating that it may be the culmination of both context and typical consumption which is responsible for the observed effects.

## **5.5 Discussion**

This study implemented a between participants design to examine how alcohol expectancies, DRSE and normative beliefs varied depending on the environmental context in which the survey was administered (student bar or university lecture theatre). The design emphasised increased ecological validity, afforded by the unrestricted and un-staged nature of participant interaction with their environments. In support of previous research (Labrie et al., 2011; Wall et al., 2000), results suggest that positive social, fun and tension reduction outcome expectancies are context specific. Similarly, one's perceived ability to refuse alcohol when offered, or when friends or spouses are drinking, was found to be lower during bar-based questioning.



Overall, the present research suggests that certain environments may trigger associated beliefs and expectancies (Reder, et al., 2009; Wiers et al., 2003). Here, out of apparent conscious awareness, memories and responses may be activated in much the same way that context has been found to impact drug withdrawal, tolerance and overdose (Kenny et al., 2006; Siegel, 2001). The present findings may also contribute support for the alcohol myopia theory which states that alcohol consumption (likely in the bar environment) impairs perception, the resulting myopia enhancing social responses, self-evaluations, and reducing anxiety (Steele & Josephs, 1990). In turn, these context activated expectancies may illicit increased alcohol consumption (c.f. Wall et al., 2000; 2001). In contrast with previous research (Wiers et al., 2003), negative outcome expectancies, however, appeared to be constant regardless of context, suggesting that it is the contextually dependent nature of positive expectancies that may be of most importance when considering intervention approaches.

As to the cause of such contrasting findings, however, variation in the outcome expectancy measures used may be a plausible explanation. Indeed, research presented by Wiers et al. (2003) may have utilised a greater number of cognitive and social negative expectancy measures. Participants in Wier's et al. (2003) study were also approached immediately upon entering the bar, before they had bought a drink, and were excluded from participation if alcohol had been consumed. It may therefore be suggested that limiting participant behaviour in this way may lower the ecological validity of this study of context effects. Participants had not had chance to interact with their environment as they typically would. Yet, in the present study, participants were approached whilst they were socialising in the bar and were not excluded if they

had consumed alcohol. It is believed that this allowed greater contextual interaction/engagement and, hence, increased the ecological validity of responses. Furthermore, there is disparity between the neutral or control contexts utilised between the Wiers et al's (2003) and present research (student social area vs. lecture theatre respectively). It would appear reasonable to assume that variations in alcohol neutral contexts may also alter expectancies in the same fashion that the bar context would appear to alter expectations. Indeed, differences in the social interactions occurring in a lecture theatre, as opposed to a student social area, would seem likely. Divergent research findings such as this may, therefore, provide further evidence for the fluidity of alcohol outcome expectancies between contexts.

Against hypotheses, no contextual differences were observed for normative frequency ratings between contexts once self-reported typical drinking quantity had been controlled for. One explanation for this is that context may also have been influencing the covariate. The context of questioning has previously been shown to influence responses (c.f. Davies & Baker, 1987) and the present study utilised self-reported consumption quantities which were recorded in-vivo, suggesting that context could have impacted the covariate. The finding that there were significant contextual differences in self-reported consumption quantities indicates that this may indeed have been the case. Consequently, future research may benefit from the use of an independent measure of consumption and an increase in participant sample size in order to amplify the strength of analyses. It was, however, interesting to note that normative frequency ratings did not vary between conditions yet self-reported typical consumption quantities were different between contexts. Previous research has demonstrated response variations depending on whether quantity or frequency

normative beliefs are assessed (Neighbors et al., 2006a). It therefore follows that future research should examine whether perceived quantity norms (rather than frequency norms) may differ between contexts.

A number of limitations in the present research should be noted. The present sample was predominantly female and all were university students. Future research examining gender, and same-gender norms, as well as research with a wider community sample, is thus advised. The between participants nature of this investigation should also be considered. Preliminary analyses revealed that samples did not vary significantly on potentially mediating demographic variables and participants in the pub and lecture contexts did not differ in their reported approval of alcohol consumption or intoxication, nor did they differ in the reported frequency of their consumption - which goes some way to reducing these concerns. ANCOVA analyses also controlled for between participant variations in typical consumption quantities. However, Senchak et al. (1998) suggest that people seek out supportive social environments for their drinking and, as such, those who drink more (and have supportive cognitions) may be more likely to frequent a student bar. The present findings should, therefore, be extended via future within participant investigations, which would provide further methodological control over potential variations in alcohol consumption habits. Moreover, the use of a direct measure of participants' alcohol consumption in-vivo may be useful as intoxication may alter alcohol expectancies (c.f. Fromme, Katz, & D'Amico, 1997; Labrie et al., 2011) and impair cognitive functioning, thus limiting question responses (Hindmarch, Kerr, & Sherwood, 1991). This would also control for the possibility that disparities between

the time of sampling (between 1 pm and 6 pm) may have caused variations in intoxication which could have affected responses.

In conclusion, the present study builds on the diminutive existing literature whilst emphasising increased ecological validity, afforded by the unrestricted and un-staged nature of participant interaction with their environments. On the basis of the current results, conclusions from previous research conducted in non alcohol-related environments may therefore be questioned. The present research also adopted a wider approach which simultaneously examined multiple alcohol-related cognitions, as well as providing a unique insight into specific sub-categories. Specifically, by examining these sub-categories, social, fun and tension reduction expectancies and social DRSE were found to vary between the pub and lecture contexts. This contributes towards an extended understanding of the effect of context on alcohol-related cognition. The results should therefore highlight the importance of in-vivo and context-aware research and should be regarded as the next step towards offering further insight into the under-examined area of contextual variations in alcohol-related cognitions. The present findings support the continued improvement of therapeutic interventions by enabling more specific targeting of contextually varying alcohol-related cognitions.

## 6. CHAPTER 6 – STUDY TWO

### Alcohol-related cognitions in adults and adolescents: Age differences in alcohol expectancies, efficacy and normative beliefs

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## **Study 2 Abstract**

***Aim:** To examine the extent to which alcohol-related experiences shape alcohol-related cognitions. **Method:** Participants (n =549) were college students (further education-typically aged 15-18 years), university students (higher education-typically aged 18-22 years) and business people (white collar professional <50 years) who completed questionnaires in their place of work or study. **Results:** Overall positive expectancies were higher and DRSE was lower in the college students than in the business or university samples. However, not all expectancies and DRSE subcategories followed this pattern. Furthermore, university students believed that their university cohort drinks more frequently when compared to the college and business samples' ratings of their fellow students/business colleagues. Participant groups of similar age were, therefore, alike in some aspects of their alcohol-related cognitions but different in others. Similarly, participant groups whom are divergent in age appeared to be alike in alcohol-related cognitions such as tension reduction expectancies. **Conclusions:** These cognitions appear to be shaped not solely by age but by more subtle factors associated with personal contexts such as experiences of alcohol. The failure to study more diverse populations may limit the application of previous research. Further research is therefore required to assess apparent variations in beliefs.*

## **6.2 Introduction**

In an effort to provide a greater understanding of alcohol consumption, there has been, and continues to be, substantial research into alcohol-related cognitions. However, notwithstanding their importance for informing practice, it has been noted that there is little research that has utilised general community samples (e.g. Hasking & Oei, 2002; Lee et al., 1999), the majority relying on student samples (Foxcroft. et al., 1997; McAlaney et al., 2010; Moreira et al., 2009). There is, however, reason to believe that alcohol-related cognitions may differ between student and non-student samples. Furthermore, the focus on student samples may unduly homogenise participants who may be found to differ in their cognitions if more focus was paid to the different dynamics within this wide cohort.

In the UK, the legal age at which alcohol may be consumed is 18 years. As such, younger persons may have less direct experience of alcohol consumption to inform their beliefs (McAlaney & McMahon, 2007b), meaning that that their expectations and normative beliefs may vary from those who have more experience of alcohol consumption (McAlaney et al., 2010; McAlaney & McMahon, 2007b). The over-reliance on student samples may therefore result in findings which are not necessarily reflective of those older samples with more experience of consumption. Further, variations in experiences within the student cohort may also result in differences in cognitions. Any alcohol use which college students do experience is likely to be substantially different from those university student respondents who can legally drink. Indeed, drinking in parks and at home being much more common in those under 18 years (Honest, Seymour, & Webster, 2000), as opposed to drinking in licensed premises, where fewer of UK college students have experience (c.f. Roe &

Ashe, 2008). Research utilises exclusively student samples, or examines individual student groups (college or university students as opposed to both), may therefore incorrectly homogenise alcohol-related cognitions.

There is limited existing research which appears to suggest age-related variations in alcohol-related cognitions (c.f. for example, Leigh & Stacy, 2004; McAlaney, 2007; McAlaney & McMahon, 2007b). The over-reliance on student based research may, however, largely obscure these variations and may also limit the success of interventions which should be sensitive to the varying social and personal contexts which shape substance use (Davies, 1997). Accordingly, the present research aimed to assess alcohol-related norms, DRSE and expectancies within a wider population, specifically, college students, university students and business professionals. In line with McAlaney and McMahon (2007), it was predicted that responses would differ as a function of age. It was predicted that norm misperceptions (ibid) and positive expectancies (Leigh & Stacy, 2004) would be greater among younger than older participants. Alternatively, negative outcome expectancies were predicted to be greater in the older than the younger samples (Leigh & Stacy, 2004). Furthermore, DRSE was predicted to be greater in older than younger participants, potentially explaining the higher levels of consumption often observed in this age group (Jarvinen & Room, 2007; Weschler, et al., 1995).

## **6.3 Method**

### **6.3.1 Design**

This research examined the effect of participant group (Between participants, 3 levels: College students, university student, or business people) on alcohol expectancies, efficacy and normative beliefs.



### 6.3.2 Participants

Participants exceeding 50 years of age were excluded from analyses in order to limit the age range of the sample, and 47 participants were excluded from further analyses as they indicated that they did not consume alcohol consumption and this led to high proportions of missing data. Responses from 549 participants who drink alcohol (63% Female, 87% White British) were therefore recruited from UK businesses ( $n = 146$ ,  $M = 35.63$ ,  $S.D = 9.24$ ), colleges ( $n = 264$ ,  $M = 17.61$ ,  $S.D = 3.20$ ) and universities ( $n = 146$ ,  $M = 20.22$ ,  $S.D = 3.68$ )<sup>4</sup>. Demographic comparisons (see Table 6) revealed that the significant majority of participants were White British and there were more females than would be expected by chance. Whilst there was no gender split within the business sample ( $p > .05$ ), there were significantly more females than males in both the university ( $p < .001$ ) and college samples ( $p < .001$ ), perhaps owing to the greater numbers of females continuing in education in England (Usher & Medow, 2010). There were also differences revealed between alcohol consumption quantity and frequency, frequency of drunkenness and attitudes towards drinking and drunkenness (see Table 6). Both the college and university samples reported drinking greater quantities ( $p < .001$ ), being consumed more frequently ( $p < .001$ ) and having more positive attitudes towards drinking ( $p < .001$ ) and drunkenness ( $p < .001$ ) than did the business sample. The business ( $p < .01$ ) and the university sample ( $p < .001$ ) also reported drinking more frequently than did the college sample, whilst the university and business sample's drinking did not differ in its frequency ( $p > .05$ ). Attitudes towards drinking ( $p > .05$ ) and drunkenness ( $p > .05$ ) did not differ between the university and college samples.

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<sup>4</sup> In the UK, college is the higher education system which follows compulsory schooling. Here, students are typically aged 15-18 years. University education is classified as higher education and may be entered after college. UK university students are typically aged 18-22 years.

**Table 6**  
*Demographic and alcohol consumption comparisons between participant groups.*

	Participant Group			Statistic <i>x</i> <sup>2</sup> / <i>f</i>
	<i>Business</i>	<i>University</i>	<i>College</i>	
<b>Demographics</b>				
Gender (% Female)	52	69	63	35.85*
Ethnicity (% White British)	85	88	87	642.63*
Age (Average)	35.63 (9.24)	20.22 (3.68)	17.61 (3.20)	496.78*
<b>Alcohol Consumption</b>				
Attitudes towards drinking	3.43 (.75)	3.61 (.66)	3.70 (.83)	25.98*
Attitudes towards drunkenness	2.70 (.94)	3.30 (.89)	3.41 (.98)	68.26*
Frequency of drinking	4.28 (1.52)	4.47 (1.43)	3.74 (1.37)	13.40*
Frequency of intoxication	2.32 (1.23)	3.85 (2.88)	3.22 (1.54)	22.44*
Quantity of drinking	2.19 (1.42)	4.68 (1.75)	3.83 (2.05)	68.25*

\* *P* < .001

### 6.3.3 Measures

Each questionnaire consisted of the same three counterbalanced measures: The Alcohol Outcomes Expectancy Questionnaire (Leigh & Stacy, 1993) was utilised to assess both positive and negative expectancies on a 6 point likert scale (1 = no chance of happening, and 6 = certain to happen)<sup>5</sup>. The ‘Drinking Refusal Efficacy-Revisited’ Scale (c.f. Oei et al., Young, 2005) was used to assess participants’ perceived ability to refuse alcohol on a 6 point likert scale (where 1 = I am very sure I could not resist drinking and 6 = I am very sure I could resist drinking)<sup>6</sup>. Normative Beliefs items<sup>7</sup> were based on items as described by McAlaney and McMahon (2007b). These contain questions regarding the frequency of their own and others’ alcohol consumption (as specified in previous chapters and demonstrated in Appendix C).

<sup>5</sup> This assessed overall (Cronbachs Alpha = .89), positive (Cronbach’s Alpha = .82), negative expectations (Cronbach’s Alpha = .82), as well as scores on standardised sub-categories. These sub-categories are in accordance with Leigh and Stacy’s (1993) factor analysis and scores showed good consistency: Positive Social (Cronbach’s Alpha = .88), Fun (Cronbach’s Alpha = .89), Tension reduction (Cronbach’s Alpha = .69), sex (Cronbach’s Alpha = .78), Negative Social (Cronbach’s Alpha = .84), Emotional Relief (Cronbach’s Alpha = .71), Physical (Cronbach’s Alpha = .71), Cognitive/Performance (Cronbach’s Alpha = .76).

<sup>6</sup> This assessed overall (Cronbachs Alpha = .95), social (Cronbach’s Alpha = .85), emotional (Cronbach’s Alpha = .97) and opportunistic (Cronbach’s Alpha = .92). efficacy.

<sup>7</sup> Cronbachs Alpha = .69. Originally devised by McAlaney and McMahon (2007), these items were used to assess beliefs about alcohol consumption frequency (from 1 = ‘not at all’ to 8 = ‘every day’).

Participants responded to these questions on an 8 point scale (1 = not at all, and 8 = every day) and the wording of these questions was changed in accordance with the target population. For example, the question for university students “how frequently would you say students at your university drink alcohol” was changed to “students at your college” or “people at your place of work”. Demographic and alcohol consumption questions were also included within the questionnaire, as well as questions about the participants’ attitudes towards drinking and drunkenness, in order to complete suitable between-group comparisons. In line with recommendations (McAllister & Davies, 1993), questions about the participants’ personal alcohol consumption were the final components of the questionnaire.

#### ***6.3.4 Equipment***

Identical versions of the questionnaire were constructed in paper and electronic formats, utilising online survey software (SurveyGizmo). Whether paper or electronic questionnaires were distributed was determined by the preference of the institution, as it has been found that responses do not differ whether paper or electronic alcohol questionnaires are used (Kypri et al., 2004; Miller et al., 2002). This dual approach was used to increase ease of participation (Evans & Mathur, 2005; Schleyer & Forrest, 2000) and flexibility (Sheehan & McMillan, 2000) and this methodology has proved successful in previous research (e.g. Kypri, Saunders, & Gallagher, 2003).

#### ***6.3.5 Procedure***

Following ethical approval, paper and electronic questionnaires were distributed at a number of UK colleges, universities and businesses which had agreed to allow their students/employees to participate. The questionnaires were distributed and completed

on campus, following university/college lectures or seminars, or at the participants' place of work. Participants were asked to privately complete their questionnaires at the time of distribution before returning their responses.

### ***6.3.6 Analytic strategy***

A series of Factorial ANOVAs (sphericity not assumed where specified) were conducted in order to assess the effect of participant group on outcome expectancies, DRSE and normative ratings. All ANOVAS were of mixed design whereby participant group (college students, university students or business persons) was the between participant variable and expectancy (positive and negative) rating became the within participant variable

## **6.4 Results**

The raw data collated for this investigation was the participants' responses to questionnaires containing alcohol expectancy (c.f. Leigh & Stacy, 1993) and drink refusal self-efficacy questions (Oei et al., 2005). They also comprised normative consumption ratings, as previously specified (McAlaney & McMahon, 2007b). Participants' expectancy and efficacy scores on sub-categories (e.g. positive tension reduction expectancies and social DRSE) were standardised by the calculation of an average score in order to ensure a consistent minimum and maximum score on each sub-category. Table 7 displays these averaged means and standard deviations of participants' alcohol-related cognitions. Further analyses of these cognitions were conducted by a series of Factorial ANOVAs and post hoc analyses, in the form of independent samples *t*-tests with adjusted  $p = .01$ <sup>8</sup>.

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<sup>8</sup> Whilst error adjustments are required to control for the possibility of a type 1 error, traditional Bonferroni adjustments for multiple testing could prove too stringent (Nakagawa, 2004; Tabachnik & Fidell, 2001) thus increasing the possibility of type 2 error. Furthermore, the inter-correlation between independent and dependent variables meant that Bonferonni adjustments were deemed particularly

### 6.4.1 Alcohol expectancies

A 3 (Participant group: college students, university students and business persons) x 2 (Expectancy: positive or negative) Factorial ANOVA of mixed design was conducted (sphericity not assumed, Greenhouse-Geisser correction implemented). This revealed a significant main effect of expectancy ( $F(1, 542) = 126.23, p < .001, \eta^2 = .19$ ).

**Table 7**  
*Participants' standardised outcome expectancy, DRSE and alcohol consumption ratings across participant groups.*

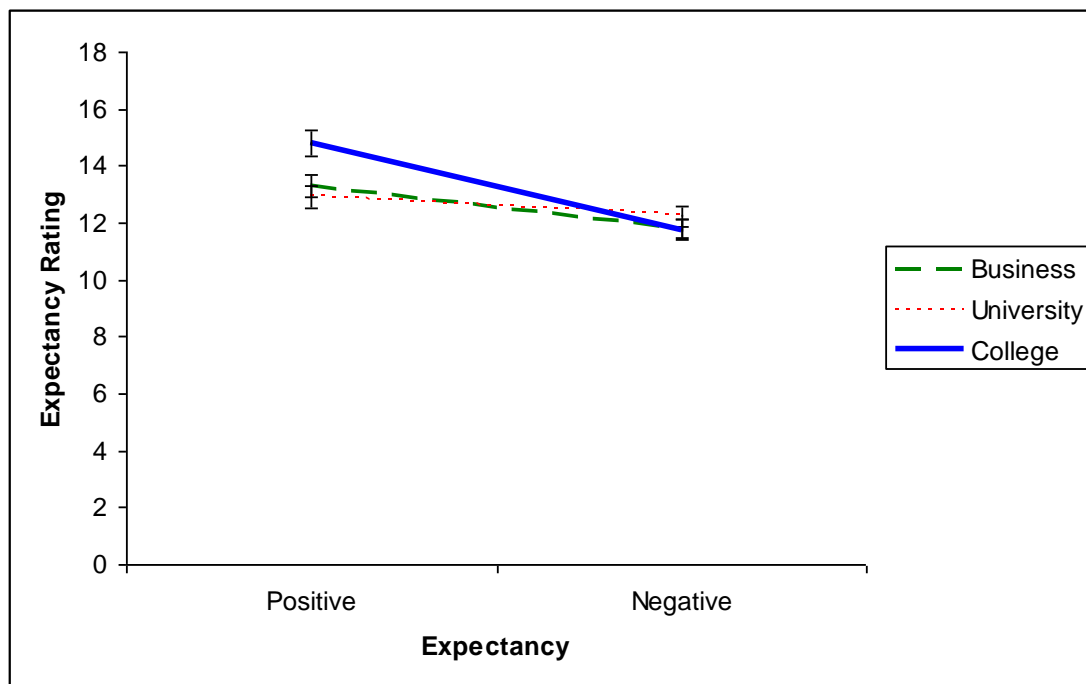
	Participant Group		
	<i>Business</i>	<i>University</i>	<i>College</i>
<b>Positive Expectancy Ratings</b>			
Social	3.86 (.74)	4.20 (.78)	4.35 (.88)
Fun	4.07 (.69)	4.49 (.76)	4.51 (.88)
Sex	3.56 (.93)	3.73 (1.07)	3.85(1.33)
Tension	1.90 (.41)	2.00 (.48)	2.12 (.65)
<b>Negative Expectancy Ratings</b>			
Social	2.03 (.99)	2.30 (1.05)	2.43 (1.14)
Emotional	2.58 (.85)	2.60 (.85)	2.47 (1.34)
Physical	3.38 (.91)	3.35 (.90)	3.17 (1.12)
Cognitive	3.81 (.85)	3.99 (.87)	3.66 (.99)
<b>Efficacy Ratings</b>			
Social	4.24 (1.26)	3.82 (1.37)	3.59 (1.33)
Emotional	5.05 (1.06)	4.99 (1.14)	4.66 (1.43)
Opportunist	5.32 (.84)	5.46 (.76)	5.30 (1.10)
<b>Frequency ratings</b>			
Personal	4.23 (1.45)	4.48 (1.44)	3.71 (1.34)
Friends'	5.19 (1.05)	5.09 (1.15)	4.43 (1.23)
Student/Business'	5.12 (1.11)	6.05 (.87)	5.12 (1.11)
UK's	5.50 (1.16)	5.55 (.90)	5.50 (1.16)

which showed that positive outcomes were judged to be significantly more likely than negative outcomes. A significant main effect of participant group ( $F(2, 542) = 6.85, p$

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unsuitable (Sankoh, Huque, & Dubey, 1997). A standard .01 adjustment was thus adopted. Similar methods of error correction have been utilised in previous research, in preference to overly conservative Bonferroni adjustments (e.g. Adams, 2007; Montgomery, Fisk, Newcombe, & Murphy, 2005).

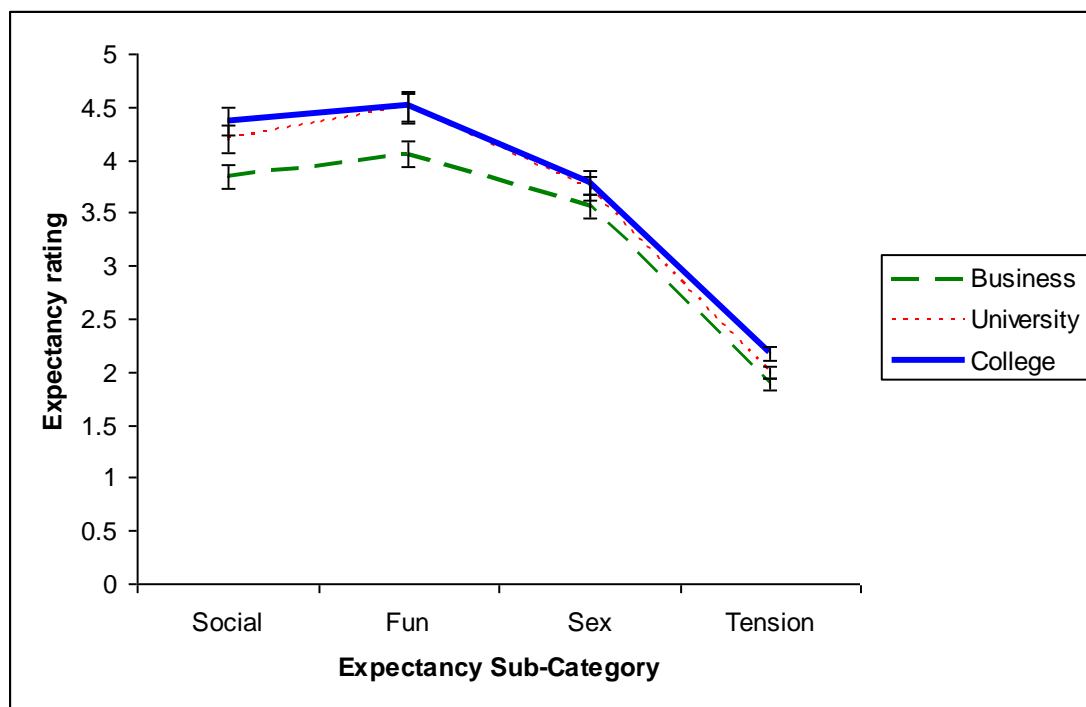
< .01,  $\text{Eta}^2 = .03$ ) and a significant 2-way interaction between participant group and expectancy ( $F(2, 542) = 126.23, p < .001, \text{Eta}^2 = .08$ ) was also revealed, as depicted in Figure 5. Post hoc analyses (equal variances not assumed) indicated that positive expectancies were higher in the college sample than in the business ( $t(354) = 3.55, p < .001$ ) and university samples ( $t(399) = 6.37, p < .001$ ). Positive expectancies did not, however, differ significantly between the business sample and the university sample. Furthermore, negative expectancies did not differ between any of the participant groups.



**Figure 3** Mean positive and negative standardised expectancy ratings across participant groups.

In light of findings regarding overall positive expectancies, further analyses were conducted to examine positive expectancies in terms of their sub-categories (social, fun, sex & tension). A 4 (Positive expectancy: social, fun, sex, tension reduction) x 3 (Participant group: college student, university student or business person) Factorial

ANOVA of mixed design was conducted (sphericity not assumed, Greenhouse-Geisser correction implemented). This revealed significant main effects of positive expectancy ( $F(3, 1464) = 1017.98, p < .001, \text{Eta}^2 = .68$ ) and participant group ( $F(2, 488) = 15.18, p < .001, \text{Eta}^2 = .06$ ), with these results being qualified by a significant 2-way interaction (see Figure 4) between positive expectancy and participant group ( $F(6, 1464) = 21.91, p < .05, \text{Eta}^2 = .02$ ).



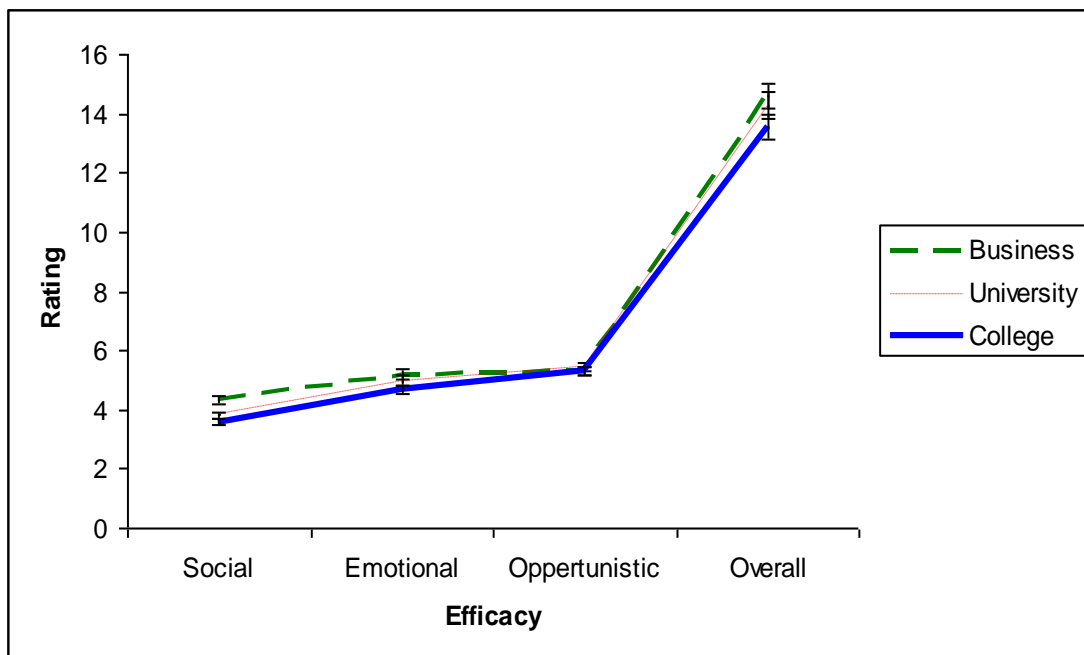
**Figure 4** Mean expectancy sub-category ratings across participant groups.

Informed by Figure 4, a series of post hoc analyses (equal variances not assumed) indicated that positive social expectancies were significantly more endorsed in the college ( $t(337) = 6.04, p < .001$ ) and university samples ( $t(230) = -3.39, p < .01$ ) than in the business sample. Yet, positive social expectancies did not differ significantly between the college and university students ( $t(349) = 1.36, p = .18$ ). Positive fun ( $t(360) = 5.47, p < .001$ ) and tension reduction ( $t(399) = 3.66, p < .001$ ) outcome expectancies were also significantly higher in the college than in the business sample.

Furthermore, university students endorsed positive fun expectancies ( $t(276) = 4.93, p < .001$ ) significantly more than the business sample, whilst neither fun nor tension reduction expectancies differed between college and university students. University students' tension reduction expectancies did not, however, differ from those of the business sample. Finally, positive sexual expectancies were found to be comparable across the three participant groups.

### 6.4.2 Drink refusal self-efficacy

A 4 (Efficacy rating: Overall, social pressure, emotional relief, and opportunistic) x 3 (Participant group: college student, university student or business person) Factorial ANOVA of mixed design (sphericity not assumed, Greenhouse-Geisser correction implemented) was conducted. This revealed a significant main effect of participant group ( $F(3, 542) = 6.13, p < .01, \eta^2 = .02$ ) efficacy rating ( $F(2.8, 1006) = 545.40, p < .001, \eta^2 = .50$ ) and a significant 2-way interaction effect between efficacy rating and participant group ( $F(2.8, 1001) = 9.73, p < .001, \eta^2 = .04$ ), displayed in Figure 5.



**Figure 5** Mean standardised drink refusal self-efficacy scores across participant groups.

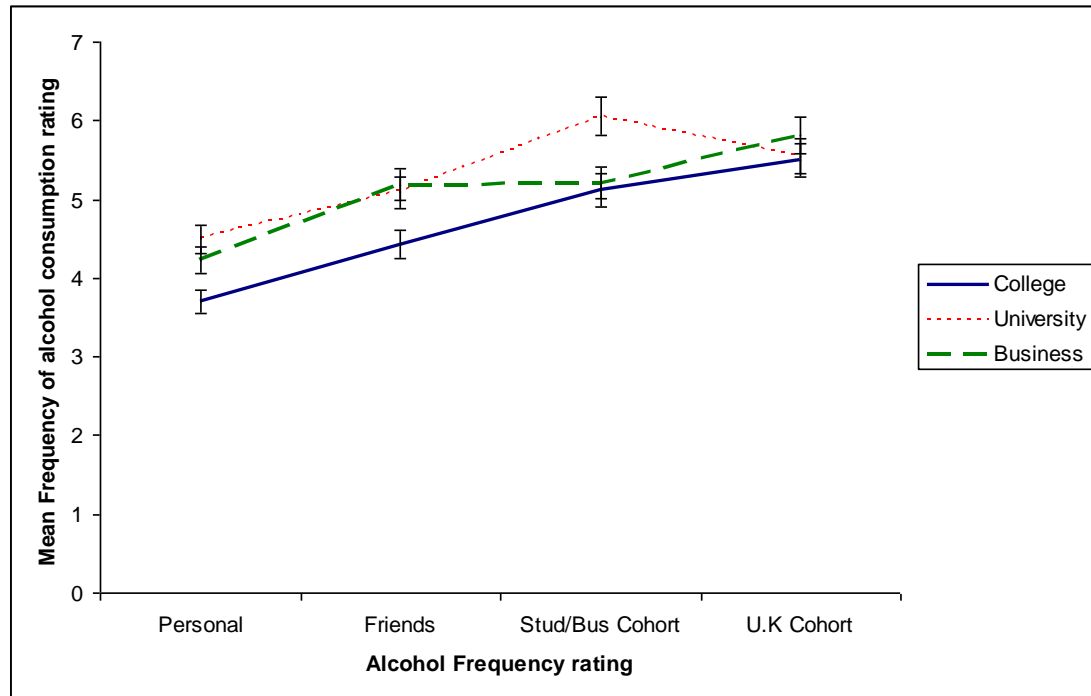


From Figure 5 it was apparent that opportunistic DRSE did not seem to differ markedly between the participant age categories. Further exploratory analyses (equal variances not assumed) revealed that overall ( $t(404) = -3.23, p < .01$ ), social ( $t(404) = -4.81, p < .001$ ) and emotional relief DRSE scores ( $t(377) = -3.13, p < .01$ ) were significantly higher in the business than in the college sample. It was also apparent that the university sample scored higher on overall ( $t(397) = -2.16, p < .01$ ) and emotional relief ( $t(340) = -2.50, p < .01$ ) DRSE scores than the college sample. However, there were no significant differences between the business and university samples in their emotional relief or overall DRSE. Also, the university sample did not differ significantly from the college sample in their social DRSE, whilst social DRSE scores were higher in the business than in the university sample ( $t(283) = 2.66, p < .01$ ).

### **6.4.3 Normative beliefs**

A 4 (Alcohol frequency rating: personal, friends', student cohort, UK cohort) x 3 (Participant group: College student, university student, business person) Factorial ANOVA of mixed design was conducted (sphericity not assumed, Greenhouse-Geisser correction implemented). This revealed a significant main effect of alcohol frequency rating ( $F(2, 1241) = 229.21, p < .001, \eta^2 = .32$ ), with post hoc analyses revealing that participants believe that their own consumption to be less frequent than that of their friends ( $t(516) = -12.57, p < .001$ ), fellow students/work colleagues ( $t(513) = -19.12, p < .001$ ) and others of their age in the UK ( $t(513) = -21.11, p < .001$ ), in accordance with popular theories of normative beliefs. A significant main effect of participant group ( $F(1,500) = 25.01, p < .001, \eta^2 = .09$ ) and a significant

two-way interaction between alcohol frequency rating and participant group was also revealed ( $F(5, 1249) = 12.68, p < .001, \eta^2 = .05$ ), as is illustrated in Figure 6.



**Figure 6** Mean reported frequencies of alcohol consumption (Personal, friends', student/business cohorts' and UK cohorts').

Post hoc analyses revealed that both business ( $t(382) = -3.65, p < .001$ ) and university student participants ( $t(536) = -11.10, p < .001$ ) rated their personal alcohol consumption as more frequent than did the college sample. Such results were mirrored by findings which suggested that both the business ( $t(349) = -7.36, p < .001$ ) and university groups ( $t(395) = -5.51, p < .001$ ) rated their friends' alcohol consumption as being significantly more frequent than did the college sample. Figure 6 indicated that ratings of friends' alcohol consumption by the business and university samples did not appear to differ significantly. Conversely, university student participants provided greater frequency ratings for their fellow students than the business sample provided for their work colleagues ( $t(277) = 2.53, p < .05$ ) or the

college samples provided for fellow college students ( $t(397) = -9.07, p < .001$ ), whilst the college and business samples did not appear to differ substantially. Ratings regarding the consumption of those of a similar age in the UK also did not appear to vary between the college and university students. However, the business sample believed that others their own age within the UK consumed alcohol more frequently than did the college ( $t(398) = -2.80, p < .01$ ) and university samples ( $t(278) = 2.53, p < .05$ ).

## **6.5 Discussion**

This study implemented a between participant design to examine whether alcohol expectancies, DRSE and normative beliefs varied between participant groups (college students, university students, business persons). As anticipated, it was found that positive expectancies were higher and DRSE was lower in the college students than in the university or business samples. Such findings, therefore, appear in line with the observed trend of mounting positive alcohol expectancies throughout development (Leigh & Stacy, 2004; Johnson & Johnson, 1995) and an incremental sense of one's ability to refuse alcohol (Shope, Copeland, Maharg, Dielman, & Butchart, 1993) which results from early social observations/development (Critchlow, 1986) and experiences of consumption throughout adolescence (Leigh & Stacy, 2004). Resultantly, the present findings may support the contention that there is a change in expectancies and efficacy in late adolescence/early adulthood (Anderson et al., 2011; Bekman, Goldman, Worley, & Anderson, 2011; Bekman et al., 2011; Nocolai, Moshagen, & Demmel, 2012).

However, the examination of positive expectancies and DRSE sub-categories further elucidates these results. Here, alcohol-related cognitions were not consistently divergent between participant groups. For instance, positive social outcome expectancies were higher, and social DRSE was lower, in the college and university samples than in the business sample. The college and university sample did not, however, differ in their social outcome expectancies or social DRSE. Positive fun expectancies were also higher in the university and college samples than in the business sample. Yet, tension reduction expectancies were only higher in the college than the business sample, whilst the university and business samples did not differ in these tension reduction expectancies. Such results appear to suggest that there are differences in the alcohol-related cognitions between those of legal drinking age (university and non-student sample) and those not of legal drinking age (the college sample). Nonetheless, there were also deviations in the cognitions held between the two student samples, suggesting that aspects of their alcohol-related experiences are shared, despite their age-related variations in legal alcohol consumption. In other words, there appear to be sub-categories within the UK student population in terms of their shared expectancies and DRSE beliefs.

It is reported that the fun and socialisation components of alcohol consumption are particularly important to UK student alcohol consumption (Plant & Plant, 2006). In mature alcohol consumption, however, such constructs seem less important (Labouvie, 1996). The shared student experience of alcohol consumption may therefore be a factor which influences the observed homogeneity between college and university students' fun and socialisation expectancies. Furthermore, the social/communal focus on alcohol may make refusing consumption in social

situations seem particularly difficult for student samples (c.f. 'Focus Theory of Normative Conduct' Kallgren, et al., 2000). Conversely, the experience of using alcohol as a method of emotion regulation has predominately been evident in younger adolescents (Pohorecky, 1991). This differentiation in experience may be attributed as the cause of higher tension reduction expectancies in college students, relative to the other groups in this study. Additionally, opportunistic DRSE and expectations of increased sexual responsiveness and assertiveness were equally prevalent regardless of participant group. As outcome expectancies are asserted to result from experience, the present study findings suggest a shared experience of sex and alcohol consumption across participants, as evidenced in previous research (Leigh, 1990). Experience of alcohol consumption, and not solely age, therefore appear to be an important determinant of the alcohol-related cognitions. This may account for the cognitive similarities observed between-groups of participants whom are vastly different in age, whilst, on the other hand, different cognitions were exhibited within the UK student population (i.e. between the college and university students) despite their similar ages. In a similar vein, expectancy based sub-categories have been identified within the university student population (Leeman et al., 2012).

The present research also utilised both student and non-student participants to reinforce previous findings that it is common to believe others' alcohol consumption is greater than our own (c.f. for example, Berkowitz, 2004; Borsari & Carey, 2001; Pekins, 2007). However, when asked to comment on the frequency of alcohol consumption by their fellow students/colleagues, university students rated their cohort as drinking more frequently than did the college or business samples. It has been asserted that university students are immersed in a social culture of drinking,

encountering alcohol consumption on a level not hitherto experienced (Borsari & Carey, 2001). The social stereotype of university student's heavy consumption may thus affect their self perception (Piacentini & Banister, 2006). As such, the present results may indicate the potential for one's personal consumption experiences to affect alcohol-related cognitions. Such results may have particularly important implications when considering previous research based principally on university student samples, as it appears that this group may be particularly susceptible to these inflated normative beliefs.

The present research therefore offers some support for the emerging existent literature which suggests that age may shape alcohol-related cognitions (e.g. Leigh & Stacy, 2004; McAlaney & McMahon, 2007). However, the present research has expanded upon such findings by examining the sub-categories of alcohol-related beliefs across several participant groups (college, university and business). Here, differences in cognitions were not consistently found across age and suggest that these may be mediated, not so much by age itself, but rather by similar or disparate experiences of alcohol. While this hypothesis seemingly warrants further future consideration, such findings may have implications for the validity of existing, student-focused research, and for the improvement of interventions which aim to reduce alcohol consumption by targeting alcohol-related cognitions.

It must be noted that this study administered questionnaires in only one setting (lecture/work place), meaning that future research may be improved by examining responses in other environmental contexts, where beliefs may be different (c.f. Labrie, et al., 2011; Monk & Heim, 2013b; Wall, et al., 2000; 2001). It may also be advisable

that future research examines the effect of the alcohol consumption measure used (c.f. Zamboanga et al., 2006), in light of previously observed variations depending on the quantity/frequency measure administered (e.g. Baldwin et al., 1993). Lastly, it should be noted that age and alcohol consumption may be confounding variables in the present research. Indeed, the younger age group (college sample) may have contained a number of people who consumed very little, whilst the older groups may contain people who have reduced drinking for various reasons, which may have altered expectancies and beliefs (Leigh & Stacy, 2004). The present study can therefore be regarded as a step towards offering further insight into the dynamic nature of alcohol-related cognitions in both adolescent and adult samples.

## 7. CHAPTER 7 – STUDY THREE

### Panoramic projection: Affording a wider view on contextual influences on alcohol-related cognitions

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## 7.1 Study 3 Abstract

**Aim:** *Although much is known about the effect of one's cognitions on alcohol consumption, there has been considerably less examination of their contextually varying nature. The present study therefore aimed to examine the effect of social influence and environmental cues on alcohol-related cognitions using panoramic filming and projection as a system of controlled contextual cueing.* **Method:** *A 2 x 2 factorial design simultaneously varied environmental cues (bar or lecture based panoramic videos) with social influence (peer group or solitary assessment).* **Results:** *Participants' positive outcome expectancies were higher, and drink refusal self-efficacy was lower, when they were assessed as part of a group rather than alone. Participants exposed to pub, as opposed to lecture based cues, also showed greater expectancies and lower drink refusal self-efficacy. An interactive effect of social influence and environmental cues was observed for both positive and negative expectancies. Group testing and alcohol-related cueing also resulted in higher ratings of participants' own and others' alcohol consumption when compared to solitary testing and neutral cueing conditions.* **Conclusions:** *Environmental and social contextual factors may be important mediators of alcohol-related cognitions, a finding which potentially has implications for the delivery of interventions.*

## **7.2 Introduction**

In an attempt to increase understanding of the factors driving alcohol consumption, a number of alcohol-related cognitions are commonly researched. These include alcohol expectancies, drink refusal self-efficacy and normative consumption ratings (beliefs), all of which are commonly found to be associated with, and predictive of, increased consumption (e.g. Anderson et al., 2011; Berkowitz, 2004; Carey, 1995; Erickson, Harrison, Cook, Cousineau, & Adlaf, 2012; Oei & Morawska, 2004; Perkins, Haines, & Rice, 2005; Strahan, Panayiotou, Clements, & Scott, 2011). As indicated in Chapters 2, 3 and 4, observed contextual changes in consumption have been postulated to be the product of environmentally-bound deviations in such cognitions (c.f. for example, Wall et al., 2000; McAlaney et al., 2010). However, a lack of in-vivo assessment in these areas of research has meant that research findings do not necessarily emulate the contextual cues present in real world locations. Instead, findings may be viewed as retrospective accounts rather than reports of an experience ‘as lived’, a common problem in psychological research (Stone & Shiffman, 2002).

Research which has conducted in-vivo assessments does suggest that both one’s current social (c.f. Pedersen, et al., 2008) and environmental context (c.f. Labrie et al., 2011; Wall et al., 2000; Wal et al., 2001; Wiers et al., 2003) are potential moderators of said cognitions. Indeed, participants show higher positive expectancies and lower negative expectancies when questioned in alcohol-related environments (Wall et al., 2000; 2001; Wiers et al., 2003), and higher normative estimates of consumption when examined as part of a group of peers (Pedersen et al., 2008). An advanced and simultaneous assessment of both social and environmental contexts could thus

provide a more reliable image of the dynamic nature of the environment on alcohol-related cognition.

In 1995, Roehrich and Goldman examined their contextual cueing hypothesis utilising videos of either a pub or a neutral setting. Technology is, however, now able to create a more immersive, realistic experience for the viewer (Iwata, 2004; Moezzi, Tai, & Gerard, 1997) in order to enhance situational priming and boost the ecological validity of such research (c.f. Cruz-Neira, Sandin & DeFanti, 1993; Onural, 2010). Thus, in this study, panoramic filming and projection was utilised in order to produce controlled but immersive contextual cueing. In accordance with the indications from contextual research, it was predicted that presenting alcohol-related cues using a recorded drinking environment would result in greater positive alcohol expectancies, lower negative expectancies, and heighten perceptions of others' drinking. DRSE was also predicted to be lower during cueing with a drinking environment. Additionally, viewing in groups of peers (as opposed to solitary viewing) was hypothesised to increase positive expectancies and normative frequency ratings whilst lowering DRSE.

## **7.3 Method**

### **7.3.1 Design**

A 2 (Social Context: Between participants, 2 levels) x 2 (Environmental Context: Between participants, 2 levels) design was utilised to examine the effect of social influence (Social Context: Alone or Group) and environmental cues (Environmental Context: bar or lecture theatre video) on participants' norm, efficacy and expectancy ratings. As both independent variables between subjects, participants therefore took

part in 1 of 4 possible conditions - Alone viewing a pub video, alone viewing a lecture video, in a group viewing a lecture video or in a group viewing a pub video.

### ***7.3.2 Participants***

Participants were recruited via an online participation pool and poster advertisements for volunteers, in accordance with ethical guidelines. Participants were randomly allocated to both social context (alone or group participation) and environmental cueing conditions (pub or lecture theatre footage). Participants were therefore allocated to one of four conditions; alone watching lecture theatre footage, alone watching pub footage, in a group watching the lecture theatre video or in a group watching the pub video. Random allocation was achieved via the use of a random number generator to allocate volunteering participants (who appeared as numbers on the electronic sign up system) to one of the four conditions. 78 participants ( $M = 20.52$ ,  $S.D = 2.67$ ) were recruited for this study (62% female,  $n = 1$  no gender stated). The majority were first year undergraduates (85 %) and were of white British background (91.9%). Those who stated that they did not consume alcohol ( $n = 3$ ) were removed from subsequent analyses.

### ***Demographic comparisons***

Demographic comparisons were conducted via the use of a series of 2 x 2 ANOVAs. Descriptive statistics can be found in Table 8. These revealed that there were no significant differences in the age of participants randomly allocated to the alone or the group condition ( $F(3, 64) = 3.44$ ,  $p = .07$ ,  $\eta^2 = .05$ ), nor in the age of participants in the pub or the lecture viewing conditions ( $F(3, 64) = 1.80$ ,  $p = .19$ ,  $\eta^2 = .02$ ).

**Table 8**  
**Participant demographics across social and environmental context conditions.**

<i>Condition</i>	<b>Demographics</b>						
	<i>Age</i>	<i>Gender (n)</i>		<i>Ethnicity</i>	<i>Study Year</i>	<i>Typical Number of Drinks</i>	
	<i>M</i>	<i>Male</i>	<i>Female</i>	<i>(% White British)</i>	<i>(% 1<sup>st</sup> yr)</i>	<i>M</i>	<i>Range</i>
<i>Alone</i>	2.14 (2.54)	20	20	85	89	6.88 (2.27)	2-12
<i>Group</i>	19.88 (1.07)	8	27	100	79	8.19 (1.20)	2-16
<i>Pub</i>	20.96 (2.70)	16	22	92	90	7.56 (1.68)	2-12
<i>Lecture</i>	20.03 (2.60)	13	24	87	76	7.49 (2.88)	2-16

No significant interaction was revealed ( $F(3, 64) = 1.33, p = .25, \eta^2 = .02$ ). There was no significant difference in the gender of participants viewing the pub video or the lecture video ( $F(3, 74) = .71, p = .40, \eta^2 = .01$ ). There were significantly more females than males in the group condition whilst there was an equal number of males and females in the alone condition ( $F(3, 74) = 5.82, p < .05, \eta^2 = .08$ ) however there was no significant interaction ( $F(3, 74) = 1.68, p = .20, \eta^2 = .02$ ). Further, there were no significant differences in the ethnic make-up or present year of study ( $F(3, 73) = .01, p = .09, \eta^2 = .00$ ;  $F(3, 73) = .34, p = .56, \eta^2 = .01$  respectively) of participants viewing the pub video or lecture video; nor did ethnicity and year of study differ significantly ( $F(3, 73) = 2.96, p = .09, \eta^2 = .04$ ;  $F(3, 73) = 3.04, p = .09, \eta^2 = .04$  respectively) between the group or solitary viewing conditions. No significant interactions were revealed during analysis of between-group differences in ethnicity ( $F(3, 73) = .01, p = .93, \eta^2 = .0$ ) or present year of study ( $F(3, 73) = 1.25, p = .89, \eta^2 = .02$ ). As such, participants appeared to be largely demographically comparable.

### **Consumption analyses**

Overall, participants reported drinking an average of 8 drinks on a typical drinking

occasion ( $M = 7.56$ ,  $S.D = 9.62$ ,  $Range = 2-16$  drinks). There were no significant differences in the self-reported typical number of drinks consumed in those who participated in pub or lecture cued viewing conditions ( $F(3, 73) = .00$ ,  $p = .96$ ,  $\eta^2 = .00$ ), between the alone or group viewing conditions ( $F(3, 73) = .38$ ,  $p = .54$ ,  $\eta^2 = .01$ ) and no significant interaction ( $F(3, 71) = 1.25$ ,  $p = 1.25$ ,  $\eta^2 = .02$ ). There were therefore no apparent between-group variations in the typical consumption quantity which may alter alcohol-related cognitions (LaBrie et al., 2011).

### **7.3.3 Measures**

Each questionnaire consisted of the same three key items, with counterbalancing to avoid order effects. First, the Alcohol Outcomes Expectancy Questionnaire (Leigh & Stacy, 1993) was utilised. Here, participants were asked to assess the likelihood of a series of thirty-four outcomes, half positive and half negative, rated on a 6 point likert scale (1 = no chance, and 6 = certain to happen). The discriminative and predictive validity of this measure, in relation to alcohol consumption, has been evidenced (Leigh & Stacy, 1993; Stacy et al., 1990) and has been shown to have adequate reliability (Leigh & Stacy, 1993) and good congruent validity when compared with similar expectancy measures (Vik, Carrello, & Nathan, 1999; Leigh & Stacy, 1993). The present research also found this measure to have satisfactory internal consistency, with positive outcome expectancies demonstrating a Cronbach's Alpha of .66 and negative expectancies a Cronbach's Alpha of .61.

Second, the Drinking Refusal Efficacy-Revisited scale was used (Oei et al., 2005), which involves participants rating how sure they are that they could refuse alcohol in nineteen situations. Participants rated their level of refusal certainty in each of the

situations on a 6 point likert scale (1 = I am very sure I could not resist drinking, and 6 = I am very sure I could resist drinking). The DRSE-R has been found to have good construct and concurrent validity (Oei et al., 2005) and to be a reliable questionnaire, predictive of alcohol consumption (Young et al., 2007; Oei et al., 2005). The present investigation also indicated that the DRSE-R scale had good internal consistency (Cronbach's Alpha = .92).

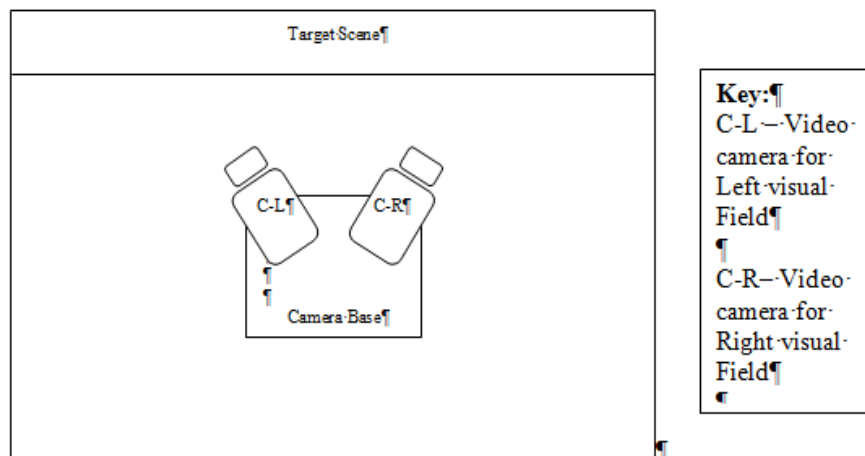
Finally, normative beliefs were assessed utilising items as described by McAlaney and McMahon (2007b). Participants were asked how frequently they drink and about the frequency of consumption in other students at the university, other people the same age in the UK, and friends. Each question was accompanied by a set of 8 responses from which participants were asked to select the most appropriate frequency response (1 = not at all, and 8 = every day). Items pertaining to personal alcohol consumption however were separated from questions regarding the alcohol use of others, in order to limit signal strength (Davies & Best, 1996) and in consideration of findings from Melson et al. (2011) which suggest that the questions asked may impact participant responses to norm related questions. These items had good internal consistency with a Cronbach's Alpha of .74.

### ***7.3.4 Equipment and setup***

#### ***Filming***

Panoramic filming for the purposes of this experiment was conducted via the use of two Panasonic HD video cameras fixed into position, as can be seen in Figure 7. By facing the cameras at the protagonists and fixing the cameras at approximately 45 degrees (left side of the visual field) and 135 degrees (right side of the visual field) a panoramic scene could be filmed. The images received by each camera met at 90

degrees and thus captured the full 180 degree scene. When appropriate, slight alterations were made to the position of the cameras to ensure that the two images aligned. Once in position the two cameras were simultaneously set to record. A sound recorder was also synchronised with the video camera recordings in order to capture richer, accompanying audio in each context. The completed videos were electronically edited so as to fully synchronise and align the two videos and remove any central image overlap. The recorded sound was also added and synchronised to these recordings. Two DVDs were then produced, one for each side of the visual field. The completed video recordings thus consisted of two audio-visual colour panoramic films lasting thirty minutes each; one of a populated lecture theatre on campus (where students were recorded whilst listening to a lecture and taking notes), and one of a populated student union bar on campus (where students were recorded drinking and socialising). Those persons who appeared on the video were the same in both videos and all gave their full consent for the use of this video for research purposes, in accordance with ethical guidelines.

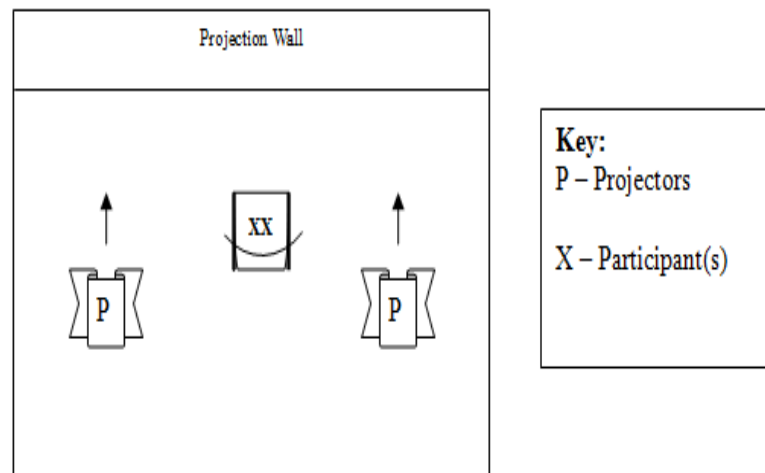


**Figure 7** *Diagram of camera set up for panoramic projection.*



## ***Projection***

For the purposes of the experiment, the panoramic filming was projected across a laboratory wall which the participant faced, thus creating a panoramic and immersive display. In order to produce this effect, two Hitachi LCD projectors were used. These were horizontally aligned, positioned equidistantly from the focal wall and received input from two Sony BlueRay DVD players which played at a synchronised rate (one for each recording - left and right visual field). Participants were then seated on a chair in front of, and in the middle of, these projectors, allowing for an immersive experience (see Figure 8). The projection was accompanied by the recorded sound played via the use of surround speakers.



**Figure 8** *Diagram of experiment set up for panoramic projection.*

### ***7.3.5 Procedure***

Participants were seated 2 meters away from the projection wall; those in the group condition were seated equidistant from the wall, side by side. Participants were allocated in groups of 2 or 3 for the group condition and these numbers were selected

on the basis of previous research which indicates that any effect of group context are heightened by fewer group members (Pedersen et al., 2008). Lights were then dimmed to maximize picture quality, and the participants viewed the panoramically projected video with the accompanying surround sound. Participants were instructed to simply watch the video for the first 3 minutes before, once cued by the researcher, beginning to complete the questionnaire whilst the video continued to play.

### ***7.3.6 Analytic strategy***

The raw data collated for this investigation were the participants' responses to questionnaires containing alcohol expectancy (c.f. Leigh & Stacy, 1993), drink refusal self-efficacy (c.f. DRSE-R, Oei et al., 2005) and normative beliefs questions (McAlaney & McMahon, 2007a), as previously specified. These responses were collected whilst under the influence of different environmental stimuli (pub or lecture theatre video) and in different social contexts (alone or in a group). Analyses were conducted by way of a series of Factorial ANOVAS (sphericity assumed in all cases) with accompanying post hoc *t*-tests (all with adjusted  $p = .01$  and equal variances assumed). Separate 2 (Social Context: Alone or Group) x 2 (Environmental Context: Lecture or Pub) Between Subject Factorial ANOVAS were conducted in order to assess Positive Expectancies, Negative Expectancies and Drink Refusal Self-Efficacy. Normative Beliefs were assessed by way of a 4 (Alcohol frequency rating: personal, friends', student cohort, UK cohort) x 2 (Social Context: Alone or Group) x 2 (Environmental Context: Lecture or Pub) Factorial ANOVA of mixed design with accompanying post hoc tests.

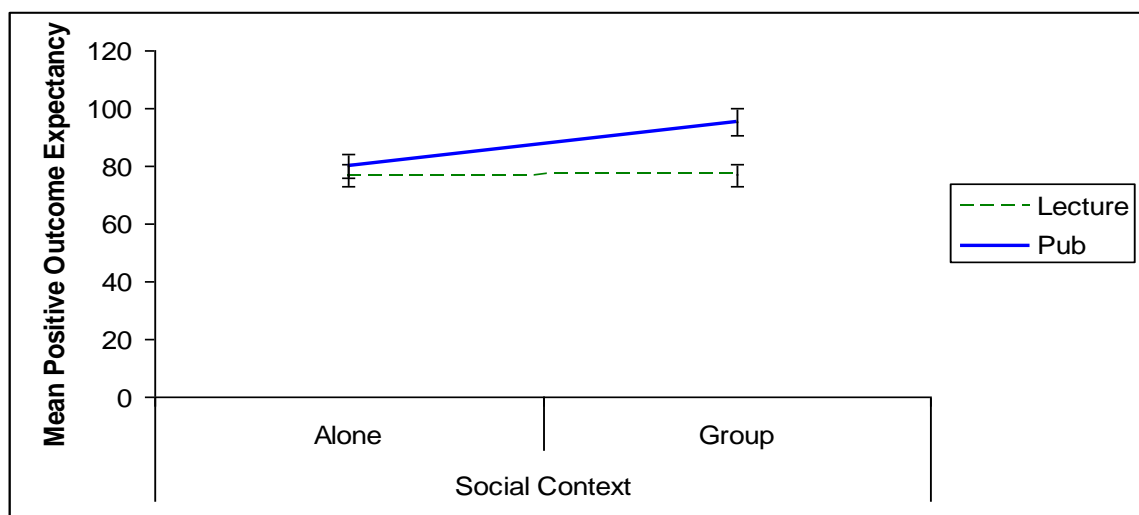
## 7.4 Results

### 7.4.1 Alcohol expectancies.

Table 9 displays the means and standard deviations of participants' positive and negative outcome expectancies measured, whilst watching different panoramically projected footage (pub or lecture) and in different social contexts (alone or group).

#### **Positive expectancies**

Those viewing the projected pub video ( $F(1,71) = 20.65, p < .001, \eta^2 = .22$ ) and those who watched as part of a group ( $F(1, 71) = 11.31, p < .01, \eta^2 = .14$ ) showed significantly greater positive outcome expectancies than those who viewed the lecture video or viewed alone. A significant two-way interaction between social and environmental context was also indicated ( $F(1,71) = 6.38, p < .05, \eta^2 = .08$ ). Post hoc analyses indicated no significant differences in positive expectations, regardless of whether participants viewed the lecture footage alone or in a group ( $t(35) = -1.57, p = .13$ ). However, those who viewed the pub video in a group showed significantly higher expectancies ( $t(36) = -3.92, p < .001$ ) than those who viewed the same footage alone. The excitatory influence of the group social context thus appeared to be exclusive to those experiencing alcohol-related contextual cueing (the bar video footage). Figure 9 demonstrates this effect.



**Figure 9** Mean reported positive outcome expectancies across social and environmental context.

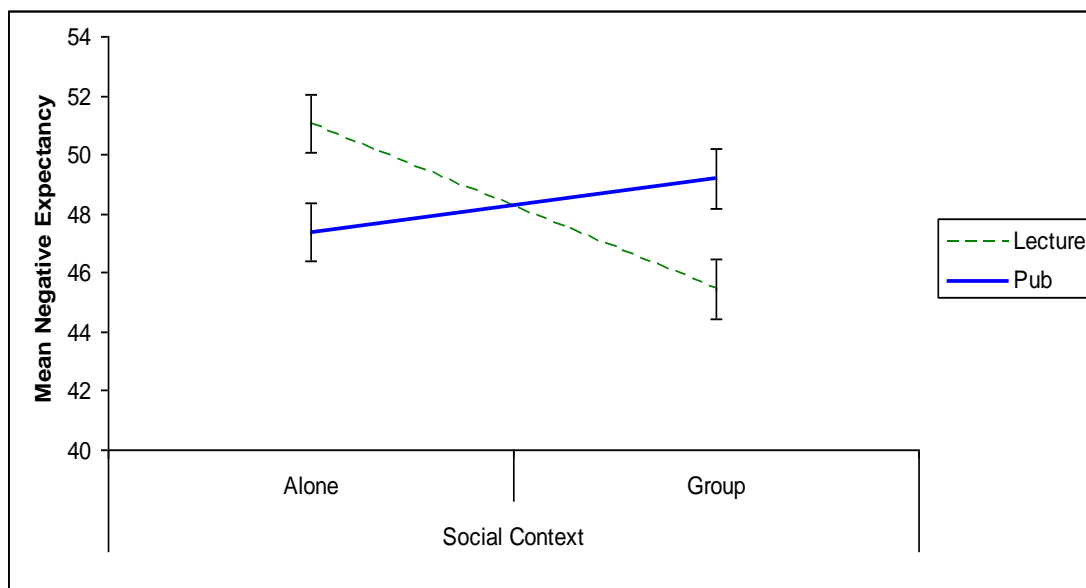
**Table 9**

*Participants' overall positive and negative expectancies and overall DRSE assessed across social and environmental context conditions.*

	Participant Score		Overall DRSE
	<i>Pos. Expectancies</i>	<i>Neg. Expectancies</i>	
<b>Social Context</b>			
<i>Alone</i>	77.48 (9.21)	49.13 (6.54)	77.48 (9.21)
<i>Group</i>	86.19 (16.51)	47.31 (6.18)	86.19 (16.51)
<b>Environmental Context</b>			
<i>Lecture</i>	75.76 (10.38)	48.32 (6.88)	75.76 (10.38)
<i>Pub</i>	87.15 (14.45)	48.21 (5.97)	87.15 (14.45)

### ***Negative expectancies***

No significant main effect of social context ( $F(1, 71) = 1.82, p = .18, \text{Eta}^2 = .03$ ) or environmental context ( $F(1, 71) = .00, p = .99, \text{Eta}^2 = .00$ ) was revealed. However, a significant two-way interaction (see Figure 10) between social and environmental context ( $F(1, 71) = 6.80, p < .01, \text{Eta}^2 = .09$ ) and accompanying post hoc testing suggested that participants who watched the pub footage alone had significantly lower negative expectancies ( $t(38) = 1.83, p < .01$ ) than did those who watched the lecture footage alone. Conversely however, negative expectancies were significantly higher when watching the pub footage in a group ( $t(33) = -1.87, p < .01$ ) than when watching the lecture video in a group.



**Figure 10 Mean Reported Negative Outcome Expectancies across social and environmental context.**

#### **7.4.2 Drink refusal self-efficacy**

Means and standard deviations of participants' DRSE scores are shown in Table 9. Further analysis indicated significant main effects of social ( $F(1, 71) = 11.31, p < .01, \eta^2 = .14$ ) and environmental context ( $F(1, 71) = 34.15, p < .001, \eta^2 = .32$ ), suggesting that DRSE was significantly greater in the lecture and solitary viewing conditions than in the respective pub and group viewing conditions. No significant interaction between social and environmental context was indicated ( $F(1, 71) = 1.29, p = .26, \eta^2 = .02$ ).

#### **7.4.3 Normative beliefs**

Descriptive statistics of participants' ratings regarding the frequency of their own and others' consumption across social and environmental context conditions are displayed in Table 10. A significant main effect of alcohol frequency rating ( $F(3, 204) = 49.17, p < .001, \eta^2 = .22$ ) was revealed. Paired samples post hoc *t*-tests indicated that participants believed that their own drinking was significantly less frequent than that

of their friends' ( $t(71) = 3.52, p < .01$ ), their fellow students' ( $t(74) = 9.26, p < .001$ ) and others their age in the UK ( $t(74) = 6.60, p < .001$ ). A significant main effect of social context ( $F(1, 68) = 11.31, p < .01, \eta^2 = .14$ ) and environmental context ( $F(1, 68) = 20.65, p < .001, \eta^2 = .22$ ), also suggested that alcohol frequency ratings were significantly greater when in the pub and group viewing conditions than when in the lecture and the solitary conditions respectively. No significant interaction was found ( $F(3, 204) = 1.32, p = .27, \eta^2 = .02$ ).

**Table 10**  
*Participants' alcohol consumption ratings assessed across social and environmental context conditions.*

	Frequency of Alcohol Consumption Ratings				Row Mean
	Personal	Friends'	Student Cohort	UK Cohort	
<b>Social Context</b>					
Alone	4.08 (1.12)	4.78 (1.13)	6.00 (.97)	5.32 (1.25)	5.08 (.86)
Group	5.19 (.75)	5.31 (.75)	6.00 (.34)	5.78 (.59)	5.57 (.47)
<b>Environmental Context</b>					
Lecture	4.43 (1.01)	4.77 (.94)	5.89 (.76)	5.37 (1.19)	5.16 (.82)
Pub	4.82 (1.25)	5.29 (.98)	6.11 (.69)	5.71 (.77)	5.48 (.63)
<b>Column Means</b>	4.62 (1.15)	4.99 (1.09)	6.01 (.72)	5.55 (1.00)	

## 7.5 Discussion

This study incorporated the use of panoramic filming and projection in order to simultaneously measure the effect of social influence (alone or group) and environmental cueing (bar or lecture) on alcohol expectancies, DRSE and normative beliefs. In line with hypotheses, the present research suggests that contextual factors such as social situation and environmental cues exert an influence on self-reported alcohol-related cognitions.

Regardless of whether participants were estimating their own consumption or that of their friends, university peers or other people their age, ratings regarding alcohol consumption frequency were higher in those who participated in a group (rather than alone) and were exposed to the pub footage (as opposed to the lecture footage). Thus, whilst between-group comparisons indicated that participants reported that they consumed the same quantity of alcohol on a typical occasion, their personal frequency estimates appeared to be influenced by contextual factors. Participants' perceived ability to refuse alcohol was also reportedly lower when viewing the pub video and when amongst peers, when contrasted with respective reports during lecture based cueing and solitary viewing. Additionally, expectancies were impacted by the interaction of social influence and environmental cueing. Here, positive expectancies were consistent across the lecture video condition, regardless of the participants' social context. During pub cueing, on the other hand, expectancies were lower during solitary, as opposed to group, viewing. The excitatory effect of social influence thus appeared to be exclusive to those experiencing alcohol-related contextual cueing (the bar video footage). In other words, increases in positive expectations appeared to be the result of being amongst peers and under the influence of alcohol-related cues, peer effects were not observed in the absence of pub based stimuli. This finding, therefore, expands previous research which has exclusively examined either in-vivo social (e.g. Pedersen et al., 2008) or environmental context (e.g. Wall et al., 2000). Furthermore, not in line with predictions, participants who watched the pub footage alone reported lower negative expectancies than did those who watched the lecture footage alone. Conversely, when watching the pub footage in a group, negative expectancies were higher than those of respondents who viewed the lecture video in a group. Although not entirely in-keeping with predictions and previous research (c.f. Wiers et al., 2003),

these findings suggest a collective influence of contextual factors on alcohol-related cognitions and, thus, expand the existing diminutive literature in this area.

The current findings, therefore, use immersive techniques to suggest that variations in alcohol consumption (e.g. Thombs et al., 1997) and related cognitions (e.g. LaBrie et al., 2011; Wall et al., 2000; 2001) may be the result of an underlying process of contextual cueing. Here, alcohol-related environmental cues appeared to alter responses, suggesting that the environment has made alcohol-related cognitions and memories more accessible (Reder et al., 2009; Roehrich & Goldman, 1995; Wall et al., 2000; Wiers et al., 2003). The present results thus compliment research which suggests an information-processing model of expectancy activation (Friedman et al., 2009; Wall et al., 2000) and extends these findings to other alcohol-related cognitions. They also fit well with recent research which has shown that even rudimentary alcohol-related stimuli can affect cognitions (Freeman, Friedman, Bartholow, & Wulfert, 2010).

The presently observed effects of social influence on cognition also appear to suggest that being amongst peers may amplify the perceived salience of the social drinking norm (c.f. Kallgren et al., 2000) and therefore alter perceptions of one's own and others' drinking. Moreover, outcome expectancies and DRSE were impacted by social influence, suggesting that the previously researched effect of group participation on normative estimates (Pedersen et al., 2008) is also found when examining other alcohol-related cognitions. Indeed, the present research suggests that social context is a particularly important mediator of the effect of environmental cues on expectancies. Previous research (e.g. Wall et al., 2000) which shows an effect of environmental



context on alcohol-related cognitions may thus be limited by its failure to also consider the potentially moderating effect of the group context. As the effect of direct peer interaction on consumption is well documented (c.f. Bott et al., 2005; Larsen, Engels, Souren, Granic, & Overbeek, 2008) it would be advantageous in the future to examine whether the present results are replicated, or even heightened, when peer influence is direct (i.e. social interaction and conversation in environment) as opposed to indirect (peer presence) as was the case in the present study.

University students are immersed in a social, pub-based drinking culture (Borsari & Carey, 2001) and alcohol consumption is highly prevalent in this sample (e.g. Karam, Kypri, & Salamoun, 2007; Knight et al., 2002), particularly with peers in the pub environment (c.f. Nyaronga et al., 2009; Straus & Bacon, 1995). As experiences are asserted to control the strength of connections and the degree of the cued activation observed (Rumelhart & Todd, 1993), context related cueing may therefore be particularly likely in present student sample. Further research beyond this sample is recommended in order that alcohol-related cognitions of the wider community can be confidently represented. Furthermore, participants in this between participant study were demographically comparable and did not differ in terms of self-reported typical alcohol consumption quantities yet there are concerns regarding the veracity of such self-report measures of consumption (c.f. Babor, Brown, & Del Boca, 1990; Davis, Thanke, & Vilhena, 2010 for more on this issue). It is hoped that this debate becomes less critical given that the random allocation of participants re-assures us that any reporting inaccuracies are evenly distributed across conditions. However, future research would be advanced via the assessment of implicit, as well as explicit, alcohol-related cognitions. Such an addition would provide further insight into the

influence of context and indicate whether the present results are replicated in implicit thought processes, in light of research suggesting that implicit and explicit cognitions offer unique contributions to predicting alcohol consumption (McCarthy & Thompsen, 2006). Implicit testing would also reduce potential concerns regarding demand characteristics in participants' present responses. Additionally, it should be noted that the present sample was heavily populated by females, perhaps owing to the greater numbers of females participating in higher education in England (Usher & Medow, 2011). This may limit the extent to which findings generalise to male students and future research may be benefitted by using a gender stratified sample. Finally, whilst the timing and location of testing meant that participants were unlikely to have been drinking prior to participation, future research would benefit by the addition of an 'in-test' measure of alcohol consumption. This would be particularly useful in order to assess whether changes in reported cognitions correspond with co-occurring changes in alcohol consumption during the experiment.

In summary, the present study adds weight to the assertion that both social influence and environmental cues impact expectancies, DRSE and normative beliefs. As such, one's present context may be an important mediator of alcohol-related beliefs and one which may warrant closer attention within research. As these cognitions are commonly associated with consumption, the application of the present findings may have implications for the improvement of alcohol interventions.

## 8. CHAPTER 8 – STUDY FOUR

### “There’s an App for that” – Context aware experiential sampling using smart-phone technology to investigate alcohol-related cognitions

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## Study 4 Abstract

**Aim:** To use context aware experiential sampling techniques to investigate the effect of context on in-vivo alcohol-related cognition. **Method:** A time-stratified random sampling strategy was adopted in order to assess 72 students and young professionals at 5-daily intervals over the course of a week. A specifically designed smart-phone application was developed for this purpose, and it recorded present situational and social contexts, as well as current consumption and present alcohol-related cognitions. **Results:** In-vivo social and environmental context effects, as well as current alcohol consumption, accounted for a significant proportion of variance in alcohol-related cognitions. For instance, prompts which occurred whilst participants were situated in a pub, bar or club and in a social group of friends were associated with increases in both positive and negative outcome expectancies, whilst refusal self-efficacy was found to decrease. **Conclusion:** Alcohol-related cognitions do not appear to be static but instead demonstrate variation across social and environmental contexts. Modern technology can enable the collection of in-vivo measures of cognition in order to accurately reflect such contextual variations and provide a more ecologically valid record of said beliefs.

## **8.2 Introduction**

Developing from early primitive devices to aid agriculture, we now have highly advanced operating systems and technological devices which are capable of running entire industries (Arthur, 2009). In the last century however, the technology accessible to the masses has substantially increased (ibid). Despite the relatively recent innovation of computers, there has been a substantial increase in their popularity, with usage levels in the UK rivalling the near universal use of older technologies such as analogue television (Shepherd, 2007). Such patterns of increasing computer use are also largely evident worldwide (Card & DiNardo, 2002). Similarly, since the advent of the telephone in 1876, there has been a continued growth in the usage and, more recently, mobile telephones have become particularly popular and technologically advanced. As such, they are now a part of everyday life for more than one billion people worldwide (Katz & Aakus, 2002) and Miller (2012) estimates that by 2025, most of the world's 8 billion people will have smart-phones – a mobile phone with advanced computing and internet capabilities.

Whilst such technological advances may have had detrimental effects in certain areas (privacy for example, c.f. Schauer, 1998), the use and potential of technology to improve people's health and quality of life is also apparent (Park & Jayaraman, 2003). Indeed, research has demonstrated that smart-phone applications in healthcare settings (Yangil, & Jengchung, 2007) and medical consultations (Banitsas, Georgiadis, Tachakra, & Cavouras, 2004) can have high practical utility. Technology also offers the opportunity to conduct advanced methods of research - providing the tools to develop theory and inform practice, with many potentially beneficial applications.

One such use of technology within research settings is found within ‘Ecological Momentary Assessment’ (EMA) research, also known as the Experience Sampling methodology (Collins et al., 1990; Collins et al., 1998). EMA utilises portable computer systems to contact participants at varying time intervals. In doing so, research has evolved beyond the administration of paper and pen questionnaires within the laboratory and this method has been successful in a variety of areas of research from schizophrenia (Granholt, Loh, & Swendsen, 2008), breakup/dating research (Oishi & Sullivan, 2006) and cannabis use (Verdoux, Gindre, Sorbara, Tournier, & Swendsen 2003). Similarly, hand-held computer devices have been used to implement EMA which assesses the effect of mood (Collins et al., 1998) and current social and situational contexts (Shrier, Walls, Rhoads, & Blood, 2013) on self-reported alcohol and marijuana consumption respectively.

Building upon EMA research which has used hand-held computers and phone based voice response systems (c.f. Collins et al., 2003), research has begun to use participants’ mobile phones to collect EMA data via phone calls (Courvoisier, Eid, Lischetzke, & Schreiber, 2010) or text messages (Kuntsche & Robert, 2009). In an examination of ‘mind wandering’ by Killingsworth and Gilbert (2010), smart-phone technology was also used to allow real life, in-vivo assessments, making participation easier, less restrained and less invasive for both participant and researcher. Indeed, examinations of this methodology have shown that participation through mobile phones was popular and produced high response rates (Kuntsche & Labhart 2012). Accordingly, Miller (2012) notes that smart-phones can allow researchers to gather substantial amounts of ecologically valid, real-time data from large and diverse samples. The previously noted popularity and accessibility of advanced mobile

devices (Katz & Aakus, 2002) also means that participation may be expected to be heightened via the use of such devices.

The use of EMA addresses the limitations of autobiographical memory which may be evident in the findings from traditional research such as diary studies (Shiffman, Stone, & Hufford, 2008) and retrospective recording. For example, a diary study which utilised covert photoreceptors found that 90% of participants responded to study, yet, in fact, only 11% had actually complied with the task instructions (Stone & Shiffman, 2002). Such research thus suggests that diary based methods of EMA may be prone to “parking-lot compliance” where participants retrospectively answer questions in order to fulfil task requirements (Smyth & Stone, 2003). Conversely, smart-phone based EMA provides instantaneous, highly rich and useful data which is electronically time-stamped to prevent such retrospective accounts. The smart-phone’s familiarity, proximity, social importance and high frequency of use also increase the ease and likelihood of research participation (Miller, 2012). EMA using smart-phone technology is also ‘context-aware’ (Miller, 2012) meaning that it can monitor dynamic changes across contexts, which may be particularly useful for monitoring behaviours which are episodic and contextually bound.

Alcohol use is but one example of such a contextually bound behaviour and it has been historically difficult to assess owing to problems of self-report bias and demand characteristics (Verster et al., 2012). Further, it has been noted that alcohol-related questioning often occurs in an environment which is far removed from the setting in which the drinking occurred (ibid). Real-time assessments in a naturalistic setting (enabled by mobile phone technology) may therefore be useful and illuminate the contextual differences which may not be captured within the laboratory. Alcohol-

impaired cognitive functioning during participation (Weissenborn & Duka, 2002) may also be addressed using smart-phone technology, as it provides a familiar, straightforward method of question and response which is easy to access (Collins, Kashdan, & Gollnisch, 2003), meaning cognitive load is low. Smart-phone-based EMA is therefore likely to produce both richer and more ecologically valid data.

Context has been noted as a potential mediator of alcohol-related cognitions including norms (c.f. McAlaney et al., 2010 ‘environments of perceptual distortion’) and expectancies (c.f. Abrams & Niaura, 1987; Cox & Klinger, 1990). However, with few exceptions (c.f. Roehrich & Goldman, 1995; Wiers et al., 2003), there is a paucity of research examining this issue. The majority of research in this area administers questionnaires in single school or laboratory context (Foxcroft et al., 1997) and utilises limited (often student) samples (c.f. Moreira et al., 2009). As such, there is little assessment of these cognitions ‘in-vivo’ or of how these cognitions may change across contexts. The present research, therefore, aims to address this issue by using smart-phone-based technology to implement EMA of alcohol-related cognitions. This was undertaken with a view to examining the effect of changing context on alcohol-related cognitions. It was also intended that this approach would produce a method of smart-phone based research which will advance psychological research, which presently lags behind the smart-phones’ capabilities (Miller, 2012). In line with previous research within this thesis, it was predicted that alcohol-related expectancies and normative beliefs would be higher, and refusal efficacy lower, when assessment occurred within alcohol-related environments and in the presence of a social group (in comparison with assessments that occurred in alcohol neutral environments and in solitary social contexts). This study also addressed the limitations of the studies



presented in Chapters 5, 6 and 7 as it provided a within participants assessment of alcohol-related cognitions, as opposed to a between subject comparison.

## **8.3 Method**

### **8.3.1 Design**

A within subject design was utilised to investigate the effect of environmental and social context on participant responses to randomly selected alcohol expectancy, efficacy and norm questions.

### **8.3.2 Participants**

72 participants aged 18-34 years ( $M = 21.73$ ,  $S.D = 3.64$ ) were recruited for this study from a sample of students ( $n = 43$ ) and young professionals ( $n = 29$ ). The majority of this sample were White British (88.9%) and 69% of this sample were female.

### **8.3.3 Measures**

Demographic questions and questions regarding the participants' personal alcohol consumption (AUDIT-C, see Appendix D) were provided at the participants' initial briefing, along with their student status (student or young professional), gender, age and ethnicity. These were anonymously combined with participants' individual responses using a unique numeric identifier. The smart-phone application ascertained participants' environment/contexts (home, work/lecture, bar/pub/club, restaurant or other) and social contexts (alone, with 1 friend, with 2 more fiends, with family, work colleagues or other), whether they were drinking or had had a drink (yes or no), and if so what they had been drinking (quantity and beverage type). Furthermore, all participants answered a random selection of items taken from a number of

questionnaires: Alcohol Outcomes Expectancy Questionnaire (Leigh & Stacy, 1993), Drinking Refusal Efficacy-Revisited (Oei et al., 2005) and Normative Belief items (as described by McAlaney & McMahon, 2007b). All the items used were presented in the same manner as originally utilised, using the same response items and scales (c.f. Oei et al., 2005; Leigh & Stacy, 1993; McAlaney & McMahon, 2007b – See Appendices A, B & C). However, all of the items from these questionnaires were not provided, in order to decrease participation time and thus increase response rate. There are 34 items in Leigh et al.'s (2003) expectancy questionnaire and these cover a range of outcomes, including social, sexual and emotional outcomes. However, it was only the six social items that were part of the question pool, three positive and three negative. In each response session. Two positive and two negative items were randomly selected and an average positive and negative expectancy score was subsequently calculated. Whilst this may limit the conclusions that can be made regarding global alcohol expectancies, it was believed, on the basis of pilot studies, that participants were less likely to respond when all items from the questionnaires were administered. Furthermore, if all of the 34 items were available for random allocation, analyses would be limited as any variation observed between contexts could equally be attributable to variation in the expectancy measure presented (e.g. social vs. sexual expectancy items).

Similarly, only the items ( $n = 5$ ) relating to social efficacy (Oei et al., 2005) were included within the question pool and participants were randomly presented with 2 of these in each response session. An average DRSE score was calculated from these responses. Participants were also presented with normative belief items which

enquired about the frequency of their personal alcohol consumption and that of friends and others their age (c.f. McAlaney & McMahon, 2007b and Appendix C).

#### ***8.3.4 Equipment***

Web based technology (hosted on Google Calendar) was utilised to prompt participants (via SMS) to participate at randomly selected intervals throughout the course of the day (see procedure). A web based smart-phone application was then designed specifically for this research and enabled the participant to respond to questioning via the use of their own mobile phone. The application was a website built using HTML and JavaScript, the interface and functionality was designed using JavaScript's jQuery mobile library and answers were tracked and stored using Google Analytics. The survey was designed to work on almost all native mobile browsers and was web standards-compliant. An individually unique number-string was stored alongside each participant's response, enabling the researcher to anonymously track each individual's specific responses over the course of the week. Google Analytics recorded the participants' responses to every question, the time taken to answer each question (in seconds), start time, total time taken, location and the mobile device used.

Each response session involved a personally interactive user experience using tree based logic. For example, only those who responded that they consumed alcohol were asked what they had drunk and what number. Participants' response mechanisms were also interactive, determined by the users' smart-phone - for example, Iphone or Android users could indicate their response by pressing or 'dragging' the onscreen response items whilst those without touch screen technology responded in a fashion compatible with their phone (e.g. 'scroll and click'). The questions were randomly

selected from the database of questions using a computer-generated randomisation code (as detailed in the measures section). The application was also designed to make the user interface as intuitive/user friendly as possible and there were no default answers set (questions not completed remained blank in the data set), in accordance with recommendations (c.f. Palmblad & Tiplady, 2004).

### ***8.3.5 Preliminary research***

To assess participants' likely responsiveness to recruitment, a short survey was initially conducted, surveying students at a local university regarding their participation preferences for an EMA study (N = 108, M = 23.74, 77% Female). 77% of respondents indicated that they would prefer participation prompts via text message, 51 % indicated that they would prefer 5-10 prompts per day and 35 % indicated they would be willing to participate for 5 days, whilst a further 30% and 34% said 6-10 days and 11-15 days respectively. 74 % indicated they would prefer a maximum response time of 5 minutes. In light of these stated preferences and recommendations in the literature in this area, the following protocol was adopted.

### ***8.3.6 Procedure***

After receiving ethical approval, participants were recruited utilising the web based recruitment system SONA and via direct approaches. All were provided with necessary information, gave their informed consent and were given a demonstration of the application. The method of 'ecological momentary assessment' (Collins et al., 1998) was then administered via the participants' own phones.

In accordance with similar EMA procedures, a time-stratified random sampling strategy was adopted (c.f. for example Moberly & Watkins, 2008). Each day was divided into five equal, 3 hour periods with one ‘alarm’ occurring at a random time within each period, with the provision that successive ‘alarms’ could not occur within 15 min (ibid). These time periods were selected from each 3 hour block using a random number generator - each 3 hour section was split into 15 minute blocks and the generator selected which time the prompt would be sent. Participants were thus prompted five times a day between 0800 and 2300 and each participant’s response was elicited at an unpredictable point in a 3 hour block, for example once between 0800 and 1100, once between 1100 and 1400 and so on. Each session took an average 2 minute 27 seconds to complete (according to Google Analytics – see analytics section for further analysis). This contacting schedule is informed by previous research (c.f. Csikszentmihalyi & Larson, 1992; Wichers et al., 2007) and recommendations by Larson and Delespaul (1992). Participants took part for 7 days and the week day at which they began participation was randomised in order to control the potential confound of week day alcohol-consumption differences and limit order effects.

The questions provided were randomly selected from a question database (see measures) in order to prevent the stereotyped responding observed in previous research (Csikszentmihalyi & Larson, 1992). Responses were only recorded if they fell within 15 minutes of the initial prompt, in order that results could reasonably be asserted to be representative of the specific time intervals in question and thus a valid account, as opposed to a retrospective report (Delespaul, 1995). Previous research has indicated that participants with an overall response rate of below 30 percent are less

reliable (Shiffman, 2009). The present study, therefore, used this guideline but adopted a more stringent criterion, excluding any data where the response rate was below 40 percent, in order to increase the reliability of the results. Similar computer based EMA procedures have been successfully utilised to examine substance use in previous research (Shiffman, 2009).

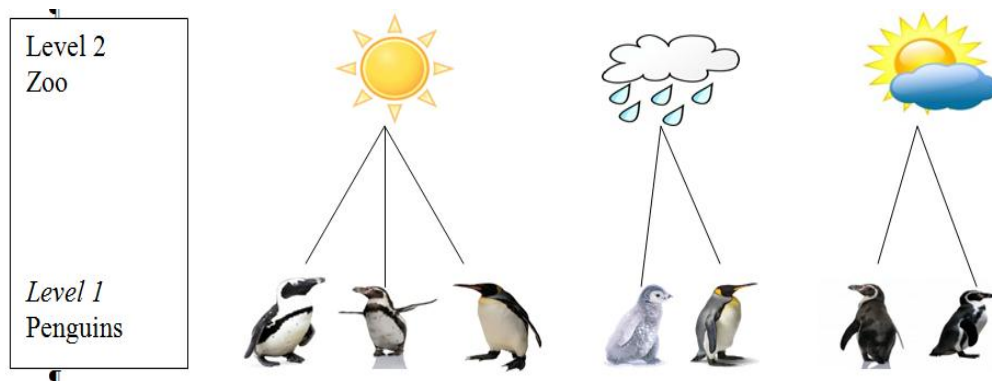
## ***8.4 Multilevel modelling as a method of analysis***

Given the relative novelty of the Multilevel modelling (Field, 2009), the following is a brief explanation of the purpose of this analyses and how it is interpreted.

### ***8.4.1 What is multilevel modelling and why use it?***

A Multilevel Model (MLM) is a complex statistical process which is capable of advanced partitioning of variance (Tabachnick & Fidell, 2001). It has become a mainstream data analysis tool over the past decade and can be used in order to analyse data from the behavioural sciences using a wide range of statistics packages (Heck, Thomas, & Tabata, 2010). Specifically, MLM is conceptualised as an extended form of regression analysis where the proportion of explainable variance in the dependent variable is quantified in terms of any number of predictor variables (ibid). Multilevel modelling can be conceptualised as realistically complex modelling. In other words, these statistics can cope with the natural complex (and related) nature of data and look for explained and unexplained variance both between and within groups (extended theoretical and mathematical outlines of MLM can be found in Goldstein, 2011). MLM allows variance to be examined at different levels of a data hierarchy. For example (see Figure 11), when measuring life expectancy in captive penguins, individual level variances attributable to factors such as age, gender, type of penguin

etc (level 1) can be modelled alongside group level (level 2) variance such as differences between zoo types.

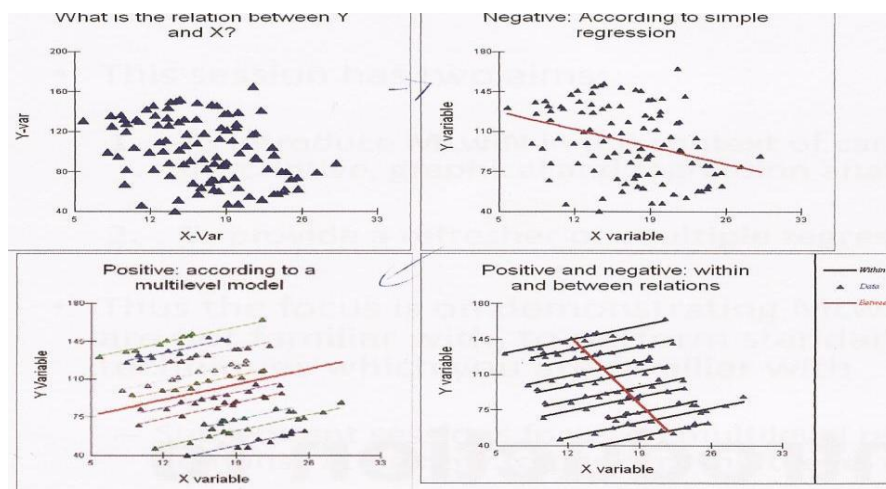


**Figure 11** *An example of a hierarchical two-level data structure.*

*Figure adapted from Bristol University: Introduction to Multilevel Modelling: Workshop Presentations: 1-9<sup>th</sup> January, 2013).*

As demonstrated in this example, individual penguins at level 1 are found nested within zoo types at level 2. Penguins are also clustered, meaning that those who are found within the same zoo type are more likely to be similar than those within a different zoo. MLM can account for this type of relatedness. Single level models can be misleading owing to the ecological or aggregation fallacy (Goldstein, 2011) which occurs when the assumption of independent observations is violated (Field, 2009; NCRM, 2013). For example, if an aggregate of an individual school's assessment scores is taken then these scores do not reflect within group variances, which may be very different. Here, the large variability between schools (which is masked by the aggregation of scores in a single level model) may cause the relationship between age and attainment to appear negative. However, by fitting a multilevel model, both

negative and positive relationships become apparent, as this allows the examination of within and between level variances – as demonstrated in Figure 12.



**Figure 12** *Graphical representation of the benefits of multilevel modelling.*

*Figure taken from Bristol University: Introduction to Multilevel Modelling: Workshop Presentations: 1-9<sup>th</sup> January, 2013).*

MLM is also able to deal with missing data, the model is also not affected by blank data points (Tabachnick & Fidell, 2001). In experiential sampling, missing data points are to be expected given the lengthy nature of participation. Furthermore, as the present research aimed to capture real-time data, the decision was made to discard any late responses (after 15 minutes), meaning that these data would also be missing. Consequently, MLM was deemed highly appropriate for the present data, given the expectation of missing data.

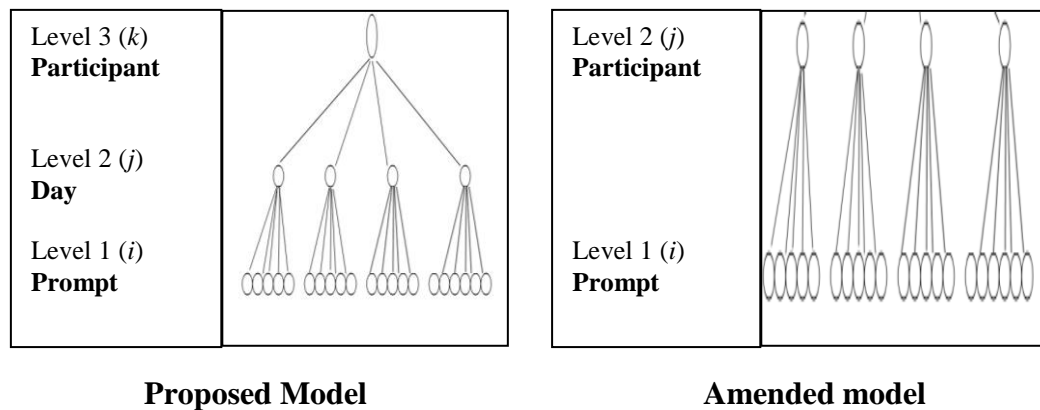
MLM allows the examination of related (hierarchical) data and can model variance in the dependent variables at different levels. The variance partition coefficient (VPC) is the proportion of total variance which is due to differences between groups, whilst the intra-class correlation (ICC) is the correlation between individual's scores within the



same group, otherwise known as the amount of variance explained by variability at the group level compared to the total variance (Heck et al., 2010).

### 8.4.2 *The proposed model*

Based on these considerations, it was decided that MLM would constitute the most suitable form of analysis for the present investigation. In the present study, the person level data become the top level rather than the bottom level of the hierarchy. However, these data remain clustered - variance in alcohol-related cognitions (the dependent variable) will be modelled. In this case, prompts were nested within days which were nested within participants (see Figure 13). MLM allows analyses of variance at the beep/prompt level (e.g. individual differences) and the person level (e.g. context factors). This model was subsequently adapted during the initial analytic assessment, reducing it to a 2 level model (prompts within participants) as specified in section 8.5.3 (as shown in Figure 13).



**Figure 13** *Hierarchical structure of the present data.*

### 8.4.3 *MLM interpretation: Key concepts*

*Empty and Full Models:* MLM are built in stages: First, the null or empty model (also referred to as the variance component model) is assembled which highlights the level

of unexplained variance prior to the imputation of any predictor variables (Heck et al., 2010). This demonstrates the amount of unexplained variance at each level. Second, the full model is computed, where predictor variables are added and the differences between the unexplained variance in the null and full models can be calculated as the variance explained (ibid). The empty and full models can also be contrasted via the  $-2 * \log$  likelihood statistic (see below).

*Intraclass Correlation (ICC):* This is the variance at the group level compared to the total variance (the individual plus the group level variance) and can be converted into a percentage, thus giving the proportion of variance explained at each level compared to the total variance explained (Heck et al., 2010).

*Coefficients  $\beta_{0ij}$ :* A measure of the amount of variance in the dependent variable that is explained by the predictor variable. Specifically, the units are a measure of change in the dependent variable that can be expected if there is one unit change in the predictor variable (Heck et al., 2010).

*The standard error:* The amount of deviation/variation in the coefficient from the mean – a small standard error in comparison to the coefficient indicates that the predictor is likely to be significant (if multiplied by 1.96, a number larger than the coefficient suggests that the predictor is not significant: NCRM, 2013).

*The  $p$  significant statistic:* The statistical significance of the coefficients within the model (standard  $p < .05$  indicates significance).

*The  $-2 * \log$  likelihood statistic:* A measure of the overall fit of the model. Large numbers indicate a poor fitting model with large amounts of unexplained variation within the model – Field, 2009). Comparisons between the  $-2 * \log$  likelihood statistic of the null and the full models provide an indication of whether there has been any significant change in the amount of variance explained (from the null to the full

model). A successful model, by the addition of predictor variables, should show a decrease in the  $-2 \times \log$  likelihood statistic, owing to the decrease in unexplained variance caused by the addition of predictors. The decrease in the  $-2 \times \log$  likelihood statistic from the null to full fitted models is assessed using the chi square statistic, in order to see if any decrease is statistically significant.

*The Chi Square ( $\chi^2$ ) Statistic:* A measure of whether there has been a statistically significant decrease in the amount of unexplained variance from the null to the full MLMs (as indicated by the  $-2 \times \log$  likelihood values).

*The intercept  $\beta_{0ij}$ :* Displayed in the heading of each MLM, this is the overall average score for prompt ( $j$ ) with the average score for participant ( $i$ ). If a further level is added to the model, the subscript  $k$  is added to represent the average score for third level.

## **8.5 Results**

### **8.5.1 Google analytics – Response data**

Average completion time was recorded at 2 minutes 27 seconds and there was no substantial increase in ‘drop offs’ as interaction with the application increased: average number of unique visitors on day 1 ( $n = 40$ ) and average number of visits on day 1 ( $n = 134$ ) pointed to relative consistency when compared with average number of unique visitors ( $n = 35$ ) and visits ( $n = 105$ ) at day 7. This suggests that order effects were limited by the use of this technology and the adopted design. Whilst recruitment was localised to the North West of the UK, the mobile nature of the application was apparent in the geographical completion locations that were recorded throughout this study. In addition to the North West locations recorded (59% of the sample), responses from Wales (2%), Ireland (5%) and London (34%) were also registered. Participants also utilised a variety of devices (Iphone 60.61%, Android 34.51%, Google Chrome 4.63%, Blackberry 0.24%) and operating systems (iOS

54.88%, Android 39.02%, Blackberry 5.98%, Windows 1.12%) during their participation, indicating that the application was multi-functional and sufficiently user friendly across a wide range of devices.

### **8.5.2 Preliminary analyses**

11 participants were removed prior to subsequent MLM owing to participant drop out ( $n = 8$ ) or their failure to meet the minimum inclusion requirement of 40% overall response rate ( $n = 3$ ). This resulted in an overall study retention rate of 84.7%. Participant data which were not recorded within 15 minutes of the initial prompt and non-responses were recorded as zero (in order to ascertain valid accounts of real-time cognitions, Delespaul, 1995). The average percentage of late responses was 5% per participant and the average number of failed responses was 20%, with the 0800-1100 time-slot elicited the highest number of late of failed responses. The study therefore had an average overall response rate of 75% per participant (26 out of a total possible 35 prompts responded to, on average).

Snijders (2008) advises that careful consideration is required in order to ensure that sufficient sample sizes are obtained at each level of a multi-level model, particularly at the level where variance is being assessed. The data at the lower levels of the model have been successfully modelled by previous research (c.f. for example, Csikszentmihalyi & Larson, 2002) and the current data structure results in a large number of data points at this level [2,136 which is 35 (5 prompt responses over 7 days) x 61 ( $n$ ) ]. Analyses conducted by Maas and Hox (2005) demonstrate that only samples sizes below 50 at the top level of a MLM lead to biased estimates of regression coefficients and variances (and associated standard errors). Given that the

structure of the present data locates participants at the top level of the data hierarchy (prompts within days, within participants), the present sample of 61 useable participants was therefore appropriate to provide unbiased and accurate measures of variance. Previous time-stratified random sampling research has also been conducted with comparable sample sizes (e.g. Moberly & Watkins, 2008). Preliminary analyses also revealed no evidence of multicollinearity (predictor variables which are highly correlated), with no two predictors correlating above the suggested .07. cut-off (Tebachnick & Fidell, 2001). Histograms showed that the residuals (the difference between the observed and the expected values) were normally distributed, largely falling along a straight line, and scatterplots indicated that the assumption of linearity and homoscedasticity were met, with the residuals versus the standardised predicted values showing a linear relationship and relatively equal variances across all the predictors.

### ***8.5.3 Analytic strategy***

A number of hierarchical random intercept multilevel models were fitted with predictor variables which were justified by correlation analyses (see Table 11 below). The data collected had a three level hierarchical structure. However, given that specific data were not recorded at the day level, it was decided that this level did not warrant inclusion within the statistical modelling. Indeed, the randomisation of the participants' date of onset meant that no specific predictors required modelling at this level and the lack information at this level may unduly reduce the overall explanatory power of the model. A series of 2 level random intercept multilevel models (prompts within participants) were therefore fitted – one for each alcohol-related cognition.

#### **8.5.4 Multilevel analyses**

Each MLM is designed to portion variance in alcohol-related cognitions, addressing a number of questions: *First*, how much variance in alcohol-related cognitions is explained at the individual level and the group level (prompt level)? *Second*, which predictors are significant predictors of variance in alcohol-related cognitions? *Third*, how much additional variance can be explained by the imputed predictors? (i.e how much unexplained variance is removed by the predictors added into the null model, and is this a significant change?).

Separate MLMs were constructed for each alcohol-related cognition and the predicted variance from the null and fitted models were compared in each case. Tables 11 and 12 outline the descriptive statistics upon which the MLMs were conducted.

**Table 11***Bivariate correlations between mean alcohol-related cognitions and all predictor variables.*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<b>1. Positive Expect.</b>	-															
<b>2. Negative Expect.</b>	.71**	-														
<b>3. DRSE</b>	.65**	.63**	-													
<b>4. Personal</b>	.89**	.77**	.76**	-												
<b>5. Friends'</b>	.88**	.77**	.73**	.93**	-											
<b>6.Stud/Coll</b>	.89**	.76**	.74**	.93**	.94**	-										
<b>7. UK</b>	.91**	.73**	.78**	.93**	.94**	.93**	-									
<b>8. Enviro. Context</b>	.67**	.48**	.23**	.55**	.58**	.59**	.59**	-								
<b>9. Social Context</b>	.59**	.50**	.50**	.54**	.57**	.63**	.60**	.59**	-							
<b>10. Student/Young Professional</b>	-.09**	-.10**	-.13**	-.05*	-.02	-.03	-.05*	.09**	.17*	-						
<b>11.Ethnic</b>	.02	-.04*	-.10*	.02	-.04	-.01	.00	.04*	.05*	.10**	-					

<b>12. Gender</b>	.09**	.04	.11**	.07**	.02*	.05*	.05*	.01	.01	-.07**	.49**	-				
<b>13. Age</b>	-.04	.08**	-.03	-.03	.02	-.03	-.04	.05*	.14**	.70**	.27**	-.22**	-			
<b>14. AUDIT</b>	.00	.02	-.01	-.08	.02	-.03	-.04	.05*	-.02	.00	.12**	-.04	-.23**	-		
<b>15. Consum. Alcohol</b>	.50**	.26**	-.19**	.31**	.32**	.30**	.26**	.66**	.31**	.09	.37**	.22**	.06**	.01	-	
<b>16. Number</b>	.50**	.28**	-.18**	.31**	.31**	.29**	.29**	.63**	.63**	.30**	.07**	.04	.03	.04	.04	-

\*\*  $p < .01$  \*  $p < .05$



**Table 12*****Descriptive statistics for each alcohol-related cognition (dependent variables).***

<b>Dependent Variables – To be included within individual MLMs</b>						
<i>Pos Exp</i>	<i>Neg Exp</i>	<i>DRSE</i>	<i>Personal</i>	<i>Friends'</i>	<i>Students'/ colleagues'</i>	<i>UK Cohort</i>
2.96 (1.96)	1.09 (.87)	3.43(2.43)	2.93(1.95)	3.09 (2.11)	3.65 (3.36)	3.66 (2.35)

Expectancies and DRSE scores presented here were the participants' averaged scores on the randomised expectancies and DRSE questions, giving a standardised maximum and minimum score of 1-6. Scores of normative consumption ratings vary from 1-8.

Table 12 has been included in order to justify the predictors included in the present study. All predictors significantly co-varied with at least one of the dependent variables (numbers 1-7 in Table 12). These predictors are within both levels of the model: prompt level variables (*j*) (social context, environmental context, alcohol consumption -yes or no, and number of drinks), and individual level predictors (*ij*) (age, gender, ethnicity, AUDIT score). It may be noted that a number of these correlations are significant but are not sufficient to be deemed strong ( $r = .07$ ). However, these weak effects may be an issue of sample size, whereby the ability to detect effects is heightened by increased sample sizes (Cohen, 1992). The following sections split the MLMs by alcohol-related cognition. In all instances, binary variables were dummy coded and the two categorical predictors (environmental and social context) were dummy coded using *Home* and *Alone* conditions as the respective reference categories.

### **8.5.5 Outcome expectancies**

*How much variance in positive and negative outcome expectancies is explained at the individual level (variance between participants) and how much is at the group level (prompt level, variance between prompts/within participants)?*

In order to answer this question, MLMs were constructed for positive and negative expectancies separately. Empty models (also known as the variance component models - models without imputed predictor variables) were constructed and are displayed in Table 13 below. The empty positive expectancies MLM indicated that there was significant variance to be explained at the prompt ( $\mu_{0j} = 3.68, p < .001$ ; Wald  $Z = 32.10, p < .001$ ) and the individual level ( $\mu_{0ij} = .17, p < .01$ ; Wald  $Z = 3.41, p < .01$ ). The ICC indicated that 95.55% of variance lay at the prompt level, whilst individual level variance accounted for 4.41% of variance. The same was also true of negative expectancies, where the null model indicated that there was significant variance to be explained at the prompt ( $\mu_{0j} = .61, p < .001$ ; Wald  $Z = 32.20, p < .001$ ) and the individual level ( $\mu_{0ij} = .15, p < .01$ ; Wald  $Z = 4.93, p < .001$ ). The ICCs indicating that prompt level variance accounted for 46.36% of variances, whilst individual level variances accounted for only 19.74% of variance.

**Table 13***Empty multi-level models for positive and negative outcome expectancies.*

	Co-efficient	Standard Error	P value	ICC
<b>Empty Model: Positive Expectancies</b>				
$\beta_{0ij} = 2.95 (.07)$				
<b>-2* log likelihood = 8896.81</b>				
<i>Prompt Level (j)</i>	3.68	.11	< .001	95.55%
<i>Individual Level (ij)</i>	.17	.05	< .001	4.41%
<b>Empty Model: Negative Expectancies</b>				
$\beta_{0ij} = 1.08 (.05)$				
<b>-2* log likelihood = 5154.85</b>				
<i>Prompt Level (j)</i>	.61	.02	< .001	46.36%
<i>Individual Level (ij)</i>	.15	.03	< .001	19.74%

*Which predictors are significant predictors of variance in expectancies?*

In order to answer this question, full random intercept MLMs were calculated, with predictors at both levels (as specified in Table 12). Namely, prompt level variables (social context, environmental context, alcohol consumption -yes or no, and number of drinks) and individual level predictors (age, gender, ethnicity, AUDIT score) were input into separate MLMs (one with positive expectancies as the dependent variable and one with negative expectancies as the dependent variable). Binary predictors were dummy coded in order to give a more easily interpretable outcome. The categorical (social and environmental context) predictor variables were coded using the home and alone conditions as respective reference groups ( $k-1$ ). As can be seen in Table 14, no single individual level predictor was significant within the MLM model of negative expectancies. However, for positive expectancies, the only individual level predictor that was significant was student status ( $\beta_{0ij} = -.23, p < .01$ ), such that being a young

professional was significantly associated with reduced positive expectancies, whilst being a university students was associated with a .23 increase in positive expectancies.

**Table 14**  
*Full multi-level models for positive and negative outcome expectancies.*

	Co-efficient	Standard Error	P value	ICC
<b>Full Model: Positive Expectancies</b>				
<i><math>\beta_{0ij} = 15.77 (1.38)</math></i>				
<b>-2* log likelihood = 7918.75</b>				
<i>Prompt Level (j)</i>	2.33	.07	< .001	95%
Environmental Context:	-	-	-	-
Home	*	*	*	*
Work	.61	.27	< .01	-
Friends'/family's house	-1.10	.30	< .001	-
Bar/Pub/Club	-.52	.22	< .05	-
Party	-.79	.40	< .05	-
Sporting event	-.91	.31	< .01	-
Other	-.33	.33	.32	-
Social Context	-	-	-	-
Alone	*	*	*	*
1 Friend	-1.78	.15	< .01	-
2 + Friends	-1.75	.18	< .001	-
Family Member	-1.10	.30	< .001	-
Work Colleague	.72	.26	< .05	-
Other	2.44	.92	< .01	-
Consumed Alcohol (If yes)	-.82	.06	< .01	-
Number of Drinks	.03	.06	.44	-
<i>Individual Level (ij)</i>	.11	.03	< .01	4.5%
Student/Young Professional (If student)	-.23	.26	< .01	-
Gender (if Male)	-.06	.12	.63	-
Ethnicity (If White British)	.21	.23	.34	-
Age	-.04	.03	.15	-
AUDIT	.03	.06	.23	-
<b>Full Model: Negative Expectancies</b>				
<i><math>\beta_{0ij} = 4.82 (.72)</math></i>				
<b>-2* log likelihood = 4578.97</b>				
<i>Prompt Level (j)</i>	.47	.01	< .001	78.33%

Environmental Context:				
Home	*	*	*	*
Work	-.28	.12	< .05	-
Friends'/family's house	-.67	.14	< .001	-
Bar/Pub/Club	-.27	.09	< .01	-
Party	.00	.19	.98	-
Sporting event	-.25	.14	.08	-
Other	-.05	.15	.72	-
Social Context				
Alone	*	*	*	*
1 Friend	-.73	.07	< .001	-
2 + Friends	-.84	.07	< .001	-
Family Member	-.79	.08	< .001	-
Work Colleague	-.43	.12	< .001	-
Other	-.51	.42	.22	-
Consumed Alcohol (If yes)	-.51	.12	< .001	-
Number of Drinks	-.09	.02	< .001	-
<i>Individual Level (ij)</i>	.13	.03	< .001	21.6 7%
Student/Young Professional (If student)	-.12	.14	.42	
Gender (if Male)	-.05	.11	.67	
Ethnicity (If White British)	.25	.20	.23	
Age	.00	.02	.99	
AUDIT	-.03	.02	.27	

\* Reference categories

At the prompt level, having consumed alcohol within the last hour of prompting was a significant predictor of both increased positive ( $\beta_{0j} = -.82, p < .001$ ) and negative expectancies ( $\beta_{0j} = -.51, p < .001$ ) such that not having had a drink was associated with a .82 and a .51 decrease in positive and negative expectations respectively. Number of drinks was not a significant predictor of positive expectancies but it was significant in predicting variance in negative expectancies ( $\beta_{0j} = -.09, p < .001$ ) suggesting that negative expectancies decreased as alcohol consumption increased. This suggests that any level of alcohol consumption may increase both positive and negative expectancies

but, whilst the number of drinks does not appear to alter positive beliefs (they remain heightened during consumption), negative beliefs begin to decrease as alcohol consumption increases.

Both prompt level categorical predictor variables (social and environmental context) were also revealed to be significant predictors of positive and negative outcome expectancies. Specifically, responses whilst situated within alcohol-related contexts including bars ( $\beta_{0j} = -.52, p < .05$ ), parties ( $\beta_{0j} = -.91, p < .01$ ) and sporting events ( $\beta_{0j} = -.79, p < .05$ ) were associated with increased positive expectancies. Similarly, negative expectations were significantly predicted by bar locality ( $\beta_{0j} = -.25, p < .01$ ), although sporting and party venues did not account for significant variance. Being at a friend or family member's house was also a significant predictor of increased positive ( $\beta_{0j} = -1.10, p < .001$ ) and negative expectations ( $\beta_{0j} = -.67, p < .001$ ). Being at work was also a significant predictor of positive ( $\beta_{0j} = .61, p < .01$ ) and negative expectancies ( $\beta_{0j} = -.28, p < .05$ ). However, being outside of work was associated with an increase in positive expectancies, whilst being in work was associated with a .61 reduction in positive outcome expectancies. Conversely, being outside of work was associated with a decrease in negative expectancies, whilst being in work was associated with a .28 increase in negative expectancies. Being at home during responses was the reference category for both expectancy types and this context is therefore also suggested to be associated with decreased positive and negative expectations.

The social context sub-categories also varied to a statistically significant degree. Prompts that occurred whilst participants were with 1 friend ( $\beta_{0j} = -1.78, p < .001$ ;  $\beta_{0j} = -.74, p < .001$ ), 2 or more friends ( $\beta_{0j} = -1.75, p < .001$ ;  $\beta_{0j} = -.84, p < .001$ ) or family members ( $\beta_{0j} = -1.10, p < .001$ ;  $\beta_{0j} = -.79, p < .001$ ) were significant predictors associated with increases in positive and negative expectancies respectively. However, being with work colleagues was a significant predictor ( $\beta_{0j} = .72, p < .05$ ) associated with a .75 decrease in positive expectancies, whilst it was associated with a significant increase in negative expectancies ( $\beta_{0j} = -.43, p < .001$ ). Being alone during responses was the reference category for both expectancies categories, meaning that this context also appears to be associated with decreased expectations. The ‘other’ response for social context was also a significant predictor of positive expectancies ( $\beta_{0j} = 2.44, p < .01$ ). Given that this variable appears to be associated with decreased positive expectations, this response may be postulated to represent responses which occurred during non-social contexts. However, the large standard error here (.92) suggests a high degree of variability in participants’ responses in this category, perhaps due to the diversity of contexts captured by this response. Any attempt to interpret this finding without any further contextual information would therefore be unwise.

*How much additional variance can be explained by the imputed predictors? (i.e how much unexplained variance is removed by the predictors added into the null model, and is this a significant change?)*

In order to answer this question, it is necessary to compare the null and full MLMs, comparing the amount of variance to be explained (in the null model) with the amount of variance that can be explained from the fitted model.  $-2 \times \log$  likelihood statistics (using chi square) and ICC calculations are required in order to make these comparisons. Table 15 below summarises null and full model comparisons for positive and negative expectancies. As can be seen in Table 15, the full positive expectancy model resulted in a significant reduction of unexplained variance ( $\chi^2 (30, n = 61) = 978.06, p < .001$ ), with  $-2 \times \log$  likelihood values decreasing from 8896.81 in the null model, to 7918.75 in the fitted model. This was also true of the negative expectancy model, with a significant reduction in the amount of unexplained variance ( $\chi^2 = (9, n = 61) = 575.88, p < .001$ ), with a 575.88 decrease in  $2 \times \log$  likelihoods (from the null to the full model).

The full models can therefore be summarised to be significantly better at explaining variation in positive and negative expectancies than the null models. Specifically, ICC calculations revealed that of 95.6% of prompt level variances in positive outcome expectancies (identified by the null model), 36.7% of this variance has been explained by the prompt level variables (e.g. social context, environmental context and alcohol consumption), whilst 35.3% of the original 4.4% of variance identified at the individual level has been explained. Of the identified 46.36% variance in negative expectancies at the prompt level, a significant 22.95% of this variance has also been explained, whilst



15.38% of the original 19.74% of variance in individual level negative expectancies has been explained.

**Table 15**

*Null and full model comparisons for positive and negative expectancies.*

	<b>Empty Model</b>	<b>Full Model</b>	<b>% Variance explained</b>
<b>Positive Expectancies:</b>			
<i>Prompt Level (j)</i>	3.68	2.33	36.68%
<i>Individual Level (ij)</i>	.17	.11	35.29%
-2* Log Likelihood	8896.81	7918.76	
Chi Square:	$\chi^2 = (9, n = 61) = 978.06, p < .001$		
<b>Negative Expectancies:</b>			
<i>Prompt Level (j)</i>	.61	.47	22.95
<i>Individual Level (ij)</i>	.15	.13	15.38%
-2* Log Likelihood	5154.85	4578.97	
Chi Square:	$\chi^2 = (9, n = 61) = 575.88, p < .001$		

In summary, whilst the negative expectancy model did not successfully explain as much of the existing variance as the positive expectancy model, the imputation of both prompt and individual level predictor variables was associated with a significant increase in variance explained from the null model in both positive and negative expectancies. Furthermore, in both cases, a greater proportion of variance was explained by prompt level variance such as current situational and environmental context and present alcohol consumption.

### **8.5.6 Drink refusal self-efficacy**

*How much variance in DRSE is explained at the individual level (variance between*

participants) and how much is at the group level (prompt level, variance between prompts)?

As above, empty and full MLM with DRSE as the dependent variable were constructed for the purposes of comparison and to answer this question. Results of the null model are displayed in Table 16 below and revealed that there was significant variance to be explained at the prompt ( $\mu_{0j} = 5.66, p < .001$ : Wald  $Z = 32.19, p < .001$ ) and the individual level ( $\mu_{0ij} = .22, p < .01$ : Wald  $Z = 3.19, p < .01$ ). The ICC indicated that 96.26 % of variance lay at the prompt level, whilst individual level variance accounted for 3.74 % of variance.

**Table 16**  
*Empty multi-level model for DRSE.*

	Co-efficient	Standard Error	P value	ICC
<b>Empty Model: DRSE</b>				
$\beta_{0ij} = 3.43 (.08)$				
<b>-2* log likelihood = 9807.01</b>				
Prompt Level (j)	5.66	.18	< .001	96.26 %
Individual Level (ij)	.22	.07	< .01	3.74 %

*Which predictors are significant predictors of variance in DRSE?*

A full random intercept multi-level model was fitted for DRSE with predictors at both levels (as specified in the expectancy section). As can be seen in Table 17, no single predictor was a significant for DRSE at the individual level. At the prompt level, having consumed alcohol within the last hour of prompting ( $\beta_{0j} = -.19, p < .001$ ) and number of drinks ( $\beta_{0j} = 1.69, p < .001$ ) were significant predictors of DRSE. This suggests that

DRSE decreased when alcohol had been consumed and decreased, on average, by 1.69 as alcohol consumption increased. Both prompt level categorical predictor variables (social and environmental context) were also revealed to be significant predictors of DRSE. Specifically, responses whilst situated within a bars, pub or club ( $\beta_{0j} = .39, p < .05$ ), were associated with significantly decreased DRSE.

**Table 17**  
*Full multi-level model for DRSE.*

	Co-efficient	Standard Error	P value	ICC
<b>Full Model: DRSE</b>				
<b><math>\beta_{0ij} = 10.65 (1.89)</math></b>				
<b>-2* log likelihood = 9288.88</b>				
Prompt Level (j)	4.45	.14	< .001	96.74%
Environmental Context:	-	-	-	-
Home	*	*	*	*
Work	-1.36	.37.27	< .001	-
Friends'/family's house	-.11	.42	.79	-
Bar/Pub/Club	.39	.36	< .05	-
Party	.50	.57	.38	-
Sporting event	.68	.42	.11	-
Other	-.31	.46	.51	-
Social Context	-	-	-	-
Alone	*	*	*	*
1 Friend	2.15	.21	< .001	-
2 + Friends	1.93	.22	< .001	-
Family Member	1.93	.22	< .001	-
Work Colleague	-1.43	.36	< .05	-
Other	11.74	1.21	.17	-
Consumed Alcohol (If yes)	1.69	.36	< .001	-
Number of Drinks	.19	.08	< .05	-
Individual Level (ij)	.15	.05	< .001	3.26 %
Student/Young Professional (If student)	.33	.20	.11	-
Gender (if Male)	-.04	.29	.82	-
Ethnicity (If White British)	.39	.29	.18	-
Age	.02	.02	.29	-
AUDIT	-.02	.03	.57	-

\*Reference categories

Conversely, DRSE increased significantly when in work ( $\beta_{0j} = -1.43, p < .001$ ). In terms of social contexts, DRSE significantly decreased when participants were with 1 friend ( $\beta_{0j} = 2.15, p < .001$ ), 2 or more friends ( $\beta_{0j} = 1.93, p < .001$ ) and family members ( $\beta_{0j} = 1.93, p < .001$ ), whilst DRSE was significantly lower when respondents were with a work colleague ( $\beta_{0j} = -1.43, p < .001$ ). Being alone and at one's home were the reference categories for DRSE, suggesting DRSE increased in these contexts.

*How much additional variance in DRSE can be explained by the imputed predictors?*

In order to answer this question, it is necessary to compare the null and full MLMs, comparing the amount of variance to be explained (in the null model) with the amount of variance that can be explained from the fitted model.  $-2 \times \log$  likelihood statistics (using chi square) and ICC calculations are required in order to make these comparisons. Table 18 below summarises null and full model comparisons for positive and negative expectancies.

**Table 18**  
*Null and full model comparisons for DRSE.*

	Empty Model	Full Model	% Variance explained
<b>DRSE:</b>			
Prompt Level (j)	5.66	4.55	21.37 %
Individual Level (ij)	.22	.15	46.67 %
-2* Log Likelihood	9807.01	9288.88	
Chi Square:	$\chi^2 = (9, n = 61) = 518.13, p < .001$		

As can be seen in Table 18, the full DRSE model resulted in a significant reduction in unexplained variance ( $\chi^2 = (9, n = 61) = 518.13, p < .001$ ), with  $-2 \times \log$  likelihood values decreasing from 9807.01 in the null model, to 9288.88 in the fitted model. The full DRSE model can therefore be concluded to be significantly better at explaining variation in DRSE than the null model. Specifically, ICC calculations revealed that the full model explained a significant proportion of the DRSE variance that was highlighted by the null model (21.37% of prompt level variances explained from a total of 96.26% and 46.67% of individual level variance explained from a total 3.74%). In summary, prompt level and individual level variables were found to predict a significant proportion of variance in DRSE.

### ***8.5.7 Normative beliefs***

Previous research has indicated normative-related normative beliefs vary depending on the target of the questioning (McAlaney & McMahan, 2007b). For example, ratings of one's own personal alcohol consumption have been found to be different (lower) than ratings of friends', fellow students' or work colleagues' drinking (ibid). However, Table 12 suggests that the normative alcohol consumption in the present study were very strongly correlated ( $r = .93 - .94, p < .001$ ). It makes little statistical sense to conduct separate MLM for highly related dependent variables (Leech, Barrett, & Morgan, 2008) as, essentially, one may be explaining the same variance. It was therefore decided that participants' normative beliefs (alcohol consumption ratings) should be collapsed into one measure. This was created by taking an average of participants' answers on all 4

consumption questions. Whilst this may obscure subtle differences between types of ratings, this will still allow an indication of what factors impact how one views alcohol consumption (both one's own and others').

*How much variance in normative beliefs is explained at the individual and prompt levels?*

Empty and full MLM with normative alcohol consumption as the dependent variable were constructed for the purposes of comparison. Results of the null model are displayed in Table 19 below and revealed that there was significant variance to be explained at the prompt ( $\mu_{0j} = 4.33, p < .001$ : Wald  $Z = 32.16, p < .001$ ) and the individual level ( $\mu_{0ij} = .27, p < .001$ : Wald  $Z = 3.75, p < .001$ ). The ICC indicated that 94.34 % of variance lay at the prompt level, whilst individual level variance accounted for 5.66 % of variance.

**Table 19**  
*Empty multi-level models for normative beliefs regarding alcohol consumption.*

	<b>Co-efficient</b>	<b>Standard Error</b>	<b>P value</b>	<b>ICC</b>
<b>Empty Model: normative alcohol consumption</b>				
<i><math>\beta_{0ij} = 3.33 (.08)</math></i>				
<i><math>-2 * \log \text{likelihood} = 9251.96</math></i>				
<i>Prompt Level (j)</i>	4.33	.13	< .001	94.34 %
<i>Individual Level (ij)</i>	.27	.07	< .01	5.66 %

*Which predictors are significant predictors of variance in normative alcohol-related beliefs?*

A full random intercept MLM was constructed for normative alcohol consumption, with predictors at both levels (as specified in the expectancy section). As can be seen in Table 20, no single individual level predictor was significant for normative beliefs. At the prompt level, both prompt level categorical predictor variables (social and environmental context) were also revealed to be significant predictors of normative beliefs. Specifically, responses whilst situated within alcohol-related contexts such as bars or pubs ( $\beta_{0j} = -1.36, p < .05$ ) or when at a friend or family member's home ( $\beta_{0j} = -.68, p < .01$ ) were associated with significant increases in alcohol-related normative beliefs. Being at work was also associated with normative beliefs ( $\beta_{0j} = .61, p < .01$ ), yet being outside of work was associated with an increase in normative beliefs, whilst being in work was associated with a 1.13 reduction in alcohol ratings. Being at home was the reference category and is also suggested to be associated with decreased normative ratings.

Furthermore, social context sub-categories revealed that prompts that occurred whilst participants were with 1 friend ( $\beta_{0j} = -1.74, p < .001$ ), 2 or more friends ( $\beta_{0j} = -1.96, p < .001$ ) or family members ( $\beta_{0j} = -2.08, p < .001$ ) were significant predictors associated with increases in alcohol-related normative beliefs. However, being with work colleagues was a significant predictor ( $\beta_{0j} = .98, p < .01$ ) associated with a decrease in normative ratings. Being alone during responses was the reference category and this

context is therefore also suggested to be associated with decreased normative ratings.

**Table 20**

*Full multi-level models for normative beliefs regarding alcohol consumption.*

	Co-efficient	Standard Error	P value	ICC
<b>Full Model: Normative alcohol consumption</b>				
<i><math>\beta_{0ij} = 16.12 (1.68)</math></i>				
<b>-2* log likelihood = 8645.69</b>				
<i>Prompt Level (j)</i>	3.24	.10	< .001	92.31%
Environmental Context:	-	-	-	-
Home	*	*	*	*
Work	-1.33	.31	< .001	-
Friends'/family's house	-.68	.36	.79	-
Bar/Pub/Club	-1.36	.49	< .01	-
Party	-.39	.26	.13	-
Sporting event	-.36	.36	.32	-
Other	-.64	.39	.11	-
Social Context	-	-	-	-
Alone	*	*	*	*
1 Friend	-1.74	.18	< .001	-
2 + Friends	-1.96	.19	< .001	-
Family Member	-2.08	.21	< .001	-
Work Colleague	.98	.1	< .01	-
Other	-.61	1.09	.10	-
Consumed Alcohol (If yes)	.09	.09	.77	-
Number of Drinks	.07	.07	.97	-
<i>Individual Level (ij)</i>	.26	.07	< .001	7.69%
Student/Young Professional (If student)	-.25	.23	.28	-
Gender (if Male)	.04	.18	.83	-
Ethnicity (If White British)	.44	.33	.18	-
Age	.03	.03	.96	-
AUDIT	-.02	.04	.61	-

\* Reference categories

*How much additional variance in normative beliefs regarding alcohol consumption can be explained by the imputed predictors?*



In order to answer this question, it is necessary to compare the null and full MLMs, comparing the amount of variance to be explained (in the null model) with the amount of variance that can be explained from the fitted model.  $-2 \times \log$  likelihood statistics (using chi square) and ICC calculations are required in order to make these comparisons. Table 21 below summarises null and full model comparisons for normative alcohol ratings

**Table 21**  
*Null and full model comparisons for normative beliefs regarding alcohol consumption.*

	<b>Empty Model</b>	<b>Full Model</b>	<b>% Variance explained</b>
<b>Normative alcohol consumption:</b>			
<i>Prompt Level (j)</i>	4.33	.13	25.17 %
<i>Individual Level (ij)</i>	.27	.27	3.70%
-2* Log Likelihood	9251.96	8645.69	
Chi Square:	$\chi^2 = (9, n = 61) = 606.27, p < .001$		

As can be seen in Table 21, the full normative ratings model resulted in a significant reduction in unexplained variance ( $\chi^2 = (9, n = 61) = 606.27, p < .001$ ), with  $-2 \times \log$  likelihood values decreasing from 9251.96 in the null to 8645.69 in the fitted model. The full model can therefore be concluded to be significantly better at explaining variation in normative ratings than the null model. Specifically, ICC calculations revealed that the full model explained 25.17% of the 94.34% of prompt level variances identified in normative beliefs, and 3.70% of the original 5.66% of individual level variances identified. In summary, the imputation of both prompt and individual level

predictor variables were associated with a significant increase in variance explained from the null model. However, a greater proportion of variance was explained by prompt level variance such as current situational and environmental context and present alcohol consumption.

## **8.6 Discussion**

The aim of this research was to utilise smart-phone technology to conduct context aware experiential sampling, with the intention of assessing the impact of social and environmental contextual factors on alcohol-related cognitions. The results of this research suggest that there were significant variations in alcohol-related cognitions and that this variance falls at both the individual and the prompt level. A greater amount of variance was identified and subsequently explained at the prompt than at the individual level. However, the present research indicated that by measuring variables at both levels of this data hierarchy, a significant proportion of the apparent variation in these cognitions can be explained.

### **8.6.1 Variance at the individual level**

Individual level factors of age, gender, ethnicity and AUDIT score were not found to be individually significant predictors of any of the alcohol-related cognitions that were modelled, although there was a significant proportion of overall variance identified, and subsequently explained at this level, for each of the modelled cognitions. This suggests that it is only the combination of these factors which accounts for variation in positive

and negative expectancies, DRSE and normative beliefs/consumption ratings. Student status was the only individual level variable which was found to be a significant predictor of increased positive outcome expectancies alone. Therefore, whilst the majority of expectancy research uses student samples (Foxcroft et al., 1997), using a non-student sample with a comparable age may produce different results (lower average expectancy scores). Indeed, that age itself was not a significant predictor appears to suggest that there are aspects of the student experience which are different from the experiences of their working counterparts. In other words, as student status, but not age, was associated with increased positive expectancies, this suggests that it is the participants' student lifestyle which impacts their beliefs, as opposed to a natural age-related immaturity (which may be a plausible assertion if age was a significant predictor). This supports the results presented in Chapter 6 and this pattern of results is in line with suggestions that there is 'culture of drinking' at University which moderates their expectancies (Borsari & Carey, 2001). Future research may therefore benefit from greater inclusion of non-student participants. However, whilst individual level factors were cumulatively important in explaining variance in alcohol-related cognitions, prompt level variables were found to explain a greater amount of the variation identified. This suggests that the contexts of the prompts is more important than demographic variables or standardised alcohol-consumption measurements.

### ***8.6.2 Variance at the prompt level***

Variables that were measured at the prompt level were those factors which were free to change from one prompt to the next. These included the participants' current (in-vivo) social and environmental contexts and their current consumption levels – whether they had consumed alcohol within the past hour (yes or no) and the number of drinks that they had consumed. Social and environmental context were significant predictors of all the assessed alcohol-related cognitions. Specifically, being in a pub, bar or club was associated with increased positive expectancies, negative expectancies and normative alcohol ratings, whilst these environmental and social contexts were associated with a decrease in DRSE. The same pattern was observed for social contexts including being with 1 friend, 2 or more friends and family members. Being at work or at home, and being with work colleagues or alone was associated with a reverse pattern of results, whereby these contexts were associated with increased DRSE, whilst expectancies and normative ratings decreased. In support of previous lab (e.g. Pedersen et al., 2008; Wall et al., 2000; Wall et al., 2001) and field (e.g. LaBrie et al., 2011) research, these findings provide real-time, in-vivo support for the assertion that alcohol-related environmental contexts (for example, pubs, bars and sporting events) and social groups of family and/or friends are associated with changes in cognition – specifically, increased outcome expectancies, higher ratings of one's own and others' alcohol consumption and a decreased belief in one's ability to refuse alcohol. It was, however, particularly interesting to note that (against expectations) negative, as well as positive, expectancies increased in alcohol-related environments and in social group contexts. In studies of problem and non problem drinkers, alcohol-related paraphernalia have been

shown to create both positive and negative expectations and physiological arousal (Cooney et al., 1987). These results therefore suggest that in-vivo contextual cues can also trigger both positive and (unexpectedly) negative beliefs. The present findings may, however, be further qualified by findings regarding the effect of in-vivo consumption on negative beliefs.

Having consumed alcohol within the last hour was also associated with increases in both positive and negative expectations respectively. However, number of drinks was only a significant predictor of decreased negative expectancies. This suggests that any level of alcohol consumption is associated with heightened positive expectancies and negative expectancies. However, whilst positive expectations remain heightened regardless of the level of alcohol consumed, greater levels of consumption are associated with subsequent decreases in negative beliefs. Combined with the observation that DRSE decreased when alcohol had been consumed, and decreases further as alcohol consumption increases, this suggests that alcohol consumption is associated with a reduction of the in-vivo cognitions which are attributed to alcohol-related self-control (c.f. Baldwin et al., 1993). Conversely, real-time consumption appears to increase the positive beliefs which are associated with increases in consumption (c.f. Reich et al., 2010). Such results are, perhaps, unsurprising given alcohol consumption is synonymous with reductions of inhibitory thought processes (Field, Wiers, Christiansen, Fillmore, & Verster, 2010) and increases in one's general sense of well-being (Paton, 2005). These findings are also in accordance with research

which links expectancies, DRSE and normative beliefs with alcohol consumption (e.g. Baldwin et al., 1993; Aas et al., 1998; Perkins, 2007).

It may be postulated that the initially observed yet unexpected increase in negative expectancies (associated with alcohol-related environments, social contexts and actual alcohol consumption), may be the product of a cued response. The sights, sounds and tastes associated with alcohol may trigger a heightened memory of previously experienced negative expectancies (c.f. Siegel, 2000). Indeed, this response would be akin to the cognitive and physiological responses observed in recovering alcoholics exposed to such contexts (ibid). This process is also theorised to drive contextual increases in positive expectancies (Wall et al., 2000) and would explain the current findings that positive expectancies increased when participants were in social groups and alcohol-related environments. This association between alcohol consumption, alcohol-related environments and positive expectancies is also asserted to be pervasive (ibid) and to be one of the ‘prized’ (positive) effects of alcohol consumption (Steele & Josephs, 1990). This may therefore explain why participants’ expectancies remained high regardless of consumption levels.

However, as mentioned, negative expectancies declined as consumption quantities increased. This effect may be attributable to the ‘dangerous effects’ of alcohol (Steele & Josephs, 1990). Here, it has been postulated that alcohol consumption creates a state of myopia – a state of short-sightedness in which fewer environmental cues are processed

and those which are processed are done so with substantially less efficiency (Steele & Josephs, 1988; 1990). Specifically, the physiological effects of alcohol are asserted to reduce information processing which, amongst other things, has the effect of reducing negative beliefs and cognitions (ibid). This may therefore offer an explanation as to why negative expectancies were observed to decline with increasing consumption. Crucially, this theory also asserts that this effect only occurs when consumption is combined with the distractions provided by other social situations and distracting activities (Steele & Josephs, 1988). This may explain why this effect was only observed in social situations, as opposed to solitary contexts where there is little or no distraction.

Cumulatively, this research raises concerns about the abundant previous research which is conducted with participants who are assessed alone, in non alcohol-related environments and are sober during the completion of their questionnaires. In particular, the results of the current investigation suggested that responses which were recorded in solitary contexts and when in alcohol-neutral environments (such as at work or at home) were associated with lower expectancies and normative beliefs and increased DRSE. Conversely, the opposite was true of responses which were measured whilst participants were situated in social groups of family and friends, and when in pubs, bars, and sporting events – where normative beliefs and expectancies were heightened and DRSE decreased. As specified, alcohol consumption also moderated responses. These results therefore suggest that research in this field which has not conducted in-vivo assessments may have captured responses which do not necessarily equate to real-life cognitions.

However, by using smart-phone technology to conduct real-time, context aware experiential sampling, natural variations in alcohol-related cognitions have been identified and quantified, providing a more ecologically valid assessment of the thought processes which are associated with consumption. Real-time alcohol consumption and the social and environmental contexts of participation are, therefore, variables which seemingly warrant closer attention within future research. The need to study the effects of context is seemingly important for any area of research and the advent of increasingly advanced technology provides researchers with the opportunity to gather sophisticated levels of information through a medium which is easily accessible and popular with participants (Palmlblad & Tiplady, 2004; Verster et al., 2012).

The high response and retention rates of the present research suggest that smart-phone based experiential sampling (or ecological momentary assessment) is a valuable and popular alternative to traditional diary studies. Furthermore, the ability to electronically time stamp and assess individual responses is a highly efficacious aspect of this research method, preventing 'parking-lot' compliance, such as that seen in traditional diary studies (c.f. Smyth & Stone, 2003), and ensuring real-time as opposed to retrospective accounts. Given that the largest amount of missing data occurred for the 0900-1100 time slot, future research may, however, benefit from using a participant specific prompt schedule, so that participants only receive prompts at times they are likely to be able to respond (c.f. Moberly & Watkins, 2008). Furthermore, it should be noted that



future research may be improved by increasing the overall participant numbers, in order to boost the models' sensitivity in detecting variance. This may be particularly important in detecting individual level variance in predictors such as gender and ethnicity. These were presently not found to be significant. However, the prevalence of female and White British participants in the present sample may account for this deviation from previous research (c.f. for example, Nyaronga et al., 2009). An increase in purposeful sampling of under-represented research groups may therefore also be beneficial. The inclusion of non-student respondents, to address concerns about the prevalence of this population within the alcohol literature (Foxcroft et al., 1997) should, however, be noted as a strength of the current research.

The present research findings lead to a number of conclusions: First, alcohol-related cognitions vary depending on in-vivo social and environmental factors. Second, smart-phone technology can be used to provide ecologically valid, real-time assessments of these cognitions. Finally, given the contextual nature of all behaviour and cognitions, the applications of this research may extend to the wider alcohol-research literature, and to other areas of research where traditional research methods are laboratory-based. Indeed, this method of research may offer greater insights into the dynamic nature of cognition and behaviour.

## 9. CHAPTER 9 – OVERALL DISCUSSION AND CONCLUSIONS

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## **9.1 Summary of findings**

### **9.1.1 Study 1**

Using a field study design, Study 1 administered questionnaires in alcohol-related and non alcohol-related environments (a student lecture theatre and a student bar respectively). Comparing alcohol-related cognitions between contexts revealed a number of findings. Positive social, fun and tension reduction outcome expectancies were higher and social DRSE was lower in those participants questioned in a student bar relative to those questioned in a university lecture theatre. These differences were found whilst controlling for between-group variations in personal alcohol consumption. These findings build on the diminutive existing research in this area and suggest that alcohol-related cognitions vary between contexts. Furthermore, this research expands on previous investigations in this area by considering overall cognitions, and specific sub-categories, providing a more detailed account of the alcohol-related cognitions which are most likely to vary between contexts. Much of the research literature regarding norms, expectancies and DRSE is based on student-based questionnaires administered in laboratories and/or lecture theatres. This research may not, therefore, necessarily generalise to responses in alcohol-related environments.

### **9.1.2 Study 2**

Study 2 administered questionnaires regarding alcohol-related cognitions in UK colleges, universities and businesses. As such, the study sample consisted of both

adolescents and adults and allowed for comparisons between those not of legal drinking age (college sample) and both student (university students) and non-student samples (business sample) who can legally drink. Results revealed that overall positive expectancies were higher and DRSE was lower amongst college students than in the business or university samples. Not all expectancies and DRSE subcategories followed this pattern however and there were a number of variations to this observation. For instance, positive social outcome expectancies were higher and social DRSE was lower in the college and university samples than in the business sample. The college and university sample did not, however, differ in their social outcome expectancies or social DRSE. When rating the drinking frequency of fellow students or colleagues, university students believed that their cohort consumed more than the college and business samples. Participant groups of similar age were therefore alike in some aspects of their alcohol-related cognitions but different in others. Similarly, participant groups who are divergent in age appeared to be alike in alcohol-related cognitions such as tension reduction expectancies. It was therefore concluded that alcohol-related cognitions are shaped, not solely by age, but by more subtle factors associated with personal contexts such as experiences of alcohol. Consequently, previous research may be limited in its application if it fails to study more populations.

### ***9.1.3 Study 3***

Using a laboratory-based design, it was possible to utilise panoramic projection as

an immersive method of manipulating and measuring the effect of contextual cues on alcohol-related cognitions. The effect of social context on these cognitions was also measured. A 2 x 2 factorial design therefore simultaneously varied environmental cues (bar or lecture based panoramic videos) with social influence (peer group or solitary assessment). Results indicated that participants' positive outcome expectancies were higher, and drink refusal self-efficacy was lower, when they were assessed as part of a group rather than alone. Participants exposed to pub, as opposed to lecture based cues, also showed greater expectancies and lower drink refusal self-efficacy. An interactive effect of social influence and environmental cues was observed for both positive and negative expectancies. Group testing and alcohol-related cueing also resulted in higher ratings of participants' own and others' alcohol consumption when compared to solitary testing and neutral cueing conditions. It was concluded that environmental and social contextual factors may therefore be important moderators of alcohol-related cognitions. Accordingly, solitary testing conditions in laboratory or classrooms/lecture may not provide a full account of alcohol-related cognitions.

#### ***9.1.4 Study 4***

This study utilised a specifically designed smart-phone application in order to conduct context aware experiential sampling. A time stratified random sampling procedure was implemented which prompted participants five times a day for a week, enabling present situational and social contexts and current consumption and alcohol-related cognitions to be recorded. Analyses conducted by multilevel modelling revealed in-vivo alcohol

consumption and that social and environmental contexts were associated with variations in alcohol-related cognitions. For instance, participants who responded whilst they were situated in a pub, bar or club and in a social group of friends exhibited increases in both positive and negative outcome expectancies, whilst refusal-self-efficacy was found to decrease. It was therefore concluded that alcohol-related cognitions are dependent upon one's contextually varying social and environmental surroundings. Modern technology could be utilised to record the contextually fluid nature of cognitions and provide a more ecologically valid record.

## **9.2 *Limitations***

Specific methodological issues and limitations have been discussed in relation to each chapter's research findings. However, before considering the overall conclusions from this thesis, it is important to acknowledge and discuss some of the key issues regarding the methodology of this thesis as a whole.

### **9.2.1 *Student samples***

This thesis has sampled more widely in order to attempt to allay the concerns regarding the preponderance of student-based research in this area of research. However, as some of the research within this thesis has utilised student samples, it is important to acknowledge some of the concerns often raised about using this population for research purposes. The wider application of student-based results continues to be debated. Some argue that students are 'surrogates for consumers' (Beltramini, 1983), others state that

students are “unfinished personalities” (p. 212, Carlson, 1971) with views and attitudes that are more changeable than their adult counterparts (Sears, 1986). A second-order meta-analysis of research within the social sciences revealed substantial variations in the direction and effect sizes between student and non-student samples (Peterson, 2001). Resultantly, caution has been urged when making generalisations from student research. Similarly, it has been suggested that students constitute a ‘minor subset of human-kind’, meaning that they are interesting but not necessarily representative of the wider population (Sears, 2008).

In the field of alcohol research similar concerns about the prevalence of student samples have been voiced (e.g. Moreira et al., 2010) and there are both theoretical and research grounds to support this trepidation. UK student samples have a legal drinking age of 18 years. As such, there is reason to believe that younger persons may have less direct experience of alcohol consumption upon which to build their alcohol-related beliefs (McAlaney & McMahon, 2007b). Their cognitions may therefore differ from those of legal drinking age who have more experiences of alcohol. The type and diversity of drinking experiences may also differ between age groups (Honest et al., 2000; Roe & Ashe, 2008), leading to further variations in their alcohol-related beliefs. Accordingly, there is diminutive evidence of age-related variations in alcohol-related cognitions (c.f. for example, Leigh & Stacy, 2004; McAlaney, 2007; McAlaney & McMahon, 2007b) and Study 2 adds further supports to the suggestion that these groups vary in some aspects of their alcohol-related beliefs, whilst they are similar in others.

As Study 1 and 3 utilised exclusively student samples, it seems appropriate to be cautious with regards to the extent that results are generalised to a wider population. Sears (1986) concludes that student research should not be avoided, but used cautiously when seeking to draw conclusions about human psychology. Accordingly, this thesis acknowledges that the present results should not be assumed to apply to non-student samples. However, it has been noted that the use of student samples does not necessitate problems of validity (Druckman & Kam, 2011). Indeed, student samples are believed to be more conducive to assessing other areas which may compromise the validity of research, for example the effects of context and time (ibid). It is therefore believed that the use of student samples in some parts of this thesis is justified as it has enabled the investigation of an under-researched area, that of context effects. Certainly, the validity of previous research may be more negatively affected by the failure to consider context than by their use of student samples (ibid).

Furthermore, Study 2 used a wider community sample and Study 4 found that student status was only a significant predictor of positive expectancies, whilst it did not predict variance in any of the other modelled cognitions. This may further allay concerns about the limited application of the student samples used within this research. This thesis thus provides a first step towards a wider studying of the effect of context on alcohol-related cognitions. Future research may, however, be advised to replicate these outcomes in a wider population.



### ***9.2.2 W.E.I.R.D. people***

It has been noted that there is a bias towards research using Western, Educated, Industrialised, Rich and Democratic societies ('W.E.I.R.D.') within social research (Henrich, Heine, & Norenzayan, 2010). However, in a review of a wide range of research (e.g. visual perception and reasoning to motivations and IQ), it was suggested that findings from these samples were not necessarily consistent with those from wider populations. In fact, it was suggested that this western population may deviate substantially from the rest of the 'human species' (ibid). There may therefore be a need for caution from the present, western-based, research. Indeed, the literature reviews in Chapters 2, 3 & 4 highlight the preponderance of US American based research within the alcohol literature and suggests that this may be problematic. For example, differences in licensing laws between countries which differentially affect people's experiences of alcohol, which in turn may alter their alcohol-related cognitions. It should, however, be acknowledged that this thesis still relies on an exclusively 'W.E.I.R.D.' sample and, consequently, the present research may largely under-represent populations within and outside the UK.

Demographic analyses in all of the studies within this thesis reveal that the participants were largely White British (>75%), which means that results have not necessarily captured the wider demographic diversity which exists within the UK population. However, alcohol-based research may find it particularly problematic to access a wider demographic. There are numerous religious and cultural beliefs which prohibit alcohol

consumption and resultantly mean that certain populations may be less likely to participate in research in this area. If alcohol-based cognitions are based on experiences of consumption, then it appears valid to argue that those who do not drink would have little to offer in respect of such research. However, whilst people may not drink, they are immersed and interacting with many who do - some to a greater extent than others. These people may have a unique insight which, as yet, remains under-researched. It must, therefore, be noted that the present research may not necessarily represent these populations, and further research is required in this regard. Furthermore, there is evidence which suggests that the drinking behaviours, beliefs and contexts of non-white participants differ white respondents (Caetano, Clark, & Tam, 1998; O'Hare, 1995). The study of more diverse populations must be noted as a critical avenue of future research.

### ***9.2.3 Self-report data***

Self-report measures are the bedrock of much research into addictions (Greenfield & Kerr, 2008). It is generally accepted that this approach can be used as a reliable and valid method of research (Del Boca & Noll, 2000; Giovannucci et al. 1991). Yet, continuing to scrutinise the conditions which impact the accuracy of self-report alcohol measures is a necessary precaution for alcohol researchers. (Del Boca & Noll, 2000). A documented short-coming of research designs in this area is the reliance on retrospective self-reports of alcohol consumption (Hufford et al., 2002). This involves participants recalling and recording their previous consumption, and their associated

cognitions. However, the environments in which such assessments take place are far removed from the setting in which the drinking occurred, by nature of their post hoc design (Verster et al., 2012). Indeed, the purpose of this thesis has been to examine how contexts impact such reports, with the use of smart-phone technology and field studies, for example. However, there are broader concerns regarding the veracity of self-report measures in general (c.f. Babor, Brown, & Del Boca, 1990; Davis, Thake, & Vilhena, 2010). Specifically, it has been questioned whether participants are capable, or even inclined, to be honest about questions concerning alcohol consumption and cognitions (Davies, 1997).

Typical alcohol consumption (in terms of quantity) was a measure taken in all the research. In Study 1, for example, it was utilised as a covariate to control for between-participant differences in consumption, and in Study 4 participants were asked to state whether they had consumed alcohol since they had last been contacted and, if so, how many drinks they had consumed. The veracity of such self-report may be questioned, however. As noted previously, where reports are retrospective, participants may have limited memories about their alcohol consumption, particularly as drinking may impair memory (c.f. Walker & Hunter, 1978). Participants may also alter their responses in an attempt to be more favourably perceived by the researcher (c.f. Davies & Best, 1996) or to meet the perceived demands of the study (c.f. Melson et al., 2011), an issue which may even have impacted the real-time measures obtained in Study 4. Furthermore, it has been noted that the context of questioning can alter participants' reports about their own

substance use (c.f. Davies & Baker, 1987). As such, the covariate itself may have been impacted by the context of questioning – self-reports of consumption may therefore have been higher in the pub than the lecture theatre. Single and Wortley (2006) found that anchoring self-report measures in social contexts increased reports of consumption. Here, participants are believed to give more valid and reliable responses to context-specific questions (e.g. how many drinks do you have when going to a bar) than when responding to questions which do not place drinking into a situational frame of reference.

Such results do not represent data from in-vivo responding, as participants do not actually change their physical location. However, such results may be taken as an indication that similar or even magnified effects may be observed if participants are situated in alcohol-related environments. It is therefore possible that, in the present research, measures of alcohol consumption may have been affected by the context of questioning. This could be suggested to provide further evidence of the influence of context on alcohol-related responding. However, this must be noted as a potential limitation of research which has treated these reports as valid measures of consumption. This is particularly pertinent where self-reported alcohol consumption was used in statistical controls. Objective measures of consumption, such as a breathalyser (e.g. Labrie et al., 2012) would be an alternative method of obtaining objective measures of consumption. In order to limit researcher interference and to enable participants to naturally interact with the study environment, the present research did not use such

methods. In light of these considerations, the future use of an additional, objective measure of consumption may be recommended.

Self-reports regarding one's alcohol-related cognitions may also be questioned. All research within this thesis is dependent on the participants' ability to report what they believe/think – in other words, these are explicit measures of alcohol-related cognitions. Conversely, researchers in the field of implicit cognition have raised concerns about the nature of such explicit testing. In particular, it is argued that people are not truly aware of their own beliefs or attitudes (Nisbett & Wilson, 1977). Rather, such beliefs are believed to be implicit or unconscious, although they have the ability to mediate behaviours and responses (Barnes-Holmes et al., 2006; Greenwald & Banaji, 1995). Accordingly, implicit and explicit measures have often failed to correlate (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005), raising further concerns. "Frailties of introspection" may therefore cause explicit testing to be limited for the purposes of psychological research (Barnes-Holmes et al., 2006). This has led to the development of procedures such as the Implicit Association Test - IAT (c.f. De Houwer, 2002; Greenwald, Nosek, & Banaji, 2003) and the Implicit Relational Assessment Procedure - IRAP (c.f. Barnes-Holmes et al., 2006), which are designed to assess these unconsciously held beliefs. These implicit tests are used in favour of explicit measures and are believed to counteract inaccurate reporting and deliberate attempts to alter responses in order to avoid negative perceptions (Barnes-Holmes et al., 2006). However, it is not clear that such concerns cast unassailable doubt over explicit testing.

Indeed, meta analyses indicate that implicit and explicit self-reports are in fact correlated (e.g. Hofmann et al., 2005). Here, it was found that research demonstrating that these measures do not coincide may be the product of methodological characteristics or motivation variations (c.f. Hofmann et al., 2005 for an expanded review of this area). The present use of explicit measures of alcohol-related cognitions therefore seems defensible. Nonetheless, stronger support for the present research may be provided by the future use of both explicit and implicit testing.

#### ***9.2.4 The use of technology – Alternative approaches to paper questionnaires and self-report***

##### ***Smart-phone and technology***

As we have seen, there are potential problems arising from the use of retrospective self-reports and questionnaires administered in non alcohol-related environments. A number of approaches have been used within this thesis in order to overcome these concerns. However, it seems pertinent to highlight the strengths and potential drawbacks of these methods.

Study 3 built upon previous research, developing the use of immersive technology (c.f. Cruz-Neira, Sandin, & DeFanti, 1993; Onural, 2010), with such techniques being asserted to produce a more immersive, realistic experience for the viewer (Iwata, 2004; Moezzi et al., 1997). The aforementioned concerns about the veracity of such explicit measures remain within this research. However, it is believed that this method is likely

to produce more ecologically valid measures of cognition as it was able to manipulate and measure the effects of contextual cues and social context within a controlled laboratory. Study 4 implemented a method of context-aware experience sampling (or ecological momentary assessment) using smart-phone technology, building upon previous research using hand-held computers, phone based voice response systems (c.f. Collins et al., 2003) and participants' mobile phones to collect data via phone calls (Courvoisier et al., 2010) or text messages (Kuntsche & Robert, 2009; Verster et al., 2012).

This method of context-aware sampling reduces participants' reliance on autobiographical memory and limits 'parking-lot compliance' – limitations which hinder traditional research using diary studies (Shiffman et al., 2008; Stone & Shiffman, 2002). This methodology has also been found to be highly popular (Kuntsche & Labhart 2012) given the accessibility of mobile phones (Katz & Aakus, 2002) and enables the collection of large amounts of ecologically valid, real-time data from large and diverse samples (Miller, 2012). Furthermore, smart-phones provide a familiar, straightforward method of question response which is easy to access, meaning cognitive load is low (Collins et al., 2003; Miller, 2012). It may be noted that using the participants' own mobile phones for the purpose of study involvement could have been problematic, given that participants may have become distracted/interrupted during task completion by other features of the phone's functionality – games, phone calls etc. However, participant distraction is a possibility in most, if not all, forms of research. Furthermore,

the short average response times seem to suggest that this was not the case for the most part. Arguably, it is also the case that this potential drawback was far outweighed by the benefits afforded by this technology.

### ***Paper vs electronic questionnaires***

Online data collection provides an easy and quick method of data collection (Schleyer & Forrest, 2000) which is intended to increase flexibility and be more time efficient, for both the participants and researcher (Sheehan & McMillan, 2009). There are potential ethical concerns about online data collections – such as issues of informed consent, debriefing and confidentiality (c.f. Kraut et al., 2004). However, the ethical data collection methods employed mean that it this has been an issue (in Study 2 & 4). A paper and electronic dual-approach to data collection can also increase ease of participation and thus raise response rate (Evans & Mathur, 2005). In addition to being quick and cost effective research tools, online questionnaires also allow for an interactive experience, with tailor-made responses and questions (Kraut et al., 2004). This was particularly pertinent in Study 4, where the use of an internet-hosted smartphone application allowed the use of ‘tree-based’ response logic, whereby questions asked were dependent on the participants’ previous responses. Asking participants irrelevant questions has been shown to decrease future responsiveness (Consolvo & Walker, 2003). The use of web-based responding is therefore likely to have prevented this eventuality, saving time and increasing good-will towards future participation. The greater perceived anonymity of online surveys may also have been beneficial for



increasing participants' honesty (Davis, Bolding, Hart, Sherr, & Elford, 2004) - something which may be particularly pertinent when collecting information about alcohol, where answers could be seen to elicit potentially negative perceptions (Saitz et al., 2004). The use of online questionnaires as a method of data collection within this thesis is, therefore, deemed appropriate.

Participation in Study 2 was controlled by the use of html web-links which were emailed to specific mailing lists. Similarly, in Study 4, whilst the smart-phone application did not have to be downloaded, participation was enabled through the use of user-specific web-based links. These were sent within participation prompts to specific participants. It was therefore possible to largely control who participated in the study, reducing concerns about the lack of sampling control exhibited in some online research (Kraut et al., 2004; Wright, 2006). There have also been questions raised about the representativeness of data which is collected online (Dillman, 2000; Schaefer & Dillman, 1998). Specifically, it has been questioned whether those who complete online questionnaires are different, in terms of demographics, than those who would not respond using this method (Kraut et al., 2004; Sax, Gilmartin, & Bryant, 2003). This could pose a problem for the generalisability of the present research. Dillman (2000) notes that as long as the demographics of non-responders is comparable with those who respond, there is no threat to validity of online research, even when response rates are low. However, estimating non-response is a challenge given that, in most cases, the characteristics of non-respondents are unknown (Dey, 1997; Dillman, 2000). Yet, it has

been shown that where the participants are regular computer users, the differences between online responders and non- responders are minimal (Hayslett & Wildemuth, 2004). All of the presented studies utilised participants whom were familiar with computer use, for work or study purposes. Concerns about the representativeness of the online samples in this thesis are therefore not deemed a serious threat to the present research.

In Study 2, identical versions of the questionnaire were also constructed in electronic format and paper formats – the format of distribution being determined by each institution. This approach may be questioned as there have been indications that there may be differences in responses between online and paper questionnaires (Yun & Trumbo, 2000). However, such differences have not been found to be substantive (*ibid*) and other research has indicated that responses are consistent across presentation formats (Gosling, Vazire, Srivastava, & John, 2004). Furthermore, it has been found that alcohol measures do not differ whether paper or electronic questionnaires are used (Kypri et al., 2004; Miller et al., 2002). This dual approach is therefore not believed to compromise the validity of reliability of responses. Similar methods of data collection have been employed successfully in previous research (e.g. Kypri et al., 2003). There also appears to be a good foundation upon which to assert that data obtained through online data collection methods (e.g. Study 4) are representative of the types of responses which would be obtained via more traditional paper and pen methods. Furthermore, results which suggest that online and paper questionnaires do not provide valid,

equivalent responses (e.g. Azar, 2000) may also be the product of variations in the environments experienced by participants. For instance, online responders may be afforded more privacy, whilst those completing paper questionnaires may feel scrutinised by the researcher. Indeed, that contextual factors alter responses is the key premise of this thesis. Hence the researcher does not believe that findings, such as those from Azar (2000), should preclude the use of online data collection methods. In fact, it was believed that this method, particularly in Study 4, would provide a more dynamic measure of responses.

### **9.3 *Future research***

Future research may therefore benefit from the continued progression of context-aware experience sampling methods. Smart-phone technology can be developed to record greater levels of data and test other alcohol-related beliefs, performances and consumption in real-time settings. This would provide more information about the dynamic nature of alcohol behaviours, and cognitions. The findings of this thesis suggest that responses to alcohol-related questionnaires appear to change depending on contextual cues and one's current social and environmental location. This casts doubt upon the validity of methods which rely on the administration of questionnaires in laboratories and other non alcohol-related environments. The current thesis has demonstrated a number of approaches which may offer an alternative to such traditional questionnaire methods. However, these are fairly time intensive and place greater demands on both the researcher and the participants. Future research may, therefore, be

directed towards developing methods which allow for the administration of questionnaires whilst simultaneously eliciting responses akin to those that would be obtained in real-world contexts. For instance, the results of Study 3 suggest that participants' laboratory-based responses vary when receiving alcohol-appropriate stimuli (via panoramic projection) and when completing questionnaires in groups. If such responses were found to be akin to real-time in-vivo responses, this research methodology could be useful - eliciting ecologically valid responses within the laboratory or other non alcohol-related environments. As field studies and experiential sampling designs can be time consuming and expensive, such an approach would be beneficial to researchers wishing to examine alcohol-related cognitions.

The future use of both explicit and implicit measures of alcohol-related cognitions, and the use of objective, as-well as subjective measure of consumption, would also be valuable for future research. Objective consumption measures would supply an independent measure of consumption to compare with in-vivo self-reports. Utilising both explicit and implicit tests of cognition would also strengthen the evidence for context-dependent variations in alcohol-related cognitions. Such implicit testing methods of alcohol-related cognitions may take two forms. First, implicit testing procedures, such as the IRAP, may be implemented in alcohol-related and alcohol-neutral contexts. This would enable researchers to assess whether these implicit measures of cognitions also change depending on environmental stimuli. Second, the stimuli used within implicit testing procedures may be altered to provide contextual

information. Single and Wortley (1994) suggest that questions about alcohol-related cognitions should be ‘anchored’ by specific situational references. Hence, this approach of using contextual stimuli would allow an examination of alcohol-related contextual cues within implicit tests of outcome expectancies, norms and DRSE.

The successful use of Smart-phone technology to enable context-aware assessments also affords further avenues for future research. Recently, investigations have been conducted that have allowed a more direct measure of consumption practices, and perceptions of drinking. For instance, research into glass shape indicates that consumption is slower from a straight than a curved glass (Attwood, Scott-Samuel, Stothart, & Munafò, 2012). However, the findings of this thesis suggest that such research, which is based alcohol consumption within a laboratory, may not necessarily replicate to consumption in a more realistic environment. Future research may therefore be benefited from the use of smart-phone technology to enable real-time, context aware measures of consumption and in-vivo manipulations of factors such as glass shape.

## **9.4 Implications**

### **9.4.1 Research implications**

Much of the aforementioned, previous investigations in this area have conducted research in laboratories, or recruited participants to complete alcohol-based questionnaires on university and school campuses. It has been found that high positive outcome expectancies are associated with specific contexts (e.g. Holyfield et al., 1995;

Mustonen & Makela, 1999; O'Hare, 1998; Thombs et al., 1993). Nevertheless, such research does not assess participants' cognitions in-vivo. Here, participants were required to make judgments about the frequency/likelihood of their drinking in a number of presented contexts, with only one measure of cognition being recorded. However, by using a multi-methodological approach, the present thesis has demonstrated that it is possible to conduct ecologically valid, context-aware research and that this can successfully measure the effect of context on alcohol-related cognition. Given the findings of the present thesis, future research may therefore be bettered by the use of context-aware research designs - modern technology being a key avenue to enable such an approach.

#### ***9.4.2 Therapeutic implications***

Hayes (2004) comments that removing problematic behaviour from the context in which it occurs causes researchers to overlook the nature of the problem and the avenues for its solution (pg 646). Similarly, it has been noted that successful therapy must encompass practitioners who acknowledge and respond to the contextually varying nature of the factors which impact substance use (Cohen, 1990; Davies, 1997). The present findings may therefore go towards addressing the functional contextualist concerns (e.g. Biglan & Hayes, 1996) that research is often not capable of altering behaviour. Specifically, alcohol-related cognitions are frequently found to moderate alcohol consumption and the present findings suggest that these cognitions appear to vary depending on one's social and environmental context. The findings of this thesis

may therefore have applications for therapeutic approaches which aim to reduce consumption by targeting specific alcohol-related cognitions. However, these approaches have, to date, been found to have only varied success.

The therapeutic targeting of expectancies (c.f. for example, Corbin et al., 2001; Wiers & Kummeling, 2004), DRSE (c.f. for example, Shope et al., 2007) and normative beliefs (c.f. for example, Larimer & Crouce, 2002; Perkins, 2002; Perkins & Craig, 2006; Wechler et al., 2003) has been conducted using a variety of different methods, including education, selective feedback, motivational interventions and skills training. However, these have been shown to have mixed results in terms of decreasing both the frequency and quantity of alcohol consumed (Jones et al., 2001; Larimer & Crouce, 2007). Existing approaches may, nevertheless, be adapted to target the contextually varying nature of these cognitions – in order to increase success levels. First, interventions may benefit by providing participants with the necessary knowledge to recognise particular contexts (social or environmental) where alcohol supportive cognitions are likely (Marlatt, 1990; Marlatt & Gordon, 1985). Second, training participants to regulate their alcohol-related cognitions should ideally be context specific, in recognition of the fact that there may be contexts where these cognitions are more/less evocative. The application of the present research findings may therefore offer a path to introducing interventions which are capable of reducing alcohol consumption and can respond to context specific demands - increasing the potential for success in such interventions (Davies, 1997).

## 10. CHAPTER 10 – CONCLUSIONS

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## **10.1 Main conclusions**

In the field of Psychology, there are numerous theories about the role of context in human behaviour and cognition. Relational frame theory states that all cognitive functioning is the product of items which are related in memory and that context becomes linked with these cognition during learning process (Barnes-Holmes et al., 2006). As such, words, feelings, emotions, beliefs and behaviours are contextually bound (Barnes-Holmes et al., 2006; Hayes, 2004). Similarly, connectionist, cueing and priming theories (c.f. for example, Bargh & Pietromonaco, 1982; Reich et al., 2005) all postulate that context can impact cognitions and behaviour. The mechanism by which this is believed to occur alters between these theories. However, they are unified by their belief that responses and thoughts are not static, but are fluid and determined/influenced by one's present situations or interactions. Indeed, these abundant and well researched theories combine with the more 'common sense' wisdom that context impacts cognition and behaviour – “you would not shout in a library” because this would not be contextually appropriate, as it was said in the introduction.

However, despite this, too often research systematically ignores the issue of context effects. It is a variable that is scarcely considered and even more rarely is it manipulated and tested (Smith & Semin, 2004). Rather, the possible effects of context are reduced to a few sentences in the discussion section of research papers, where it is noted that the present research might lack ecological validity owing to its laboratory or artificially

staged nature. In other words, the results may not show how real-life contextual factors may alter the picture. Indeed, the sterile laboratory environment is far removed from the real-life context in which the targeted behaviours and beliefs usually occur (Biglan, 2001). In fact, the laboratory has its own unique context and social interactions which may affect behaviour (Smith & Semin, 2004). Even research designed to investigate theories of contextual influence (e.g. Barnes-Holmes et al., 2006) can be said to suffer from such a weakness, in that the research conducted often (somewhat ironically) fails to give full consideration to a key aspect of their theory. For example, Milgram's (1963) famous obedience research examined the impact of social context on behaviour whilst placing participants in an artificially constructed research scenario. Whether the resulting observations would be replicated in a real world environment during more authentic interactions is arguably less clear.

An important purpose of this thesis has been to highlight the lack of contextual consideration in the research literature, using alcohol-related cognition as example of this. It was not the intention of this thesis to suggest that this is the only area where context is under-researched, but rather that this is one area where this occurs. The findings of this thesis therefore suggest two things with specific regard to alcohol-related cognitions. First, systematic reviews of the literature suggest that research into the effect of context on alcohol-related cognitions is scarce. Second, the research conducted in this thesis suggests that both environmental and social context can impact alcohol-related cognitions, and hence ought to be considered within research. More

generally, the findings of this thesis also suggest that if context is as under-appreciated in a field as well researched as alcohol consumption, it is possible that the present findings would be replicated in many other areas of psychological research.

“So what?” some may say. Psychological research methods are the ‘best possible’ method of measuring real life behaviour and cognition. Certainly, it has been asserted that psychology has been successful in identifying a whole host of different conditions which will lead to variations in behaviour and beliefs (Baker, 1968). Furthermore, critiquing psychological research on the grounds of ecological validity may be suggested to doom all research to limitation. However, psychological research has been critiqued for its perceived failure to assess dynamic behaviours and cognitions in the real world, although it is contended that this is feasible (Baker, 1968). Indeed, this thesis has shown that not only is it important to consider the effect of context, but that it is feasible to do so within a research paradigm – an approach championed by functional contextualists (c.f. Biglan & Heyes, 1996). More specifically, *first*, this thesis illustrates that it is possible to measure the effect of context on the target variable in question. For instance, Study 1 (Chapter 1) demonstrates that it is possible to measure a target variable (alcohol-related cognitions) across contexts, to get an indication of between-environment change. Study 2 (Chapter 2) also indicates that it may be important to consider personal contextual factors such as age, development and exposure to alcohol. Further, Study 4 (Chapter 4) suggests that smart-phone technology may provide the opportunity to conduct context-aware experience sampling, so that the dynamic nature

of a target variable can be assessed by measuring the effect of real-time changes to participants' social and environmental contexts. *Second*, this thesis indicates that it is possible to manipulate contextual influences and measure them in the laboratory, creating more ecologically valid but controlled and relatively straight-forward research paradigms. For instance, Study 3 (Chapter 3) suggests that response patterns may change as a result of manipulations to participant's social and environmental contexts using immersive panoramic videos.

This thesis therefore suggests that both social and environmental contextual factors may have the capacity to moderate expectancies, DRSE and normative beliefs, a fact which has hitherto largely been ignored. Furthermore, it demonstrates that technology and multi-methodological research designs may be used to study alcohol-related cognitions and measure the effect of context. In the laboratory, this thesis has evidenced a unique method of creating an immersive yet controlled environment which can cue contextual changes to cognitions. Additionally, in real-world research, this thesis has also provided an original approach, demonstrating how alcohol-related cognitions can be easily assessed between contexts (via field studies) and using smart-phone technology to measure cognitions in de-facto real-time, using an experiential sampling design (ecological momentary assessment). This thesis concludes that context is an important consideration within psychological research. A multi-methodological approach to research allows researchers to suitably measure, manipulate and control for the effect of context. By adopting a context-aware (contextualist) approach to research, psychology

may overcome its ecological limitations and become better informed about real-world behaviour and cognitions (Baker, 1968), including alcohol-related cognitions. Innovations in technology would appear to be potentially useful for researchers who are aiming to conduct more ecologically valid research. Furthermore, by studying the ‘ongoing act in context’ (Biglan, 2001), interventions aimed at reducing problem behaviours can also be better equipped to address social problems, including alcohol consumption. A move toward context-aware psychological research is therefore strongly recommended, particularly as multi-methodological research designs and advancing technologies provide researchers with the tools for such an endeavour.

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## **APPENDICES**

**Appendix A** - Outcome expectancy questionnaire

**Appendix B** - DRSE questionnaire

**Appendix C** - Normative beliefs questionnaire

**Appendix A - The alcohol outcomes expectancy questionnaire (Leigh & Stacy, 1993).\***

**WHEN I DRINK ALCOHOL:**

**HOW LIKELY IS IT THAT THIS WOULD HAPPEN?**

	No chance	Very unlikely	Unlikely	Likely	Very likely	Certain to happen
1. I am more accepted socially	1	2	3	4	5	6
2. I become aggressive	1	2	3	4	5	6
3. I am less alert	1	2	3	4	5	6
4. I feel ashamed of myself	1	2	3	4	5	6
5. I enjoy the buzz	1	2	3	4	5	6
6. I become clumsy or uncoordinated	1	2	3	4	5	6
7. I feel good	1	2	3	4	5	6
8. I get into fights	1	2	3	4	5	6
9. I can't concentrate	1	2	3	4	5	6
10. I have a good time	1	2	3	4	5	6
11. I have problems driving	1	2	3	4	5	6
12. I feel guilty	1	2	3	4	5	6
13. I get a hangover	1	2	3	4	5	6
14. I feel happy	1	2	3	4	5	6
15. I get a headache	1	2	3	4	5	6
16. I am more sexually assertive	1	2	3	4	5	6

**WHEN I DRINK ALCOHOL:**

**HOW LIKELY IS IT THAT THIS WOULD HAPPEN?**

	No chance	Very unlikely	Unlikely	Likely	Very likely	Certain to happen
17. It is fun	1	2	3	4	5	6
18. I get mean	1	2	3	4	5	6
19. I have problems with memory and concentration	1	2	3	4	5	6
20. I am more outgoing	1	2	3	4	5	6
21. It takes away my negative moods and feelings	1	2	3	4	5	6
22. I have more desire for sex	1	2	3	4	5	6
23. It is easier for me to socialize	1	2	3	4	5	6
24. I feel pleasant physical effects	1	2	3	4	5	6
25. I am more sexually responsive	1	2	3	4	5	6
26. I feel more sociable	1	2	3	4	5	6
27. I feel sad or depressed	1	2	3	4	5	6
28. I am able to talk more freely	1	2	3	4	5	6
29. I become more sexually active	1	2	3	4	5	6
30. I feel sick	1	2	3	4	5	6
31. I feel less stressed	1	2	3	4	5	6
32. I am friendlier	1	2	3	4	5	6
33. I experience unpleasant physical effects	1	2	3	4	5	6
34. I am able to take my mind off my problems	1	2	3	4	5	6

**\* The order of all questionnaire items was randomised for study participation and wordings were altered so that they were appropriate for the target audience**

**Appendix B - Drinking refusal self-efficacy questionnaire – Revisited (Oei et al., 2005). \***

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>				
I am very sure I could <b>NOT</b> resist drinking	I most likely could <b>NOT</b> resist drinking	I probably could <b>NOT</b> resist drinking	I probably could resist drinking	I most likely could resist drinking	I am very sure I could resist drinking				
				<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
1. When I am out at dinner									
2. When I am watching TV									
3. When I am angry									
4. When someone offers me a drink									
5. When I am at lunch									
6. When I feel frustrated									
7. When I am worried									
8. When I feel upset									
9. When I feel down									
10. When I feel nervous									
11. When I am on the way home from work or college									
12. When I feel sad									
13. When my spouse or partner is drinking									
14. When I am listening to music or reading									
15. When my friends are drinking									
16. When I am by myself									
17. When I have just finished playing a sport									
18. When I am in a pub or club									
19. When I first arrive home									

**\* The order of all questionnaire items was randomised for study participation and wordings were altered so that they were appropriate for the target audience**

**Appendix C - Normative belief questionnaire (McAlaney & McMahon, 2007a). \***

Item	
1	<p><i>How frequently would you say most of your friends drink alcohol?(Please Circle)</i></p> <p>Not at all            1 day or less in the month            2 – 3 days in the month            1 day a week            2 days a week            3 – 4 days a week            5 – 6 days a week            Every day</p>
2	<p><i>How frequently would you say students at your University/College (or your fellow work colleagues) drink alcohol?(Please Circle)</i></p> <p>Not at all            1 day or less in the month            2 – 3 days in the month            1 day a week            2 days a week            3 – 4 days a week            5 – 6 days a week            Every day</p>
3	<p><i>How frequently would you say most of the people your age in the UK drink alcohol? (Please Circle)</i></p> <p>Not at all            1 day or less in the month            2 – 3 days in the month            1 day a week            2 days a week            3 – 4 days a week            5 – 6 days a week            Every day</p>

4	<p><i>How frequently do you drink alcohol?(Please Circle)</i></p> <p><i>Not at all</i>  <i>1 day or less in the month</i>  <i>2 – 3 days in the month</i>  <i>1 day a week</i>  <i>2 days a week</i>  <i>3 – 4 days a week</i>  <i>5 – 6 days a week</i>  <i>Every day</i></p>
5	<p><i>How often do drink enough alcohol to become drunk? (Please Circle)</i></p> <p><i>Not at all</i>  <i>1 day or less in the month</i>  <i>2 – 3 days in the month</i>  <i>1 day a week</i>  <i>2 days a week</i>  <i>3 – 4 days a week</i>  <i>5 – 6 days a week</i>  <i>Every day</i></p>

**\* The order of all questionnaire items were randomised for study participation and wordings were altered so that they were appropriate for the target audience**



## Appendix D – AUDIT-C.

Questions	Please Circle your answer				
	0	1	2	3	4
How often do you have a drink containing alcohol?	Never	Monthly or less	2 - 4 times per month	2 - 3 times per week	4+ times per week
How many units of alcohol do you drink on a typical day when you are drinking?	1 -2	3 - 4	5 - 6	7 - 9	10+
How often have you had 6 or more units if female, or 8 or more if male, on a single occasion in the last year?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily