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JAMES COOK
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Exploring the Underlying Nature of Alcohol-related Implicit Attitudes.

Thesis submitted by

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in the Department of Psychology,

College of Healthcare Sciences

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Declaration of Ethics

The research presented and reported in this thesis was conducted within the guidelines for research ethics outlined in the National Statement on Ethics Conduct in Research Involving Humans (1999), the Joint NHMRC/AVCC Statement and Guidelines on Research Practice (1997), the James Cook University Policy on Experimentation Ethics, Standard Practices and Guidelines (2001), and the James Cook University Statement and Guidelines on Research Practice (2001). The proposed research methodologies received human research ethics approval from the James Cook University Human Research Ethics Committee (approval numbers H4279, H4248, H4891, and H5292).

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Daniel Lindsay   Date

Statement of the Contribution of Others

I recognise the financial and infrastructural contribution of James Cook University through providing me a work station, access to resources, and funding to conduct my research and attend conferences.

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Abstract

Contemporary research into alcohol consumption has identified automatic cognitive processes such as implicit attitudes as being influential on the initiation and maintenance of drinking behaviour (Houben & Wiers, 2006, 2008a). However, the structure of implicit alcohol-related attitudes, as well as ways in which these attitudes can be manipulated, remains relatively unknown. Therefore, the current research project aimed to explore the underlying nature of implicit attitudes toward alcohol consumption.

To date, research examining implicit alcohol-related attitude change has focused on associative processes, namely Evaluative Conditioning (EC; Houben, Haverman, & Wiers, 2010; Houben, Schoenmakers, & Wiers, 2010). It was argued here that advertisements may serve as a real-world example of an EC trial. Study 1 ($N = 80$) and Study 2 ($N = 54$) examined the immediate influence of beer and chocolate advertising on implicit attitudes, as measured on an Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998), and using a pre- and post-test design. The results of Study 1 indicated that viewing an advertisement for beer produced a significant positive shift in beer-related implicit attitudes from pre- to post-test. Participants who had previously seen the beer advertisement reported a significantly larger shift in beer-related implicit attitudes than participants who had never seen it. Furthermore, participants who had seen the beer advertisement most often reported the strongest implicit attitude change. No change was found for chocolate-related implicit attitudes in Study 1.

All of the above attitude findings from Study 1 were replicated in Study 2. Extending the results from Study 1, Study 2 introduced a measure of consumption behaviour for both beer and chocolate. The results from Study 2 found no direct relationship between advertisement exposure and product consumption in the laboratory. However, previous

advertisement exposure moderated the relationship between beer-related implicit attitude change and beer consumption in the laboratory. The results from Studies 1 and 2 indicated that advertisements, which may use the associative principles of EC, are able to produce implicit alcohol-related attitude change. Study 3 ($N = 243$) aimed to examine the influence of non-associative processes, namely message frames, on alcohol-related implicit attitude change. The results from Study 3 indicated that socially-focused messages were more influential in producing negative implicit attitude change than health-focused messages.

Due to the significant alcohol-related implicit attitude change found in Studies 1-3, it was argued that individuals may hold ambivalent attitudes toward alcohol. Therefore, the ambivalent nature of explicit and implicit alcohol-related attitudes was explored in Study 4 ($N = 257$) and Study 5 ($N = 340$) respectively. The results from these studies provided evidence to suggest that implicit and explicit attitudes toward alcohol consumption are ambivalent. Study 5 also examined whether the experience of alcohol-related consequences contributed to ambivalence in alcohol-related attitudes, but no significant relationships were found.

Based on the results of this research project, it appears as though both associative and non-associative processes can produce alcohol-related implicit attitude change. A possible explanation for this change is that individuals' attitudes toward alcohol consumption are ambivalent. Further research is needed to examine the relationship between ambivalence in alcohol-related attitudes and consumption behaviour, as well as an exploration of the factors that may produce ambivalence in alcohol-related attitudes. Recommendations for alcohol advertising, attitude measurement and community level anti-drinking messages are provided. The results of this research project increase the current understanding of the complex nature of implicit alcohol-related attitudes.

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List of Abbreviations

AGPHT = Australian Government Preventative Health Taskforce

AIHW = Australian Institute of Health and Welfare

APE = Associative-propositional evaluation model

EAST = Extrinsic Affective Simon Task

EC = Evaluative Conditioning

ELM = Elaboration Likelihood Model

FARE = Foundation of Alcohol Research and Education

HSM = Heuristic-Systematic Model

IAT = Implicit Association Test

MCM = Meta-Cognitive Model

NDSHS = National Drug Strategy Household Survey

PSA = Public Service Announcement

RIM = Reflective-impulsive Model

ST-IAT = Single Target Implicit Association Test

WHO = World Health Organisation

Introduction

In a survey of over 1800 Australian adults undertaken in 2014, three-quarters of all participants reported that they believed Australia has a problem with excess drinking or alcohol abuse (Foundation for Alcohol Research and Education, 2015). Alcohol remains the most commonly consumed drug in Australian society (Australian Institute of Health and Welfare, 2011). The high rate of alcohol consumption within Australia remain despite the documented health and social negatives associated with drinking behaviour (Australian Government, 2009; Begg, Vos, Barker, Stanley, & Lopez, 2008; World Health Organisation, 2011). If an individual was making a rational decision to consume alcohol, one would expect that the individual would take these negatives into account and perhaps make the decision to not consume alcohol. However, recent research has identified that the decision to engage in alcohol consumption may not be fully governed by rational or deliberative processes, with automatic and impulsive processes such as implicit attitudes being influential on drinking behaviour (Houben & Wiers, 2008a).

With the emergence of research examining processes such as implicit attitudes, a greater understanding of why individuals engage in health-risk behaviour such as alcohol consumption may be produced. By attempting to understand the underlying structure of implicit attitudes, as well as how these attitudes can be manipulated, perhaps it will become possible to influence implicit attitudes in order to reduce drinking behaviour. The current research project aims to assist in this endeavour, with the results of the five experimental studies conducted here contributing to a greater understanding of the underlying nature of alcohol-related implicit attitudes. More specifically, this research project aimed to identify both associative and non-associative processes through which implicit attitudes could be altered. Additionally, the final two

studies of this research project examined the structure of both explicit and implicit attitudes to help examine the underlying positive and negative evaluations an individual may hold toward alcohol consumption.

This thesis consists of 11 Chapters, with Chapters 1-4 and Chapter 8 presenting a critical review of the literature on dual-systems modelling, implicit attitudes, attitude change, implicit attitude measurement and attitudinal ambivalence. Within each chapter, the appropriate construct is applied to alcohol consumption, as this is the behaviour of interest throughout this research project. This literature review led to the development of various aims and hypotheses which are addressed through the experimental studies outlined in Chapters 5-7 and 9-10. Chapter 11 presents a general discussion of the findings from this research project, with attempts made to link these findings back to previous research findings and theoretical assumptions. Chapter 11 also includes the bigger picture implications and limitations of these findings.

Research Questions

The initial focus of the literature review for this research project was driven by the following research questions:

1. Can alcohol-related implicit attitudes be immediately influenced by exposure to an alcohol-related advertisement?

2. Can alcohol-related implicit attitude change produced by advertisement exposure influence alcohol consumption behaviour?

3. Can non-associative processes, namely health message frames, produce alcohol-related implicit attitude change?

These research questions were the focus of Chapters 1-7 of this research project, with Studies 1-3 directly examining these research questions. Based on the results of the first 3 studies of this research project, the following research questions were developed:

4. Are explicit attitudes toward alcohol consumption ambivalent?

5. Are implicit attitudes toward alcohol consumption ambivalent?

6. Is the experience of various alcohol-related consequences associated with attitudinal ambivalence?

These research questions were the focus of Chapters 8-10 of this research project, with Studies 4 and 5 directly examining these research questions.

Chapter 1: Dual-systems Modelling

General Overview of Dual-systems Models

When attempting to explain the nature of human behaviour, major psychological theories have assumed that individuals act in ways which are deliberative and rational (Ajzen, 1991; Fishbein & Ajzen, 1971). Based on the assumption that behaviour is driven by largely deliberative processes, human beings have been labelled as 'rational animals' that are able to understand the value and consequences of their actions (Strack & Deutsch, 2004). However, it is obvious that individuals do not always behave rationally and may engage in behaviour that is not congruent with their stated beliefs or best interests. Several theories have attempted to explain such irrational behaviour, with a major assumption of these theories being that there are more than one set of principles controlling human cognitive processes (Chaiken, 1980; Sloman, 1996; Smith & DeCoster, 2000; Wilson, Lindsey, & Schooler, 2000) and/or behaviour (Strack & Deutsch, 2004). With the emergence of these theories, multiple aspects of human behaviour once assumed to be driven by higher order processes of deliberative judgement and decision making are now hypothesised to be influenced by automatic processes that lie outside of conscious awareness and may occur spontaneously (Gawronski & Bodenhausen, 2006).

In line with the apparent influence of automatic and deliberative processing on human behaviour, dual-process models have become a popular theoretical outlook of contemporary research in social cognition. Although they have gained significant interest of late, the concept of dual-processing accounts of human cognition is not a new one, with Sloman (1996) suggesting that the distinction between automatic and deliberative processes can be traced back to the work of Aristotle. Sloman (1996) also notes that various other prominent psychological researchers (e.g. James, 1950; Piaget,

1926, as cited in Sloman, 1996) have made a distinction between automatic and deliberative decision-making processes.

Before examining the characteristics of dual-process and dual-systems models, it is important to highlight that the development and refinement of these models has been largely theoretical in nature. Therefore, some authors argue that dual-systems modelling can best be described as a theoretical framework lacking the "…conceptual rigour required from a well-formulated scientific theory and consequently does not lend itself to the derivation of precise and unambiguous hypotheses" (Keren & Schul, 2009, p. 543). As the predictions of dual-systems models are theoretically and not empirically driven, the following discussion on dual-process and dual-systems models is relatively descriptive in nature, providing an overview of the suggested processes that are predicted to be responsible for human decision making. Although largely theoretical, dual-systems models provide one possible explanation for the nature of human cognitive processing and behaviour. Whether or not this is the correct interpretation of such complex processes remains open to debate and cannot be covered in great detail here. However, it is argued that there is benefit to using dual-systems models because they provide a broad theoretical framework for the explanation of some of the most complex processes in psychological research: human cognition and behaviour.

Dual-processes or dual-systems? As reported by Evans (2008), contemporary dual-process models of social cognition emerged in the 1980's (Chaiken, 1980; Petty & Cacioppo, 1981). Since their introduction, dual-process models have been constantly refined and expanded upon and authors have argued that they are among the most popular large-scale theories currently used in social cognition research (Deutsch & Strack, 2006). Before examining the different characteristics associated with the dual nature of social cognition, it is important to make a distinction between dual-*process*

and dual-*systems* models. The distinction between these two separate models is a rather confusing one, with some authors using the terms interchangeably, while others highlight major differences between the two concepts (Keren & Schul, 2009). According to Deutsch and Strack (2006), dual-*process* models differ from dual-*systems* models because the latter move beyond simply describing two routes to judgements or decision-making by assigning characteristics to each of the systems and not limiting themselves to one area of social cognition.

Early dual-*process* models were domain-specific in that they were specifically applied to a single area of social cognition such as persuasion or prejudice and stereotyping (Gawronski & Creighton, 2013). Major models of social cognition proposed in the 1980's such as the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1986) and the Heuristic-Systematic Model (HSM; Chaiken, Liberman, & Eagly, 1989) propose two separate processes that manipulate information differently. For example, the HSM, which focuses on information processing, suggests that there are two distinct modes of thinking about information. Firstly, the HSM assumes that when engaging in systematic processing, individuals attempt to understand information through careful attention, deep thinking and intensive reasoning (Chaiken & Ledgerwood, 2012). In contrast, heuristic processing involves a focus on salient and easily comprehended cues that can activate judgements that are well established in memory (Chaiken & Ledgerwood, 2012). Therefore, the HSM is a dual-*process* model in that it suggests there are two separate processes that are responsible for information processing.

Essentially, dual-*systems* models are an extension of dual-*process* models in that the former can be applied to more general areas of social cognition and are not limited in their applicability to a particular area of research (e.g. persuasion). Authors argue

that the biggest drawback of dual-*process* models is that they are domain-specific, whereas dual-*systems* models are more generalised theories that aim to identify domain-independent principles of social cognitive processing (Gawronski & Creighton, 2013). Deutsch and Strack (2006) suggest that the biggest strength of dual-*system* over dual-*process* models is that the former integrates theory and research in the realm of existing dual-*process* models. Therefore, dual-*systems* models can perhaps be seen as more extensive and comprehensive in nature and are greater in their applicability to social cognitive phenomena than their dual-*process* counterparts.

Furthermore, dual-*system* approaches can account for two types of duality apparent in dual-*process* models. Dual-*process* models suggest that there is a difference between systematic, effortful and deliberative processing and heuristic, automatic and impulsive processing. However, popular dual-systems models such as the reflective-impulsive model (RIM; Strack & Deutsch, 2004) suggest that the deliberative system proposed in dual-*systems* models can be responsible for both heuristic and systematic judgments and whether or not one judgment is made over the other depends on the motivation and capacity of the individual (Deutsch & Strack, 2006). Therefore, one system can be responsible for two processes and this assumption does not apply in dual-*process* models.

Characteristics of dual-systems models. With the distinction between dual-*process* and dual-*systems* models now made, the focus of this particular research project will be on a dual-*systems* approach to social cognition and the characteristics of such models will now be explained. Since their initial appearance, multiple authors have developed many different dual-systems models relating to social cognition (Gawronski & Bodenhausen, 2006; Smith & DeCoster, 2000; Strack & Deutsch, 2004). It is important to remember that each of these proposed models are theories concerning the

nature of human cognitive processes. These theories attempt to provide an explanation for complex phenomena using a dual-systems framework. Therefore, they are just one possible explanation for the nature of human cognition and limitations and alternatives to these models will be discussed later.

Despite different authors providing new information about dual-system models and applying them to different areas of psychological research, the basic premise remains the same: these models hypothesise that there are two separate cognitive systems that process information and influence behaviour in different fashions (Gawronksi & Bodenhausen, 2006; Smith & DeCoster, 2000; Strack & Deutsch, 2004). The first of these systems is assumed to be unconscious, rapid and automatic with a high capacity for information. These automatic processes are generally defined by four major characteristics, they: (1) are elicited unintentionally; (2) cannot be stopped voluntarily; (3) require lower amounts of cognitive resources; and (4) are out of conscious awareness (Gawronski & Creighton, 2013). In contrast, the second of these systems is assumed to be responsible for conscious, slow and deliberative decisions or judgments. Again, these controlled processes can be defined by four major characteristics, they: (1) are initiated intentionally; (2) can be stopped voluntarily; (3) require greater amounts of cognitive resources and (4) operate within conscious awareness (Gawronski & Creighton, 2013).

Over the past 20 years, the conceptualisation of dual-systems models has been constantly refined and updated to include new research from different psychological areas (Smith & DeCoster, 2000; Strack & Deutsch, 2004). As well as using different nomenclature to label each system (e.g. System 1 and System 2, implicit and explicit, reflective and impulsive), different dual-system models tend to add something new about how each system processes information and influences behaviour. For example,

in his dual-systems model, Sloman (1996) suggested that the automatic system was governed by associative processes, while the deliberative system was governed by rule-based processing. Dual-systems models were expanded further by Smith and DeCoster (2000) who added a memory component to these models. The authors suggested that there were two qualitatively different memory systems, one which is slow-learning and the other being fast-learning. The slow-learning memory is thought to be associative in nature, sitting with the automatic system. In contrast, the fast-learning memory system is assumed to be based on rules so it can be identified as belonging to the deliberative system (Smith & DeCoster, 2000). Lastly, in his dual-systems approach, Kahneman (2003) highlighted the importance of information accessibility as the determining factor in whether a thought or preference is considered intuitive or deliberative. The more easily accessible a piece of information, the more likely the cognitive process is to be automatic. The above information is but a very brief overview of some of the major dual-systems models that have been proposed to explain the nature of human cognition. For further discussion of the development of dual-systems models, see Evans (2008).

While various dual-systems models have been proposed which add new characteristics to the different systems, there are times when authors have used different language to explain very similar concepts (Gigerenzer & Reiger, 1996). It has been argued that the labelling of similar concepts with different terminology makes it difficult to "…obtain objective and unequivocal empirical support for a valid and meaningful two-system partitioning" (Keren & Schul, 2009, p. 535). In other words, whereas explaining similar characteristics using different terminology may provide authors with a 'uniqueness' for their dual-systems theory, it limits the ability of researchers to clearly identify the characteristics which are assigned to each system. This confusion surrounding the terminology assigned to each system may explain why

minimal empirical evidence has been established for the existence of two separate processes of human cognition (Keren & Schul, 2009).

As a result of there being multiple dual-systems models of social cognition, it is not surprising that each model has small differences in certain characteristics associated with each system. Although there have been problems with consistency in the language used to explain these characteristics, the basic differences between the two systems remain relatively consistent throughout each dual-systems model. In order to highlight commonly mentioned differences between the two systems, Evans (2008) created four separate characteristic clusters that have been frequently used to distinguish them. The first of these clusters, and perhaps the most commonly-referred to characteristic, is the level of 'consciousness' predicted in each system. As mentioned above, the automatic system is assumed to be unconscious, while the controlled system is suggested to be a conscious process. The concept of 'consciousness' as referred to in dual-systems models is predicted to be closely linked to working memory processes (Evans, 2008). It is assumed that controlled processing requires access to a central working memory system which has a limited capacity for information, while automatic processing requires no access to working memory (Evans, 2008). This working memory system processes the information that individuals are currently aware of and are consciously processing and seems to be in line with the original construct of working memory as proposed by Baddeley and Hitch (1974). Although further definitions of working memory and its structure will not be discussed here (see Baddeley & Hitch, 1974), the associations of conscious thought with working memory can be used to explain why controlled processing is considered slow, sequential and limited in capacity.

The second of the characteristic clusters, labelled 'evolution', focuses on how the two systems have evolved over time and is mainly used to distinguish the two

systems in dual-systems models of the late 1990s (Evans & Over, 1996; Stanovich, 1999). This particular distinction between the two systems focuses on the assumption that automatic cognitions developed earlier in human history than more deliberative ones. Deliberative processing is thought to be unique to humans and is concerned with language, reflective consciousness and higher order control, as well as the ability to think about future possibilities. In contrast, it is argued that automatic processing is shared with animals (Evans, 2008). Unfortunately, the evolution distinction for dual-systems is somewhat flawed, with a major argument against it based on the observation that controlled processing may not be uniquely human. Research with animals, particularly that done with primates, suggests that these animals have the capacity for high-order mental representations (Toates, 2006; Whiten, 2000). Therefore, the evolution distinction is not one generally mentioned in more recent dual-systems models (Gawronski & Bodenhausen, 2006; Strack & Deutsch, 2004).

The next characteristic cluster focuses on functional characteristics of the two systems. The major distinction between the two systems in regards to this cluster is the slow and controlled versus rapid and automatic processing of information that is thought to occur in the separate systems. Further distinctions between the two systems based on their functional characteristics include the suggestion that the automatic processing system uses parallel processes in order to produce rapid processing and has a higher capacity for information than the deliberative system. In contrast, conscious thought is assumed to be sequential and limited in capacity (Evans, 2008). Another major distinction of importance is that automatic processing is suggested to be associative in nature while deliberative processing is rule-based. This particular characteristic has been argued by various authors (Gawronski & Bodenhausen, 2006;

Smith & DeCoster, 2000), and the associative nature of automatic processes will be discussed in greater detail later due to its importance to the current research project.

The final cluster used to differentiate the two systems is individual differences, with authors arguing that deliberative processing is related to general intelligence and working memory capacity (Stanovich, 1999), while automatic processing is independent of both factors. This argument is based on research which has found that inhibiting the controlled processing system by placing time constraints on responses leads to a greater likelihood of erroneous responses on certain reasoning tasks (De Neys, 2006a, 2006b; Roberts & Newton, 2001). This suggests that, regardless of general intelligence, when automatic processing is used all individuals are similar in their ability to perform certain reasoning tasks and may be equally prone to making incorrect decisions. Further discussion of the individual difference cluster is provided in the discussion below on the psychometric approach to empirical evidence for dual-systems modelling.

The Reflective-impulsive Model. The above characteristics are just some of the distinctions made between the automatic and deliberative systems as proposed in various dual-systems models. Although there are multiple dual-systems models applicable to social cognition, the one of particular interest for the current research project is the reflective-impulsive model (RIM; Strack & Deutsch, 2004). The RIM was chosen for further description because the authors have attempted to apply this model to various fields of psychological research, including the field of most interest for the current project, addictive behaviours (Deutsch & Strack, 2006). The RIM also differs from previously mentioned dual-systems models in that it accounts for a prediction of behaviour, not just judgments and information processing. Although the RIM attempts to outline some of the more complex processes in psychological research

- human cognitions and behaviour - using a dual-systems framework, it is not without its limitations. However, as Kruglanski and Orehek (2007) highlight, the RIM is "…more of a 'grand' psychological theory than are similar alternative dual-system frameworks in that it subsumes nearly all facets of psychological functioning" (p. 306). Therefore, it is one of the most comprehensive dual-systems models proposed in contemporary psychological research. It is again worth mentioning here that the RIM is a theoretical framework which takes a dual-systems approach in an attempt to understand human cognition and behaviour. Therefore, it is important to keep in mind that the description provided below is a set of assumptions pertaining to the theory behind the RIM as proposed by Strack and Deutsch (2004).

The RIM was initially developed to provide a dual-systems explanation of social behaviour and suggests that human behaviour is governed by an *impulsive* system which is responsible for influencing impulsive and automatic behaviour and a *reflective* system which is responsible for higher order mental operations that influence more deliberative behaviour (Strack & Deutsch, 2004). According to this model, the two systems operate interactively, can serve different functions and perform optimally under different boundary conditions (Deutsch & Strack, 2006). In the reflective system, behaviour is assumed to be governed by a decision process whereby the value and possible consequences are assessed and integrated into decisions to behave in particular ways. This system is also predicted to be responsible for making deliberative judgments and evaluations, creating strategic action plans for reaching certain goals and inhibiting or over-riding impulses. The decision-making processes linked to the reflective system are assumed to operate through relatively slow and controlled processes that are based on symbolic representations (Strack & Deutsch, 2004). The reflective system is also predicted to be responsible for the generation of judgments,

decisions and intentions and has a limited processing capacity that depends on ones intentions to behave in a particular way.

In contrast, the RIM assumes that the impulsive system is governed by impulses that are hypothesised to emerge from the activation of associative clusters in long-term memory by the actual or imagined input of different stimuli (Strack & Deutsch, 2004). It is also assumed that associative clusters are created or strengthened as a result of temporal or spatial co-activation of external stimuli, affective reactions to particular stimuli or associated behavioural tendencies based on previous learning experiences of the individual. For example, through repeated experience with alcohol, an associative cluster may be formed whereby the links between alcohol, the positive affective reactions of consuming alcohol, and the physical responses for consuming alcohol (e.g. putting alcohol into one's mouth) become associated. The RIM predicts that once an associative cluster is created, it can be reactivated quickly by stimulus exposure and provide an individual with a sense of 'prepardedness' such that the individual can evaluate and respond to an environment quickly in accordance with their needs or previous learning experiences (Hofmann, Friese, & Strack, 2009). These associative processes are hypothesised to need no attentional resources to become active and are independent of whether an individual actually endorses the nature of that associative link (Strack & Deutsch, 2004).

The RIM predicts that the impulsive system can influence behaviour relatively automatically by linking perceptual stimulation to behavioural schemata that have been created through previously learned associations (Deutsch & Strack, 2006). The impulsive system may also generate habit-like procedural memories, called behavioural schemata, whereby frequently occurring motor representations are paired with their antecedents and consequences. It is assumed that, through learning, concepts in the

impulsive system can also acquire an affective representation, resulting in positive or negative feelings toward an object (Deutsch & Strack, 2006). The linking of these affective valences can induce motivational orientations, such that an individual may either approach or avoid particular attitude objects. Last, the RIM assumes that the impulsive system is limited in its ability to combine concepts through abstract reasoning, suggesting that the impulsive system is purely responsible for immediate responses to a situation (Deutsch & Strack, 2006).

As mentioned previously, the RIM has been used in an attempt to explain why individuals engage in addictive behaviours such as alcohol consumption and drug use. Deutsch and Strack (2006) suggested that their model could be applied to addictive behaviours because some of the processes highlighted by addiction research could be linked to the reflective system (e.g. explicit drug-related expectancies) and some processes could be linked to the impulsive system (e.g. the development of drug habits). In regards to the valence of drugs, Deutsch and Strack (2006) assumed that drugs would be evaluatively ambivalent because consuming drugs often leads to immediate positive and delayed negative outcomes. If consumption of a drug usually ends with a negative behavioural state (e.g. hungover after consuming alcohol), then "…the drug and behavioural representations of its consumption will become associated not only with the positive consequences of its consumption, but also with aspects of the preceding negative state" (Deutsch & Strack, 2006, p. 51). This means that the associative cluster related to the drug may contain both positive and negative elements, leading to ambivalence. The argument for the development of ambivalent attitudes toward alcohol as proposed here is an important one will be discussed in greater detail later in this thesis.

Empirical evidence (or lack thereof) for dual-systems models. As mentioned previously, dual-systems accounts of social cognition often lack clear empirical evidence to support their existence. In contrast to this argument, Evans and Stanovich (2013) recently proposed that dual-systems models could be supported by a "…wide range of converging experimental, psychometric, and neuroscientific methods" (p. 224). Experimental methods for obtaining empirical evidence for dual-systems models focus on experiments that are designed to influence one type of processing system while having no influence on the other. For example, an experiment may suppress controlled processing by using tasks that load working memory or tasks that allow little time for reflective thought. Therefore, individuals are only able to use their automatic processing system to complete the task. In regards to neuroscientific methods, neural imaging may be used to show that different brains areas are activated when either automatic or controlled processing occurs. Also, a psychometric approach to distinguishing automatic and controlled processing draws upon correlational research which suggests that controlled processing is strongly correlated with an individual's cognitive ability, while automatic processing shows no such relationship (Evans & Stanovich, 2013).

In support of a division between controlled and automatic processing, Evans and Stanovich (2013) cite research looking at performance on the Wason selection task (Wason, 1968) and Tversky and Kahneman's (1983) conjuction problem. In the Wason selection task, participants are asked to decide how to test the truthfulness of a rule in the form of 'if *p,* then *q.'* Participants are then presented with four cards, each of which represents a single combination of *p* and *q* values. The selection task requires participants to make a decision regarding which cards to turn over in order to test the above rule. Due to only being able to see one side of each card, participants must

judge, based on what is on the visible side of the card, whether the invisible side is useful for testing the rule. Based on logic, the correct response would be to select the *p* and *not q* cards (Almor & Sloman, 2000). However, a typical finding for the Wason selection task is that participants will make an error in logic by selecting only the *p* card or both the *p* and *q* cards (Griggs & Cox, 1982).

In Tversky and Kahneman's (1983) conjuction problem, participants are asked to read a statement describing a fictional woman named Linda. They are then asked to rank three separate events based on their probability: 1) Linda is a bank teller, 2) Linda is active in the feminist movement, and 3) Linda is a bank teller and is active in the feminist movement. In their study using the conjunction problem, Tversky and Kahneman (1983) found that only 10-20% of participants ranked the 3rd event as being the least probable alternative. All other participants violated the conjuction rule, which suggests that the mathematical probability of a conjoint event (3rd event) cannot exceed that probability of any of its constituent events (1st and 2nd event).

Research indicates a decrease in logical accuracy on the above tasks when controlled processing is inhibited, such as when respondents perform tasks under time pressure (Evans & Curtis-Holmes, 2005) or concurrent working memory load (De Neys, 2006a). De Neys (2006a) found that participants making the conjunction fallacy when working on the Linda conjunction problem (e.g. "Linda is a feminist"; Tversky & Kahneman, 1983) responded quicker than participants who did not make this response. Further evidence (De Neys, 2006b; Roberts and Newton, 2001) focuses on performance of on the Wason selection task, with respondents making the intuitive "matching bias" response (choosing 'p' and 'q' as opposed to 'p' and 'not q') more often when they were placed under time constraints or when engaged in concurrent working memory tasks. These results suggest that when controlled processing is inhibited, responses may

be heavily influenced by automatic processing which can often be subject to belief biases leading to errors in responding.

When individuals are able to engage their controlled processing systems, belief biases are often discarded and the correct answers are obtained. For example, Evans, Handley, Neilens, Bacon and Over (2010) found that respondents with higher intellectual ability will suppress belief biases on the Wason and conjunction tasks mentioned above when they are specifically asked to think logically and draw appropriate conclusions (Evans et al., 2010). Researchers supporting a dual-systems approach suggest that individuals are able to engage their controlled processing system which overrides automatic reasoning and overcomes belief biases, producing the correct answer to reasoning problems. Therefore, the assumption of two separate systems to human reasoning is supported by findings on these reasoning tasks, with one system assumed to be governed by biases and the other by logic.

Other empirical evidence for a dual-systems division comes from the field of neuroscience. Evans (2008) suggests that research into neuroscience provides further evidence for a dual-systems approach to social cognition, with authors finding a neurological distinction between automatic and controlled processing. The so-called X-system, composed of the amygdala, lateral temporal cortex and basal ganglia, which are known to be used in relation to conditioning and associative learning, have been linked to automatic processing. In contrast, the C-system, consisting of the prefrontal cortex, cingulate cortex and the medial-temporal lobe are linked to the controlled aspects of processing (Lieberman, 2003; Lieberman, Jarcho, & Satpute, 2004). Other studies examining the neurological basis of dual-systems have used fMRI methodologies to find that different areas of the brain are activated when different reasoning (abstract or logical) was required to solve problems (Goel, Buchel, Frith, & Dolan, 2000; Goel &

Dolan, 2003). Therefore, it can be argued that there are different parts of the human

brain which may be responsible for different levels of processing, providing support for

a distinct dual-*systems* approach to social cognition.

The empirical evidence used by both Sloman (1996) and Evans and Stanovich

(2013) to justify a dual-systems have been interpreted differently by various authors.

For example, Osman (2004) suggested that the previously mentioned results on the

Wason and conjunction tasks can also be explained using a single-system framework

which does not divide automatic and controlled processing. Furthermore, Keren (2013)

argues that although the above research findings may be explained using dual-process

theories, they are also consistent with various alternative theoretical frameworks of

human cognition. This suggests that empirical evidence which may be used to support

a dual-systems approach is able to be explained with similar merit by contrasting

theoretical frameworks. Therefore, it still remains unknown which theoretical

framework of human reasoning – a dual-systems, multiple-systems or single-system

approach – is most effective in explaining these processes.

Unfortunately, it can be argued that the question of how many 'systems'

underlie human cognitive processes may not be an empirically testable one. Therefore,

it is possible that no single experiment will provide a definitive answer regarding the

processes behind human cognition. Further arguments against the dual-systems

distinction have focused on the neuroscientific findings mentioned earlier, with authors

(Nee, Berman, Moore, & Jonides, 2008) questioning the interpretation of these findings.

These authors argue that neurological evidence for automatic and controlled processing

remains scarce and should not provide the basis for major assumptions regarding the

dual nature of human cognitive processing. Therefore, further neurological evidence

for separate processing systems is required before such a distinction can be accurately made.

Alternatives to dual-systems models. Although dual-systems models have become some of the more widely used models for explaining social cognitive phenomena, various alternatives to these models have been proposed. Kruglanski and Orehek (2007) suggest that just as dual-systems models have been developing over time, so have alternatives to these models. One of the major arguments against the division of systems in dual-systems models relates to the association and rule-based split related to learning in the two systems. According to Kruglanski and Orehek (2007), there are evidence-based arguments suggesting that the two types of processes outlined in dual-systems models (associative and deliberative) are both forms of rule-based learning. Based on this reliance on rule-based learning, Kruglanski and Orehek (2007) argue that the two processes may actually be considered as different points along the same continuum, not separate processes.

Another major argument against dual-systems modelling is the lack of conceptual precision for the two proposed systems, making it difficult to empirically prove or disprove the arguments made in dual-processing accounts (Gawronski & Creighton, 2013). However, the same authors highlight that the argument for the distinction between single-process, dual-process or multiple-processes are ontological in nature, and cannot be tested empirically (Gawronski & Creighton, 2013). That is, due to the largely theoretical assumptions surrounding the distinction between the processes, it is difficult to state with full confidence how many systems govern human processing. For this reason, it is perhaps impossible to obtain a full understanding of the number of systems involved in social cognitive phenomena. Despite this, various

alternatives to the dual-systems approach to social cognition have been hypothesised

and applied in an attempt to explain human cognitive processes.

One possible alternative to dual-system models is the Unimodel (Kruglanski et

al., 2006; Kruglanski & Thompson, 1999; Kruglanski, Thompson, & Spiegel, 1999). In

the Unimodel, Kruglanski and colleagues outline a single-process model of human

judgment which focuses on syllogistic reasoning based on various pieces of evidence

such as, but not limited to, persuasive arguments and feelings. According to this model,

dual-systems approaches complicate human judgments by depicting complex variants

of the same mechanism. The Unimodel proposes that all judgments are essentially

governed by rules, with a particular emphasis on if-then contingencies that an organism

has learnt. What really separates the Unimodel from dual-systems models then is the

argument in the Unimodel approach that associative learning can represent an instance

of rule following as opposed to an automatic, non-rule based type of learning

(Kruglanski et al., 2006). In other words, dual-systems theories generally argue that

only controlled processing is rule-based, whereas the Unimodel argues that both

automatic and controlled processing can be governed by rules. In support of this,

Kruglanski and Orehek (2007) cite the work of Holyoak, Kohl, and Nisbett (1989) who

argued that classical conditioning can be explained through 'if-then' rules. For

example, the learning of a relationship between a light and a shock stimulus can be rule-

based, such that *if* a tone sounds, *then* a shock will occur. Therefore, the Unimodel

argues that a distinction between automatic and controlled processing is not necessary

as they are both governed by similar sets of rules and principles.

A major problem with the Unimodel approach is its focus on the influence of

human judgment on social cognition, as "judgment formation touches only the tip of the

iceberg of social cognition, which does not occur in mental isolation but in close

interaction with memory, affect, habits, and other nonjudgmental factors" (Deutsch & Strack, 2006, p. 169). Deutsch and Strack (2006) argue that accessibility of knowledge and affective reactions may influence the outcome of reasoning and result from independent memory or affect systems separate from judgments alone. However the concepts of affect and accessibility are not part of the Unimodel approach and without reference to these independent concepts, the model may be incomplete in its ability to explain human judgments.

Another single-process account for human cognition comes from the connectionist network approach, which suggests that knowledge is formed via a connection of "nodes" with identical properties (Smith & DeCoster, 1998). This approach has been used to explain how people acquire and generalise social knowledge and is similar to the associative networks outlined in the impulsive system of the RIM. The connectionist approach also assumes that associative properties may be responsible for deliberative processes. However, Deutsch and Strack (2006) suggest that because connectionist approaches used to simulate reflective functions often show the emergence of subsystems or use additional, qualitatively different processes (e.g. Van Overwalle & Siebler, 2005), the use of them as single- process accounts of cognitions is questionable. The alternative models proposed above are not without their flaws and dual-system approaches continue to be a popular psychological explanation for social cognitive processes. As a result of this, a dual-systems approach will continue to be used as the psychological framework for the current research project.

Implicit-explicit Attitude Distinction

Having examined dual-systems models of social cognition, a dual-systems framework will now be applied to one of the major research fields of social cognition, that of attitudes. An attitude can be defined as "…favourable or unfavourable

dispositions toward social objects, such as people, places, and policies" (Greenwald & Banaji, 1995, p. 7). This is just one of many definitions of an attitude, with a common theme in the general definition of attitudes being that they are summary evaluations of different objects which can range along a positive or negative dimension (Petty, Wegener, & Fabrigar, 1997). In 1954, Allport (as cited in Schwarz & Bohner, 2001) suggested that attitudes were the single most indispensable construct in social psychological research. Attitudes are considered so important to social cognitive research because they may have great influence over an individual's behaviour (Fazio, 1990). Therefore, attitude research is vital because it may help to explain and predict important aspects of human interaction. As a result of its importance, research into attitudes has been prolific in an attempt to provide a greater understanding of the structure and bases of this construct.

According to Gawronski and Bodenhausen (2006), the dual-systems approach so common in social cognition research is also dominant in the contemporary research of attitudes, which distinguishes between *explicit* and *implicit* attitudes in order to obtain a greater understanding of when attitudes may influence behaviour. It is worth noting that, similar to the dual-systems divisions discussed above, the explicit-implicit distinction is a theoretical framework that attempts to explain the nature of the attitude concept. Therefore, the characteristics assigned to each attitude construct, as defined below, are theoretical in nature. Fortunately, there has been a greater effort to empirically examine the differences between explicit and implicit attitudes than there has been for the automatic and controlled processing distinction. This empirical evidence is promising in highlighting a distinction between the two attitude constructs and will be discussed in greater detail later.

The first set of cognitions defined in a dual-systems approach to attitudes can be referred to as *explicit* cognitions. The investigation of these cognitions has dominated psychological research into attitudes over the past 80 years. Explicit attitudes are assumed to be intentional in nature, can be consciously accessed and are under cognitive control (Pieters, van der Vorst, Engels, & Wiers, 2010). According to the associative-propositional evaluation (APE) model proposed by Gawronski and Bodenhausen (2006), the explicit cognitive system is propositional and operates through controlled processes. As a result of being propositional, researchers (Gawronski & Bodenhausen, 2006; Strack, Werth, & Deutsch, 2006) argue that explicit cognitions are evaluative judgements about stimuli that are assigned truth values (e.g. 'I like flowers'). Additionally, explicit cognitions operate slowly, tend to be disrupted by other processes, and depend largely on intention. Therefore, similar to the reflective system in the RIM, explicit cognitions are suggested to be deliberative judgments that operate slowly and have a greater influence on rational human behaviour.

In contrast, implicit attitudes are a relatively recent introduction to the study of attitudes considering the level of psychological research dedicated to this construct. The first major application of implicit attitudes to social cognition research occurred less than 20 years ago (Greenwald & Banaji, 1995), with the authors defining implicit attitudes as "…introspectively unidentified (or inaccurately identified) traces of past experience that mediate favourable or unfavourable feeling, thought, or action toward social objects" (p. 8). Since the introduction of the implicit attitude construct, research focused on attitudes has experienced what some authors describe as a 'second measurement revolution' focused on the development of implicit attitude measures (Gawronski & LeBel, 2008). This so-called revolution has produced a large body of research, with Bohner and Dickel (2011) finding that in a five-year period from 2005 to

2010 alone, over 1700 articles have been published on implicit attitudes, indicating a large interest in this area.

As more recently defined by Pieters et al. (2010), implicit attitudes refer to associations in memory that influence cognitive and affective processes and behaviour in a relatively impulsive and automatic fashion. Implicit attitudes are hypothesised to be associative in nature and operate through automatic processes. These associations are similar to those described in the RIM, with automatic affective reactions resulting from previously created associations being activated automatically when a particular stimulus is encountered. These automatic processes require very little cognitive capacity or even an intention to consciously evaluate an object in order to be activated (Gawronski & Bodenhausen, 2006).

In their seminal article on implicit attitudes, Greenwald and Banaji (1995) highlighted the importance of dual-process models in the development of the implicit-explicit attitude distinction. The authors point out two separate dual-process models of social cognition, the ELM and HSM, as having relatively thoughtful (central or systematic) or thoughtless (peripheral or heuristic) levels of cognition linked to persuasion. Based on the two levels of processing predicted in dual-process models, it appears that there may be a link between these two theoretical analyses and the different forms of attitudes. Implicit attitudes as described by Greenwald and Banaji (1995) appear to be subsumed by the level of thoughtless processing described in the HSM, while explicit attitudes can be linked to thoughtful processing as outlined in the HSM. Therefore, as Whitfield and Jordan (2009) suggest, "Dual system models provide a useful framework for understanding implicit and explicit attitudes" (p. 748).

It is not surprising that there is a link between the explicit-implicit attitude distinction and dual-systems models of social cognition considering the similarity of characteristics assigned to each system and attitudinal concept. Although never mentioned in Strack and Deutsch's (2004) description of the RIM (as their model was focused on the explanation of social behaviour), the reflective and impulsive systems are closely related to the concepts of explicit and implicit attitudes. In fact, the characteristics assigned to the reflective system of the RIM can also be attributable to explicit cognitions, while the same can be said of the impulsive system of the RIM and implicit cognitions.

The characteristics of implicit and explicit attitudes mentioned above provide a clear distinction between two separate attitude constructs. Other major distinctions that can be made between implicit and explicit attitudes stem from the way these two constructs are measured and the processes through which these two types of attitudes can be changed (Gawronski & Bodenhausen, 2006; Rydell & McConnell, 2006). Briefly, the most common distinction between measures tapping into either explicit and implicit cognitions is that individuals completing explicit measures are assumed to be fully aware that a self-report of their attitude is being assessed, while in implicit measures individuals are unaware of what the measure is actually assessing (Petty, Fazio, & Briñol, 2009).

In relation to the processes through which explicit and implicit attitudes can be altered, it is argued that implicit attitudes can generally be changed or created through associative processes, while explicit attitudes are formed or altered through more propositional and rule-based processes (Gawronski & Bodenhausen, 2006). Discussion of the two distinctions between implicit and explicit attitudes mentioned above are covered in greater detail elsewhere in this paper, so they will not be discussed further

here (see Chapter 4: Methodology for discussion on implicit measures; see Chapter 3: Evaluative Conditioning and Implicit Attitude Change for discussion on the processes underlying implicit attitude change).

Much like the distinctions made between systems in dual-systems models of social cognition, the key differences between explicit and implicit attitudes focus on the level of consciousness, processing speed and level of cognitive control for both attitude constructs. However, the apparent distinction between explicit and implicit attitudes based on the characteristics mentioned above are purely theoretical. Empirical evidence must support the distinction between these attitude constructs in order to justify a division of attitudes in to two separate constructs. As mentioned previously, the lack of empirical evidence for a dual-systems approach to social cognition is a major limitation to these models (Gawronski & Creighton, 2013). Fortunately, Greenwald and Nosek (2009) suggest that there is more empirical research which provides evidence for a distinction between implicit and explicit attitudes. In their chapter, the authors examine the concept of attitudinal dissociation, which refers to the possible "…existences of distinct structural representations underlying distinguishable classes of attitude manifestation" (Greenwald & Nosek, 2009, p. 65). Evidence for a dissociation in attitudes can be found empirically by showing a different pattern of responding to measures of the same construct, and/or when responses have different relationships with other variables being measured. An example of this empirical dissociation is highlighted by Greenwald and Nosek (2009). In this study, attitudes toward age were assessed implicitly on an Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) and explicitly on three questions assessing self-reported attitudes toward old and young individuals on either Likert-scales or an 11-point thermometer rating scale.

The first piece of empirical evidence for an implicit-explicit dissociation comes from correlations between the explicit and implicit measures which produced only a weak positive correlation ($r = .16$). There was also a substantial difference in means for the two measures, with nearly one standard deviation difference between assessments of explicit and implicit attitudes. It was found that the implicit measure recorded attitudes that were significantly more positive toward younger people than the explicit measure. Another possible piece of evidence for empirical dissociation between attitudinal structures is the finding that chronological age had a significant relationship with the explicit but not implicit measure of attitudes. The above results suggest a possible dissociation between attitudinal systems by showing that (a) there is a low inter-correlation between two measures of the same construct, (b) a significant separation of means, and (c) different meaningful relationships to a third variable. Unfortunately, the pattern of results as listed above does not always occur, with attitudes toward political preferences showing very high positive correlations between explicit and implicit measures and very low differences between the means of implicit and explicit attitudes (Greenwald & Nosek, 2009). These results suggest that the relationship between explicit and implicit attitudes may vary based on the attitude being assessed (see Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005a for further discussion).

In order to further justify the interpretation of empirically separate constructs of implicit and explicit attitudes, validity-related evidence concerning the measures of these two constructs needs to be obtained. The measures of implicit and explicit attitudes should show discriminant validity by producing different patterns of relationships to other variables, suggesting that the two measures are not measuring the same construct. Second, they should also produce convergent validity, establishing that the two measures can warrant interpretation as measuring the same type of construct.

As Greenwald and Nosek (2009) suggest, this creates somewhat of a paradox of dissociation, in that the two measures must assess the same type, but different forms, of a particular construct. In regards to the discriminant validity of the measures, this has been met and shown in the correlations for attitudes toward age as reported above. This evidence for discriminant validity suggests that the terms implicit and explicit can be used to label separate attitude constructs. A study by Nosek and Smyth (2007) found convergent validity evidence for implicit attitudes by finding that there were significant correlations between implicit and explicit attitudes for five of seven attitude domains that they assessed. Furthermore, the authors also found that a two-attitude model was a statistically superior explanation of attitudes than a single-attitude model, suggesting that there may be two separate processes underlying attitudes (Nosek & Smyth, 2007).

Finding construct validity for both implicit and explicit measures may also help to support the explicit-implicit attitude distinction. The most important aspect of determining construct validity can be found when studies assess correlations between explicit and implicit attitude measurements and attitude-relevant behaviours. A meta-analysis of the relationship between attitude measurements and behaviour (Greenwald, Poehlman, Uhlmann, & Banaji, 2009) found that implicit attitude measures showed consistently positive relationships with behavioural indicators with an average effect size of $r = .27$. These relationships were found to be non-significantly influenced by potential moderators, in contrast to the relationship between explicit measures and behavioural indicators, which were found to be significantly influenced by moderators. These meta-analytic results show evidence for convergent validity of implicit and explicit self-report as separate measures of an attitude. The above validity findings provide some evidence that there may be an empirically testable distinction between explicit and implicit attitudes, over and above the theoretical differences that are

proposed in dual-systems models of attitudes. Although not conclusive, it is encouraging that empirical studies can produce some evidence for an explicit and implicit attitude distinction.

Despite the above evidence suggesting a possible implicit-explicit attitude distinction, there are authors who argue against such a distinction. Perhaps the most compelling of these arguments is related to the way in which implicit and explicit attitudes are measured. Instead of being structurally distinct attitudinal processes (Wilson et al., 2000), single-representation arguments suggest that all attitude manifestations are actually attributable to a single form of mental attitude representation (Fazio & Olson, 2003). Any illusion of attitude dissociation is due to the processes that are apparently different in implicit and explicit attitude *measurement*, rather than due to any difference in the attitude *construct* themselves. As Fazio and Olson (2003) highlight, research surrounding implicit attitudes has been "…surprisingly atheoretical. It [research on implicit attitudes] largely has been a methodological, empirically driven enterprise" (p. 301). As a result of this, the authors argue that there should not be a distinction made between explicit and implicit *attitudes,* but rather a distinction between implicit and explicit *measures* of attitudes (Fazio & Olson, 2003).

The above argument is definitely a valid one and whether or not implicit and explicit processes should be labelled as attitudes or simply an artefact of the nature of implicit measures is still debated in attitude research. However, for the purpose of this research, implicit and explicit attitudes will be used as labels throughout and they will be referring to what is being assessed on the different measures used in the current research project. Even though some authors may disagree with this distinction, for the ease of reporting the explicit and implicit attitude labels will be used here.

This chapter has provided an overview of dual-systems models and the application of such models to research focused on attitudes. The implicit-explicit attitude distinction that has been highlighted in this chapter is of particular importance to the current research project, as it focuses on the implicit attitude construct. Implicit attitudes have been defined in this chapter, as well as evidence being provided to suggest that these attitudes may be a separate construct from explicit attitudes. The next chapter will outline how implicit attitudes have been applied to different psychological research fields, with a particular interest in implicit alcohol-related attitudes. Furthermore, it will highlight how implicit attitudes can aid in the prediction of drinking behaviour.

Chapter 2: Implicit Attitudes and Alcohol Consumption

Alcohol Consumption in Australia

Alcohol occupies a significant place in Australian society and is consumed in a wide range of social circumstances; whether it is having a few drinks while socialising with friends, binge drinking on a weekend in preparation for a night out or simply having a drink after a hard day's work. According to the Australian Government Preventative Health Taskforce [(AGPHT), 2009], alcohol is an intrinsic part of Australian culture, acting as a relaxant, an accompaniment to celebrations and socialising, a major source of employment and exports as well as a generator of tax revenue. The Australian drinking culture has its historical roots in the first days of Australia's colonisation, with alcohol fulfilling many functions during early settlement. As Midford (2005) reports, hard currency during the early settlement of Australia was scarce so rum was used as an alternative form of payment between convicts, creating an environment where alcohol was consumed on a frequent basis.

To this day, the consumption of alcohol remains a widely practiced behaviour in Australia, with research indicating that in 2010, alcohol remained the most commonly used drug in Australia with over 80% of Australians aged over 14 consuming alcohol at least once in the previous 12 months. The next most widely used drug was tobacco, but only approximately 18% of Australians reported using it in the past 12 months [Australian Institute of Health and Welfare (AIHW), 2011]. The amount of alcohol consumed in Australia is considered high by world standards, with Australia in the top 20% of countries in the world in terms of alcohol consumed per capita [World Health Organisation (WHO), 2011]. A more recent study found that in 2010-11, over 80% of Australians aged 18 years and above had consumed alcohol in the past year with a higher percentage of males (87.6%) consuming alcohol than females (77.3%)

[Australian Bureau of Statistics (ABS), 2012]. Despite the large percentage of Australians reporting consuming alcohol, research suggests that alcohol is generally consumed in moderation, with approximately 73% of Australians reporting drinking below levels that are associated with long-term harm to physical or mental health (AIHW, 2010).

Although the majority of Australians report consuming alcohol in moderation, binge drinking remains a prominent feature of the Australian drinking culture. Binge drinking can be defined as occasions of drinking "…during which a person consumes an excessive and potentially harmful amount of alcohol in a single drinking episode" (Bonar et al., 2012, p. 187). In Australia, the 2009 NHMRC guidelines advise that in a single occasion of drinking, the risk of alcohol-related injury increases with the amount of alcohol consumed. The guidelines suggest that drinking no more than five standard drinks in a single drinking session reduces the short-term risk of alcohol-related injury (AIHW, 2011). According to this guideline, around one in every five Australians (20.4%) drink at risky levels at least once a month, equating to more than 42 million occasions of binge drinking in Australia each year (AGPHT, 2009). This research also indicated that males were far more likely than females to consume alcohol at risky levels. Furthermore, individuals aged between 15 and 29 were significantly more likely than any other age group to consume alcohol at risky levels (AGPHT, 2009). A Foundation of Alcohol Research and Education (FARE) study reported that around 27% of 18-24 year olds reported consuming more than five standard drinks in one session, while 6% of this age group consumed 11 drinks or more in a standard drinking session (2012). In support of these findings, the National Drug Strategy Household Survey 2013 (NDSHS; AIHW, 2014) found that 26% of 23,855 Australian respondents consumed alcohol at risky levels. The NDSHS also found that individuals aged 18-24

were more likely than any other age group to exceed the short-term risk drinking guidelines (AIHW, 2014). These figures suggest that excessive drinking sessions are a significant problem within the Australian population, particularly among the adolescent and young adult age groups.

Excessive and risky alcohol consumption can lead to a wide range of adverse health and social consequences that can harm both the drinker and those around them. When considering the health impacts of excessive alcohol consumption, it is important to consider both short-term and long-term impacts as both can result in significant morbidity and mortality (AGPHT, 2009). From a short-term health perspective, alcohol consumption can cause loss of balance, poor co-ordination, slower reaction times and thought processes, increased aggression and nausea or vomiting (Heinz, Beck, Meyer-Lindenberg, Sterzer, & Heinz, 2011; Modig, Patel, Magnusson, & Fransson,, 2012). These short-term effects can then lead to a greater likelihood of experiencing a long-term injury or even death through violent acts or vehicle accidents (either as a driver or being hit by a vehicle). Furthermore, it is estimated that about one-third of all self-inflicted injuries and suicides are able to be linked to alcohol consumption (Dietze, Room, Jolley, Matthews, & Chikritzhs, 2011; Rehm et al., 2009).

In Australia, it has been found that one in every four hospitalisations of 15 to 25 year olds occurs as a result of an alcohol-related incident, with 70 Australians under the age of 25 being hospitalised each week due to alcohol-fuelled assault (Australian Government, 2009). A recent study conducted by Dietze et al. (2011) assessed the adverse consequences related to drinking alcohol experienced in a sample of 1608 Australian adults. In this sample, 17% of the 18-24 year old respondents indicated that they had been injured in the past year as a result of an alcohol-fuelled incident, while

14% said they had been in a fight while drunk and another 14% claimed they were experiencing deteriorating physical health as a result of their drinking.

As well as leading to serious injuries and/or death while intoxicated, alcohol consumption can also have significant long-term adverse health outcomes. According to the WHO (2011), alcohol consumption is the third largest risk factor for disease and disability in the world, with alcohol being identified as a causal factor in 60 types of diseases (e.g. cancer, cirrhosis of the liver, cardiovascular diseases) and injuries and a component cause in 200 others (Rehm et al., 2011). In Australia alone, the consumption of alcohol accounts for 3.2% of the total burden of disease and injury (Begg, Vos, Barker, Stanley, & Lopez, 2008). Research by the WHO (2011) also showed that the consumption of alcohol contributes to more deaths than HIV/AIDS and tuberculosis by being a significant factor in almost 4% of all deaths worldwide. The harmful use of alcohol is a particularly grave threat to men, as it is the leading risk factor for death in males aged 15–39, mainly due to injuries, violence and cardiovascular diseases. Globally, 6.2% of all male deaths are attributable to alcohol, compared to 1.1% of female deaths (WHO, 2011). In the findings of the 2013 NDSHS (AIHW, 2014), alcohol overtook tobacco as being the drug thought to cause the most deaths in Australia for individuals over the age of 14. This suggests that Australians are gaining an increased awareness of the serious negative health outcomes that are associated with consuming alcohol.

The negative effects of risky alcohol consumption go beyond diseases and injuries to include a variety of adverse socioeconomic consequences, both for the drinker and for the wider community. The social consequences of alcohol consumption can include unintended harm to family members, friends and workmates, as well as to bystanders and strangers that can seriously damage or end important social relationships

(AGPHT, 2009). These impacts can include, but are not limited to, a loss of workforce productivity, healthcare services being used to treat individuals affected by alcohol-related disease or injury, property damage, and insurance administration (Collins & Lapsley, 2008). As well as these factors, perhaps the biggest social impact is the high levels of crime and violence related to alcohol consumption, which creates significant costs for justice and law enforcement sectors. Each of these previously mentioned issues can be seen as the social costs of alcohol consumption, which have been estimated to be over $10 billion a year in Australia alone (Collins & Lapsley, 2008).

Explicit Alcohol-related Cognitions

The information provided above clearly demonstrates that excessive alcohol consumption can have significant negative health and social effects on individuals and society generally. Despite these negative effects, alcohol continues to be consumed at risky levels in Australia, particularly in adolescent and young adult populations (AGPHT, 2009). In order to understand why individuals continue to consume alcohol in light of negative consequences, research has attempted to identify important psychological variables influencing the initiation and maintenance of drinking behaviour.

As highlighted by Houben, Wiers, and Roefs (2006), addiction-related cognitions have traditionally been measured using self-report assessments which require participants to use introspection. These self-report measures are hypothesised to tap in to an individual's explicit cognitions toward behaviours such as alcohol consumption. The assumption behind these self-report measures is that the respondent should be aware of and directly able to report the causes of their own behaviour (Pieters et al., 2010). In relation to alcohol consumption, individuals who perceive that the benefits of consuming alcohol outweigh the negatives are predicted to consume alcohol

more frequently and at greater quantities (Field & Wiers, 2012). Explicit measurements of alcohol-related cognitions have focused on constructs such as outcome expectancies, general alcohol-related attitudes and drinking motives in an attempt to explain and predict drinking behaviour. This means that respondents are directly asked about their attitudes towards, motives for and expectancy of outcomes related to consuming alcohol (Pieters et al., 2010).

According to some authors, alcohol-related expectancies have received the most attention in research focusing on explicit attitudes toward alcohol consumption (Wiers, van Woerden, Smulders, & de Jong, 2002). Alcohol-related expectancies can be defined as "…the beliefs individuals hold about the effects of alcohol on behaviour, moods and emotions" (Wiers et al., 2002, p. 648). Since the development of expectancy assessments of alcohol consumption, hundreds of studies have attempted to examine the relationship between expectancies and drinking behaviour (Goldman, Darkes, & Del Boca, 1999). A commonly used measure of alcohol expectancies is the Alcohol Expectancy Questionnaire (AEQ; Brown, Christiansen, & Goldman, 1987). The AEQ asks participants to indicate the extent of their agreement or disagreement with various statements related to alcohol consumption (e.g. "Alcohol makes me feel happy"). Research into alcohol expectancies has suggested that they are strongly correlated with current alcohol consumption levels and can account for up to 50% of the variability in self-reported concurrent drinking behaviour (Goldman et al., 1999; Wiers, Hoogeveen, Sergeant, & Gunning, 1997). Furthermore, studies have found that explicit alcohol-related expectancies are predictive of future drinking behaviour (Goldman & Darkes, 2004). In light of this predictive power, authors have argued that explicit alcohol-related expectancies are an important cognitive mediator of drinking behaviour (Goldman et al., 1999; Wiers et al., 2002).

Other influential frameworks focusing on explicit cognitions have been based on research examining motivational processes related to alcohol consumption (Cooper, 1994) and the theories of Reasoned Action and Planned Behavior (Ajzen, 1991; Fishbein & Ajzen, 1975). Within motivational research, the aim is to identify the reasons why individuals drink or the outcomes associated with drinking alcohol which motivate consumption. These motives can be split in to positive (e.g. drink alcohol to produce a positive mood) and negative reinforcement (e.g. drink alcohol to alleviate negative mood) motives, with research suggesting that those who strongly endorse negative reinforcement motives are more likely to consume alcohol at risky levels (Grant, Stewart, O'Connor, Blackwell, & Conrod, 2007).

As highlighted by Field and Wiers (2012), the relationships found between drinking motives, alcohol expectancies and actual drinking behaviour are consistent with theoretical models such as the Theory of Planned Behaviour (TPB; Ajzen, 1991). The TPB suggests that alcohol consumption is the result of controlled and deliberative decision-making processes such as alcohol expectancies and drinking motives. The prediction of health-risk behaviour (e.g. drink driving, consuming alcohol or smoking) has been dominated by single-process health behaviour models such as the TPB that rest upon the assumption of human rationality (Rooke & Hine, 2011). The TPB is one of the most widely used theoretical frameworks for understanding and predicting the performance of health behaviours (Conner & Sparks, 1996) and assumes that behaviour can be predicted by intentions. Furthermore, intentions themselves are hypothesised to be predicted by explicit attitudes toward performing a behaviour, perceived control over the performance of a behaviour and subjective norms (Ajzen, 1991).

Although a wide body of research has used the TPB to predict health-risk behaviour such as smoking and alcohol (Armitage, Conner, Loach, & Willetts, 1999;

Hanson, 1997; Marcoux & Shope, 1997; Norman, Bennett, & Lewis, 1998), the results of such research has shown the predictive power of the TPB to be quite poor for these behaviours. This was highlighted by McMillan and Conner (2003), who found that intentions and perceived behavioural control account for, on average, less than 10% of the variability in self-reported smoking behaviour and approximately 28% of variability in self-reported drinking behaviour. Further evidence for the poor validity of the TPB in predicting health-risk behaviours that are considered impulsive or irrational has been found for unprotected sex (Albarracín, Johnson, Fishbein, & Muellerleile, 2001; Webb & Sheeran, 2006), binge drinking and drink driving (Stacy, Bentler, & Flay, 1994).

This poor prediction may be a reflection of the impulsive nature of health-risk behaviour. Webb and Sheeran (2006) suggest that when there is a lack of control over behaviour or there is a chance that the behaviour is a social reaction to external circumstances, the performance of a behaviour is relatively automatic and the relationship between intention and behaviour is weakened. Therefore, it can be argued that for behaviour that can be considered irrational, such as health-risk behaviour, deliberative decision-making processes are less influential than they would be for rational or health-protective behaviour. Health-risk behaviour is considered irrational because the performance of such behaviour often leads to negative outcomes such as feelings of nausea as a result of consuming alcohol. It is argued that individuals behaving rationally would not engage in health-risk behaviour in order to avoid the negative outcomes this behaviour can produce. However, individuals still continue to consume alcohol at risky levels, suggesting that health-risk behaviour may not be solely influenced by rational decision-making. It can be argued then that impulsive and automatic processes may be better predictors of the performance of health-risk behaviour than more deliberative processes. However, by focusing on a single-process

account of behaviour, the TPB does not take these automatic processes into account,

leading to poorer predictions of impulsive or irrational behaviour.

Dual-systems Models of Addictive Behaviours

As well as the limitations of single-process models highlighted above, major

problems have been raised with the explicit assessment of cognitions related to a

particular set of health-risk behaviours, namely addictive behaviours such as alcohol

consumption and drug use. For example when explicit measures of alcohol-related

cognitions are used, respondents may not be willing or able to report their relevant

cognitions toward alcohol consumption. Factors such as social desirability may

influence explicit responses to questions surrounding attitudes toward alcohol, as being

portrayed as someone who enjoys consuming alcohol may be undesirable or have

implications for that respondent. For example, as Payne, Govorun and Arbuckle (2008)

suggest, "In certain quantities or in certain company, drinking may be unpopular to

admit, leading people to misreport their thoughts and behaviour" (p. 238). Therefore,

responses to questions assessing the performance of addictive behaviours may be

vulnerable to being altered to produce a more socially-appropriate response set.

It has also been argued that the "…cognitive-motivational processes mediating

addiction are not accessible through conscious introspection" (Houben et al., 2006, p.

91). For example, heavy drinkers may not be able to report the reasons or motivation

behind their drinking behaviour, and can often report more negative outcomes of

alcohol consumption than positives (de Visser & Smith, 2007). This means that

although they are explicitly aware of the negative consequences of consuming alcohol

or using drugs, there may be unconscious or automatic processes that are influential in

the continued performance of these irrational health-risk behaviours. This has been

highlighted by research from various authors who argued that the measurement of

automatic processes may be more appropriate for assessing the cognitions and motivations behind alcohol consumption and other addictive behaviours (e.g. McCusker, 2001; Stacy, 1997). The limitations of explicit measures of addictive behaviours as outlined above have led to the development of dual-systems models which use implicit and explicit measures of cognitions in order to obtain a greater understanding of these types of behaviours.

As stated in the previous chapter, dual-systems models are among the most commonly used theoretical frameworks in social cognitive research. However, dual-systems models are not restricted to this research field and they have recently been used to aid the prediction and explanation of addictive behaviours (Deutsch & Strack, 2006; Wiers et al., 2007). Dual-systems approaches to addictive behaviours suggest that these behaviours develop as a result of the imbalances between deliberative and automatic processes (Pieters et al., 2010). Therefore, although dual-systems models can be applied to different research fields, the characteristics of the two systems remain the same. For a quick recap of the two systems, the implicit system focuses on automatic appraisals of stimuli based on their affective and motivational value, while the explicit system includes controlled processes which are related to conscious and deliberative decision-making and expectations of behavioural outcomes (Pieters et al., 2010).

In their 2008 article, Hofmann, Friese and Wiers applied a dual-systems approach in an attempt to provide a more detailed explanation of health behaviour. In this article, the authors argue that when considering the performance of health-related behaviours, conflict often arises between immediate impulses and reasoned attitudes that attempt to refrain from acting on these impulses. Hofmann et al. (2008a) suggest that past research has primarily focused on explicit processes related to the performance of health behaviour, with the influence of impulsive processes receiving considerably

less attention. The authors argue that, in order to obtain a more complete model of health-related behaviour both impulsive and deliberative processes must be taken in to account (Hofmann et al., 2008a). Therefore, Hofmann et al. (2008a) use the reflective-impulsive model (RIM; Strack & Deutsch, 2004) as a framework for their dual-systems approach to health behaviours. As mentioned in the previous chapter, the authors of the RIM have applied their theoretical framework to addictive behaviours in an attempt to explain the processes which may influence the performance of these types of behaviours (Deutsch & Strack, 2006). However, Hofmann et al. (2008a) expand upon the application of the RIM to addictive behaviours by providing empirical evidence to support such an application.

An early piece of empirical evidence to support a dual-systems approach to health behaviour focused on the influence of cognitive load on food choice between chocolate and fruit (Friese, Hofmann, & Wänke, 2008). In this study, participants completed an Implicit Association Test (IAT; Greenwald et al., 1998) to assess implicit attitudes toward fruit compared to chocolate stimuli as well as self-reported attitudes toward both chocolate and fruit. Participants were then randomly allocated to a high or low cognitive load group, with the low cognitive load group asked to remember a 1-digit number when performing the food choice task and the high cognitive load group asked to remember an 8-digit number when making their choice. The results from this study indicated that implicit attitudes were more predictive of food choice for participants under high cognitive load than for participants under low cognitive load. This suggests that, when placed under cognitive load, impulsive processes may better predict behaviour. This finding supports one of the key assumptions of the RIM in that automatic processes become more influential on decisions and behaviour when controlled processing is inhibited.

Other supporting empirical evidence can be found in studies focused on the influence of working memory capacity on impulsive and controlled processing. Numerous studies have shown that implicit attitudes are significant predictors of health-related behaviours for individuals low in working memory capacity, while explicit attitudes are more predictive of behaviours for individuals high in working memory capacity (Grenard et al., 2008; Hofmann, Gschwendner, Friese, Wiers, & Schmitt, 2008b). For example, Grenard et al. (2008) examined implicit attitudes toward drugs in 145 adolescents by asking them to complete word association tasks (e.g. write the first word that comes to mind when you think of the word '*draft'*). All participants also completed a measure of their working memory capacity and reported the frequency of their cigarette and alcohol use in the past 30 days. The results from this study indicate that implicit attitudes were more predictive of drug use in participants with a low working memory capacity than they were for participants with a high working memory capacity. The above findings provide support for another key assumption of dual-systems theories; that working memory capacity may moderate the relationship between cognitions and behaviour (Evans, 2008; Stanovich, 1999). More specifically, automatic cognitions are more predictive of behaviour for individuals with low working memory capacity compared to individuals with high working memory capacity. The above empirical evidence suggests that health behaviour may be governed by automatic and controlled processes, as the evidence supports some of the major assumptions made by popular dual-systems frameworks.

Implicit Health-related Attitudes

Using a dual-systems framework may be particularly important for explaining why individuals initiate and maintain drinking behaviour. As mentioned earlier, consuming alcohol at risky levels is associated with various health- and social-related

harms (AIHW, 2014; Collins & Lapsley, 2008; WHO, 2011). In light of these negative outcomes, it can be argued that an individual making a rational decision to consume alcohol would consider the possible negative outcomes and make a decision not to consume alcohol. However, in light of knowledge of the negatives associated with drinking behaviour, alcohol remains the most commonly consumed drug in Australia (AIHW, 2011). Therefore, it appears as though, in consuming excessive amounts of alcohol, individuals may not be behaving rationally. This suggests that other, more impulsive or automatic factors, may have a major influence over the performance of drinking behaviour. As a result of this assumption, authors have provided theoretical assumptions which provide a possible interpretation of how impulsive processes may influence alcohol consumption (Wiers et al., 2007). Some of these assumptions are provided below and outline one possible explanation for why individuals initiate and then maintain their drinking behaviour in light of negative outcomes.

As the focus of this research project is on the impulsive system associated with alcohol consumption, a quick recap of the impulsive system of the RIM (Strack & Deutsch, 2004) and how it applies to drinking behaviour will be discussed here. Within the impulsive system, it is assumed that associative clusters are created or strengthened by the temporal co-activation of external stimuli, affective reactions and behavioural tendencies (Strack & Deutsch, 2004). These associative clusters are predicted to reflect the learning history of an individual, so someone who has had more positive experiences when consuming alcohol would be assumed to have stronger positive-alcohol associations than those who have had more negative experiences with alcohol. It is predicted that once an associative cluster has been formed, it can be reactivated quickly through exposure to relevant stimuli or internal triggering conditions such as thirst (Ferguson & Bargh, 2004).

Research into drinking behaviour suggests that the consumption of alcohol inhibits the ability of the reflective system to symbolically represent deliberative attitudes and to monitor actual behaviour with these explicit representations (Fillmore & Vogel-Sprott, 1998; Hofmann et al., 2008a). Therefore, even though people may be perfectly aware of the negative consequences associated with alcohol, the negative valence associated with these consequences is assumed to be stored in the reflective system which may become inhibited when alcohol is consumed. Authors argue that, when the reflective system is inhibited, the inhibitory or over-riding behaviours necessary for effective self-regulation may not activate and the impulsive system may take control over behaviour (Hofmann et al., 2008a). With regular alcohol consumption, it is predicted that the impulsive system may begin to automatically assign increased motivational value and positive affect to alcohol-related stimuli and cues (Houben, Havermans, & Wiers, 2010a). This leads to the assumption that whenever an individual encounters alcohol-related cues or stimuli, their automatic or implicit processes may be activated and generate strong impulses to consume alcohol. Therefore, if someone is thirsty and sees a bottle of beer sitting on a table, it is predicted that associative clusters relating to a positive evaluation of beer may be activated, followed by an automatic behavioural schemata to approach and consume the beer (Deutsch & Strack, 2006).

These impulsive processes are hypothesised to influence behaviour faster than deliberate decision-making processes and a decision may be made to consume alcohol before any real thought is given to the consequences (Wiers et al., 2007). Additionally, due to the intoxicating nature of alcohol, the more of the substance that is consumed, the less rational the person may become (Peele & Grant, 1999). In other words, it is assumed that with each drink consumed, the ability to rationally refuse an offer to have

another drink may be reduced. It can be argued then that the only time an individual may be able to rationally refuse an alcoholic beverage is before any drinks are consumed. However, an individual who has developed positive alcohol-related implicit cognitions may have a reduced ability to rationally refuse an alcoholic drink even before they consume any alcohol. Furthermore, associative processes are assumed to influence behaviour and cognitions unconsciously and are independent of any truth values (i.e. whether the individual believes the association is true or false) (Gawronski & Bodenhausen, 2006). Therefore, even if an individual is consciously aware that alcohol consumption may lead to negative outcomes, automatic associative processes may still influence drinking behaviour due to an alcohol-positive-approach associative cluster. This highlights the possible importance of automatic processes in the performance of drinking behaviour.

Implicit Attitudes

As a result of the emergence of the application of dual-systems models to addictive behaviours, research has begun to explore the value of implicit measures for assessing the more impulsive cognitions that may be related to these behaviours (Houben & Wiers, 2006, 2008a; McCarthy & Thompsen, 2006). Research suggests that indirect attitude assessments may be able to assess implicit cognitions which are activated automatically and can influence behaviour outside of one's conscious awareness (Gawronski, Hofmann, & Wilbur, 2006). A greater discussion of implicit measures occurs later in *Chapter 4: Methodology*. However, the rationale behind the measurement of implicit attitudes toward alcohol consumption will be outlined in greater detail below.

Measurement of implicit cognitions related to addictive behaviours can be split into three separate research areas. These three areas include automatic approach/avoid

tendencies, attentional biases for substance-related cues and memory associations incorporating automatic evaluations of drug-related stimuli. Various studies have found that each of these three factors, when assessed separately, can significantly predict drinking behaviour over and above explicit cognitions (Jones, Jones, Blundell, & Bruce, 2002; Houben & Wiers, 2008a; Palfai & Ostafin, 2003). Due to their apparent predictive power for alcohol consumption, each of the three factors has received considerable attention and separate measures assumed to assess each construct have been created. The majority of these measures use reaction times to gauge an individual's implicit evaluations toward a certain target object. For example, attentional bias research is typically conducted with an altered Stroop task which requires participants to name the font colour of substance-related or control words (Cox, Fadardi, & Pothos, 2006). The difference in reaction time to identify control compared to substance-related words is then used to infer attentional biases. In contrast, the IAT (Greenwald et al., 1998) is the most popular measure for assessing memory associations and evaluative reactions toward different substances. This set of implicit cognitions are the main focus of the current study so their application to alcohol research will be discussed in greater detail later.

Since their application to health-related research, studies using indirect measures to assess implicit attitudes toward health behaviours have been extensive, with implicit attitudes adding predictive power to the explanation of behaviours such as condom use (Stacy, Ames, Ullman, Zogg, & Leigh, 2006), smoking (Payne, McClernon, & Dobbins, 2007), unhealthy snacking (Conner, Perugini, O'Gorman, Ayres, & Prestwich, 2007), exercise (Calitri, Lowe, Eves, & Bennett, 2009) and alcohol consumption (Wiers et al., 2002). A meta-analysis of 72 studies examining the relationship between implicit attitudes and substance use found an average sample-weighted correlation of $r = .27$

(Rooke, Hine, & Thorsteinsson, 2008), suggesting that implicit cognitions may be reliably associated with, and an important predictor of, substance use.

Implicit Alcohol-related Attitudes

As outlined by Reich, Below, and Goldman (2010), the number of studies assessing explicit alcohol-related cognitions number into the thousands. In contrast, a meta-analysis of studies using implicit measures to assess alcohol-related cognitions only found 48 studies (Rooke et al., 2008). Although more studies would have been conducted since the 2008 assessment, studies examining implicit attitudes toward alcohol consumption remain in their infancy when compared to studies assessing explicit cognitions and drinking behaviour. However, with the rise of implicit measurement, a greater understanding of the automatic processes that may underlie drinking behaviour is being generated.

Perhaps the first implicit assessment of alcohol consumption was conducted by Stacy (1997) using a free association task. In this task, participants were asked to produce responses to various words as quickly as they could. The stimuli used for this task were ambiguous words which could have been interpreted as having a meaning related to alcohol consumption (e.g. draft, pitcher) and various words related to alcohol expectancies (e.g. relaxation). Participants were shown these words then asked to think of and report the first word that came to mind. For an explicit measure of alcohol cognitions, participants were required to provide three positive outcomes of drinking behaviour. The results from this research found a significant positive correlation between the explicit and implicit measure ($r = .23$), with both measures predicting drinking behaviour. Furthermore, the implicit measure accounted for a larger portion of variability in drinking behaviour than the explicit measure, providing the first evidence for the value of implicit measures when assessing alcohol consumption (Stacy, 1997).

Although the first study assessing alcohol-related implicit attitudes used a free association task (Stacy, 1997), Houben and Wiers (2008b) suggest that the majority of research looking at alcohol-related implicit cognitions have been conducted with different varieties of the IAT (Greenwald et al., 1998). As the IAT is the implicit attitude measure being used in the current research project, this overview of implicit alcohol-related attitudes will be focused on research using the IAT. Furthermore, although there have been many different alcohol-related IAT variants proposed and tested (see Lindgren et al., 2012), this overview will focus on the bipolar and unipolar affective variants as they are the variants that were used in the current research project. Before getting in to the application of the IAT to alcohol-related research, a brief overview of the IAT design will be given below. Further discussion of the IAT takes place in *Chapter 4: Methodology*.

The Implicit Association Test

According to various authors (Fazio & Olson, 2003; Glashouwer, Smulders, de Jong, Roefs, & Wiers, 2013), the most well-known and widely used measure of implicit attitudes is the IAT (Greenwald et al., 1998). The IAT is a method that is hypothesised to indirectly assess the strengths of associations between different concepts (Nosek, Greenwald, & Banaji, 2007). Perhaps the most commonly used variant of IAT, and the one used in the current study, is the bipolar IAT. This particular variant can be defined as a classification task which involves participants categorising two target categories (e.g. flowers and insects) and two attribute categories (e.g. positive and negative words) using two separate response keys. The central tenet of the IAT is that this classification task should be significantly easier for participants, as shown by faster reaction times in response to the stimuli, when the response assignment of the target and attribute categories are compatible or correspond to the subject's implicit associations

(Greenwald et al., 1998). Therefore, the performance difference in reaction times between the two response assignments is suggested to reflect the strength of the associations of the attribute categories with the target categories, and thus the subject's implicit cognitions about that target (Houben & Wiers, 2007).

Generally, the IAT consists of seven phases with differing numbers of trials depending on the number of exemplars used for each category (see Table 1). The IAT includes practice phases (B1, B2 and B5) that enable subjects to acquaint themselves with the stimuli and the sorting rules. The critical IAT phases (B3 B4, B6 and B7) involve the sorting of exemplars from four different concepts (insects, flowers, positive, negative) with two separate response options. In the initial critical phases (B3 and B4), and positive stimuli are paired with the 'q' response key, while soft drink and negative stimuli are paired with the 'p' key. In the second critical phase (B6 and B7), the target stimuli have now swapped response keys. For subjects with positive implicit attitudes toward insects, the categorisation task should be much easier in the initial critical phase than the second critical phase. There are various limitations of the IAT procedure and arguments surrounding the nature of the IAT score produced when the task is completed. However, discussion of these limitations will occur in further detail in *Chapter 4: Methodology*.

Table 1

Overview of the Bipolar Affective IAT Procedure

Block	Number of trials	Left-key response ('q')	Right key response ('p')
B1	20	Insect words	Flower words
B2	20	Positive words	Negative words
B3	40	Insect + Positive	Flower + Negative
B4	40	Insect + Positive	Flower + Negative
B5	20	Flower words	Insect words
B6	40	Flower + Positive	Insect + Negative
B7	40	Flower + Positive	Insect + Negative

Alcohol-related Implicit Association Tests. In regards to alcohol-related research, bipolar and unipolar IAT variants have been frequently used to assess implicit attitudes toward alcohol consumption. While both variants will be discussed in greater detail below, bipolar variants contain two target categories whereby alcohol is typically paired with soft drink related stimuli. The bipolar variant thus provides a measure of implicit attitudes toward alcohol consumption in comparison to another target object. In contrast, the unipolar variant measures implicit attitudes toward alcohol consumption without a comparison target and allows for a more focused and direct measure of implicit alcohol-related attitudes.

The bipolar alcohol-related IAT has two target and two attribute categories, with the target categories being alcohol and soft-drink related words and the two attribute categories being positively and negatively valenced words. The first study to assess implicit alcohol-related cognitions used the bipolar affective IAT to compare implicit cognitions between heavy and light drinkers (Wiers et al., 2002). Two separate IAT

variants, a valence IAT and an arousal IAT, were administered to 48 undergraduate participants. The target categories in both IATs were alcohol or soft drink words, while the attribute categories varied between the separate measures. In the valence IAT, the attribute categories were positively (e.g. sociable, good) or negatively (e.g. antisocial, bad) valenced words, while in the arousal IAT the attribute categories were either arousal (e.g. energetic) or sedation-related (e.g. relaxed) words.

For the affective IAT, it was found that both light and heavy drinkers could more easily pair alcohol with a negatively valenced category and soft drink with a positively valenced category than vice versa, suggesting that implicit attitudes may not be able to distinguish between risky and non-risky drinkers. However, the arousal IAT was successful in finding significant differences between light and heavy drinkers. More specifically, heavy drinkers were faster at responding when alcohol and arousal categories were paired than were light drinkers (Wiers et al., 2002). Similar findings with an arousal-sedation IAT were found with a sample of heavy drinkers (Wiers, van de Luitgaarden, van den Wildenberg, & Smulders, 2005) and in a sample of alcohol-dependent patients (De Houwer, Crombez, Koster, & De Beul, 2004). Although the arousal IAT has produced some promising results, it does not fit with the intended purpose of the current research project and will not be used. Therefore, no further discussion of it will be provided here.

In another study, Houben, Nosek and Wiers (2010c) compared six different IAT variants using either bipolar or unipolar designs. The stimuli used in these IATs were either general positive (e.g. love, sunshine) or negative (e.g. sorrow, pain) stimuli or positive (e.g. talkative, excited) or negative (e.g. nauseous, miserable) alcohol-related affective stimuli. This study found that both bipolar variants (general and alcohol-affective) and the alcohol-positive unipolar variants were related to self-report drinking

behaviours, while the alcohol-negative unipolar variants were not. The authors concluded their evaluation of the different IAT variants by suggesting that the bipolar alcohol-related affective IAT outperformed all other IATs being tested. The suggestion was based on the finding that this particular variant had stronger relationships with explicit alcohol-related cognitions and drinking behaviour than did the other IAT variations. The results of Houben et al. (2010c) guided the selection of IAT variant that was used for the current research, with bipolar alcohol-related affective IATs used in the first three studies of this project.

Although Houben et al. (2010c) found the bipolar design to be the most successful in predicting drinking behaviour, a possible issue with the bipolar variant is that it cannot reveal implicit attitudes toward a single target. Instead, the bipolar variant measures the relative strength of pairs of implicit attitudes (e.g. alcohol with positive *and* soft drink with negative). This is particularly problematic when a target does not have a direct contrast or when researchers may be interested in implicit attitudes toward a single target such as alcohol (Houben & Wiers, 2008b). To overcome these issues, unipolar variants of alcohol-related IATs have been proposed and used extensively in alcohol-related implicit attitude research (Houben & Wiers, 2006, 2008; McCarthy & Thompsen, 2006). There have been a couple of different unipolar variants, with single category IATs (SC-IATs) and single target IATs (ST-IAT; Wigboldus, Holland, van Knippenberg, 2006) being proposed. Firstly, SC-IATs maintain the use of two targets (e.g. alcohol and soft drink), but contrast them with a single attribute category (e.g. positively or negatively valenced words) and neutral words. By using a SC-IAT variant, the strength of positive or negative implicit associations with the two target objects can be assessed separately.

A study by McCarthy and Thompsen (2006) used the SC-IAT to assess implicit attitudes toward alcohol and smoking in a sample of 227 young adults. In the alcohol-related positive SC-IAT, two target categories (alcohol and mammals) were paired with either positive (e.g. happy, attractive) or neutral (e.g. basic, historical) words. For the alcohol-related negative SC-IAT, the same two target categories were paired with either negative (e.g. dangerous, sick) or neutral words (e.g. daily, digital). Explicit alcohol-related expectancies and self-reported drinking behaviour were also assessed in this study. For alcohol consumption, the scores from the positive SC-IAT were related to more positive explicit alcohol expectancies and higher levels of self-reported drinking behaviour. Negative SC-IAT scores showed no relationship to drinking behaviour. Other studies using the SC-IAT have also found that individuals with positive implicit alcohol-related associations also report consuming greater quantities of alcohol than those individuals with negative or neutral implicit alcohol-related cognitions (Houben & Wiers, 2006; Jajodia & Earleywine, 2003).

Another unipolar variant of the IAT is the ST-IAT which pairs a single target (e.g. alcohol) category with two attribute categories (e.g. positive and neutral words). Therefore, the contrast between two target categories, as is common in the bipolar IAT and the SC-IAT, is eliminated and implicit attitudes toward a single target object are assessed. A study by Houben and Wiers (2008a) used an SC-IAT and ST-IAT to assess implicit attitudes toward alcohol in a sample of 62 females (Houben & Wiers, 2008a). In this study, participants completed an SC-IAT pairing alcohol and soft drink with positive and neutral or negative and neutral words, as well as an ST-IAT pairing alcohol only words with positive and neutral or negative and neutral words. Explicit measures of participants' attitudes and expectancies toward alcohol consumption were also assessed. Results with the SC-IAT were similar to those reported above, with positive

implicit alcohol-related attitudes predicting drinking behaviour beyond the variance explained by explicit alcohol-related cognitions (Houben & Wiers, 2008a). In contrast, negative implicit attitudes toward alcohol were unrelated to drinking behaviour. Results using the ST-IAT were the same as those from the SC-IAT, with only scores on the positive ST-IAT being related to drinking behaviour and scores on the negative ST-IAT showing no relationship with drinking behaviour. These findings provide further evidence for the argument that only positive implicit attitudes are related to drinking behaviour.

Another implicit measurement which uses a similar design to the ST-IAT is the Extrinsic Affective Simon Task (EAST; De Houwer, 2003). In the EAST, participants press a particular response key on a computer keyboard for positive words and another response key for negatively valenced words, therefore associating those keys with a positive or negative valence. Next, target words (e.g. alcohol and soft drink) are presented in different colours to the valenced words (e.g. valenced words shown in white, alcohol words shown in blue and soft drink words shown in green). Participants are then instructed to press the positive key for words presented in one colour and the negative key for words presented in the different colour. The basic premise of the EAST is similar to that of the IAT, with implicit attitudes being measured through reaction time to stimuli. For example, a participant who takes less time to respond to alcohol-related words when paired with the positive as opposed to the negative response key is assumed to have positive implicit alcohol-related attitudes.

A study by De Houwer and De Bruycker (2007a) examined the predictive power of the EAST in relation to drinking behaviour. In this study, 39 participants completed an alcohol-related EAST task and explicit measures of their alcohol-related attitudes. Unlike the results using a bipolar IAT (Wiers et al., 2002), the results from this study

found a differentiation between heavy (10 or more drinks in a single session) and light

drinkers (3 or less drinks in a single session), with heavy drinkers showing more

positive implicit alcohol-related attitudes than light drinkers. Furthermore, implicit

attitudes were significantly correlated with explicit alcohol-related attitudes and implicit

attitudes were found to be predictive of self-reported frequency and quantity of alcohol

consumption even after controlling for explicit attitudes (De Houwer & De Bruycker,

2007a). Although the above provides some promising results, the reliability and

validity of the EAST has been found to be worse than that of the IAT (De Houwer &

De Bruycker, 2007b; Schmukle & Egloff, 2006; Teige, Schnabel, Banse, & Asendorpf,

2004) so use of this implicit attitude measurement is questionable.

In relation to the choice of implicit attitude measure for the current project, the

bipolar variant was chosen to assess alcohol-related implicit attitudes in Studies 1-3 and

a unipolar variant was chosen for Study 5. The bipolar variant was initially chosen

because results from Houben et al. (2010c), which examined the utility of several IAT

variants, found the bipolar IAT to be the most valid and reliable measure of alcohol-

related implicit attitudes. In regards to Study 5, the unipolar variant was chosen

because a more focused approach to alcohol-related implicit attitude measurement was

required, whereby attitudes toward alcohol could be assessed without comparison to

another target object.

To summarise the importance of implicit attitude measurement for alcohol

consumption, a meta-analysis of studies examining the relationship between implicit

attitudes and drinking behaviour found an average sample-weighted correlation of r

$=.35$ (Reich et al., 2010). Furthermore, the unique effect of implicit attitudes on

drinking behaviour after explicit attitudes had been taken into account was $r = .23$

(Reich et al., 2010). Although this is a relatively modest value, the results suggest that

implicit attitude measurements may be important for the prediction of drinking behaviour. The research listed above also suggests that holding positive implicit attitudes toward alcohol is of particular importance, as it is these positive associations which have been consistently found to be predictive of drinking behaviour. Therefore, a greater understanding of how positive implicit attitudes toward alcohol are formed, or if implicit attitudes can be manipulated to be more or less positive, is of particular interest.

The current chapter focused on the construct of implicit attitudes and how they relate to alcohol consumption. This chapter has highlighted the importance of implicit attitude measurement in order to obtain a greater understanding of the cognitive processes associated with the initiation and maintenance of drinking behaviour. The next chapter focuses on attitude change, with a particular focus on how implicit attitudes can be formed or altered.

Chapter 3: Evaluative Conditioning and Implicit Attitude Change

Explicit Attitude Change

As described previously, attitudes can be defined as summary evaluations of different objects, people or ideas (Petty et al., 1997). These evaluations are assumed to be positive, negative or neutral and can refer to very broad and abstract constructs or very concrete and specific objects. Research into the formation and alteration of attitudes is of vital importance because attitudes are argued to guide behaviour (Fazio, 1990). Therefore, if research can shed light on how attitudes can be manipulated, it may lead the way for changing an individual's behaviour. Of particular interest for this thesis is how implicit attitudes can be altered. However, before examining implicit attitude change, a brief discussion of some of the major theories in explicit attitude change will occur below.

According to Briñol, McCaslin and Petty (2012), most research focused on attitude change research has examined how relatively deliberative cognitive processes can influence explicit attitudes. When attempting to address the issue of how explicit attitudes can be changed, dual-process models of persuasion have been able to shed some light on the conditions under which different kinds of message cues are able to influence explicit evaluations. As reported by Crano and Prislin (2006), "…the dual-process models remain today's most influential persuasion paradigms, as they have been since their inception" (p. 348). Perhaps two of the most well-known dual-process models of persuasion are Petty and Cacioppo's (1986) Elaboration Likelihood Model (ELM) and the Heuristic-Systematic Model (HSM) developed by Chaiken et al. (1989). These two models were proposed in an attempt to obtain a greater understanding of the conditions under which cognitive processes could produce change in explicit attitudes. Petty et al. (1997) argue that the ELM and HSM have maintained their popularity over

the years due to the multitude of persuasion processes, variables and outcomes they encompass.

The major assumption of the ELM is that the modification of an individual's attitudes can be achieved through either high or low levels of cognitive elaboration. Being a dual-process model, the ELM claims that explicit attitudes can be altered or formed through either a central or peripheral route to persuasion (Petty & Cacioppo, 1986). The central route to persuasion focuses on the central cues of a message which generally refer to the quality of the argument being presented in the message. On the other hand, the peripheral route focuses on the peripheral cues of a message which can be factors such as the likeability and credibility of the source providing the message. Research has shown that individuals who process messages with low cognitive elaboration are more likely to be influenced by peripheral rather than central cues, while those able to process messages with high cognitive elaboration are more easily persuaded by central cues (Petty & Cacioppo, 1986).

The ELM also argues that the process through which an attitude is formed predicts the strength of the particular attitude. For example, if someone is persuaded by peripheral cues such as source likeability, the attitude that is formed is less resistant to change and less predictive of subsequent behaviour than an attitude that has been developed through attending to the central cues of a message (Petty & Cacioppo, 1986). For example, a study by Haugtvedt, Petty and Cacioppo (1992) found that participants who engaged in greater cognitive processing during the formation of attitudes toward an unfamiliar object showed more resistance to change and greater persistence over time in their attitudes than participants who formed similar initial attitudes with lesser thought processes.

Building on the main ideas proposed in the ELM, the HSM expands this theory by adding several different assumptions regarding the motivational influences of persuasion. The HSM looks at both systematic and heuristic processing of persuasive messages. Whereas systematic processing is assumed to involve trying to thoroughly understand available information through deep thinking processes, heuristic processing is suggested to be automatic and less demanding processing that focuses on easily noticeable message cues (Petty & Briñol, 2012). It is predicted that using systematic thinking requires a high degree of mental effort and requires the individual to be able to both devote their attention to the issue and muster sufficient motivation to do so. In contrast, heuristic processing is assumed to occur when an individual does not have much time or possess the necessary motivation to process information and make a decision (Petty & Briñol, 2012).

Both the HSM and ELM have been widely researched and validated in the laboratory, and have been used in attempts to explain persuasion in real-world situations such as advertising (Haugtvedt et al., 1992), health communication (Petty, Barden, & Wheeler, 2009; Zuckerman & Chaiken, 1998) and political attitudes and voting behaviour (Forehand, Gastil, & Smith, 2004). Both models have helped to shed some light on the processes leading to explicit attitude change and according to Petty and Briñol (2012) have "…brought some coherence to an attitude change literature that had gotten quite messy" (p. 239). As the major focus for the current research project is on implicit attitude change, no further discussion of explicit attitude change will occur here. For a recent and more in-depth review of the literature on explicit attitude change, see Bohner and Dickel (2011). The focus of the remainder of this chapter will be on implicit attitude change and the processes through which such change can occur.

Implicit Attitude Change

Despite the large body of research into the formation and alteration of explicit attitudes, Gawronski and Bodenhausen (2006) reported that "…changes in implicit attitudes are still largely unexplained" (p. 692). This lack of research may be due to a multitude of factors, the major one being that dominant models of attitude change mentioned previously (Chaiken et al., 1989; Petty & Cacioppo, 1986) viewed attitudes as a unitary construct instead of distinguishing between explicit and implicit attitudes. Another factor for the lack of research into implicit attitude change is that implicit object-evaluation associations were predicted to have been generated over a long period of learning (Briñol et al., 2012). As a result of this, automatic evaluations were assumed to be more enduring and resistant to change than deliberative attitudes. However, in line with the continued development and increasing popularity of implicit attitude measures, researchers began to look for processes in which implicit attitudes could be altered or formed (Gawronski & Bodenhausen, 2006).

As dual-systems models propose that explicit and implicit attitudes are two separate cognitive systems (see Chapter 1: Dual-systems Modelling), it is not unreasonable to argue that the processes through which explicit and implicit attitudes can be changed will also differ. This argument serves the basis for the dual-process associative-propositional evaluation (APE) model of implicit and explicit attitude change (Gawronski & Bodenhausen, 2006) which suggests that implicit attitudes can be manipulated more readily through associative processes while explicit attitudes are manipulated by propositions. According to the APE model, there are two important features of associative evaluations that separate them from more explicit processes. First, automatic evaluations are assumed to be independent of the assignment of truth values (Gawronski & Bodenhausen, 2006). In other words, associative evaluations can

be activated regardless of whether an individual believes them to be accurate or inaccurate. Second, associative processes can be influenced through the process of pattern activation, which refers to the idea that the differential activation of certain associations in memory can be determined by both the preexisting structure of associations in memory and the particular set of external input stimuli (Gawronski & Bodenhausen, 2006). This means that a single attitudinal object may be capable of activating different associative patterns and thus different automatic reactions. An example of pattern activation is shown in Dasgupta and Greenwald (2001), who found that implicit racial prejudice against African-American individuals was lower when participants were presented with admired African-American faces and disliked Caucasian faces then when presented with disliked African-American faces and admired Caucasian faces. This suggests that the presentation of familiar stimuli may activate different patterns of preexisting associative structure related to the stimuli being shown.

Evaluative Conditioning

In line with the assumption that implicit attitudes may be easier to manipulate through associative processes (Gawronski & Bodenhausen, 2006), a possible method for the formation and alteration of implicit attitudes is Evaluative Conditioning (EC). EC refers to the repeated pairing of positive or negative stimuli with an attitude object in order to produce a change in liking of that attitude object (De Houwer, Thomas, & Baeyens, 2001). In the prototypical EC paradigm a neutral attitude object or conditioned stimulus (CS) is paired with either positively or negatively valenced stimuli or the unconditioned stimulus (US) (see Table 2). The common result of these EC procedures is a shift in the valence of the formerly neutral CS toward the valence of the US it is consistently paired with (De Houwer, 2007). In other words, a CS will be rated

more favourably when it has been consistently paired with a positive US than when with a negative US. This effect is due to an association being formed between the previously neutral CS and the positive valence of the US.

Table 2

Typical Evaluative Conditioning Paradigm

Neutral stimulus		Affective stimulus	Outcome
CS	$\rightarrow$	US	Change in valence of the CS

The first experiment demonstrating EC effects using the above paradigm was completed over 50 years ago, when Staats and Staats (1957, as cited in Hofmann, De Houwer, Perugini, Baeyens, & Crombez, 2010) paired neutral nonsense words (CS) with either positive or negative words (US) in order to produce either a liking or disliking of the nonsense word. This initial investigation found that nonsense words paired with positive USs were reported as being more favourable than nonsense words that were paired with negative USs, showing a clear EC effect. Since that time, a large body of research has investigated whether EC is a genuine phenomenon and under which boundary conditions it can and cannot occur (see Hofmann et al., 2010 for a review).

Unfortunately, it appears as though this research has raised more questions about the processes underlying EC effects than it has answered, and debate continues over many important factors related to the EC process and the mechanisms underlying EC effects (Hofmann et al., 2010). For example, the effect of contingency awareness on EC effects remains largely unknown, with studies finding that awareness of the CS-US contingencies is crucial to finding EC effects (Dawson, Rissling, Schell, & Wilcox, 2007; Stahl, Unkelbach, & Corneille, 2009), and other researchers finding that EC can

occur when participants are not aware of the CS-US contingency (Dickinson & Brown, 2007; Walther & Nagengast, 2006). Similarly, the findings from research examining the effect of extinction procedures on EC effects remains largely mixed, with extinction trials being found to have no effect on liking ratings of the CS (Díaz, Ruiz, & Baeyens, 2005). In contrast, research by Lipp, Oughton, and Le Lievre (2003) has found that extinction trials can reduce the liking rating of the CS, suggesting that extinction does affect EC. The mixed research on EC noted above suggests that the boundary conditions under which EC effects can occur remain largely unknown.

In addition to uncertainty surrounding the boundary conditions affecting EC effects, the nature of the mental processes that are predicted to underlie EC are also unclear, with multiple theoretical accounts proposed in an attempt to explain EC effects. However, a full explanation of each of these accounts is beyond the scope of this project (see Hofmann et al., 2010 for further discussion). Despite the conjecture surrounding the boundary conditions and mental processes underlying EC effects, a recent meta-analysis on EC research with human participants has found that EC appears to be a genuine phenomenon that consistently occurs within certain boundary conditions (see Hofmann et al., 2010 for further discussion). This suggests that, although the processes underlying EC effects may be unknown, the repeated pairing of a CS with a valenced US generally leads to a change in liking of the CS itself.

Implicit Attitude Change/Formation

Within the last decade, that has been an increased interest in research exploring the role of EC in the formation or alteration of implicit attitudes. Due to the assumption that EC effects occur through associative and automatic processes, and that EC can alter attitudes without conscious awareness, it could be argued that EC may be more applicable to the development or alteration of implicit as opposed to explicit attitudes.

This is because, by definition, implicit attitudes do not depend on conscious processing and are also associative in nature (Pieters et al., 2010). The apparent link between implicit attitudes and EC is so strong that Gawronski and Bodenhausen (2006) argued that "the prototypical case for implicit attitude change resulting from changes to an individual's associative structure is through Evaluative Conditioning" (p. 697).

To date, a growing body of research has applied EC paradigms in an attempt to form and/or alter implicit attitudes toward different attitude objects (Baccus, Baldwin, & Packer, 2004; Houben et al., 2010a; Olson & Fazio, 2001, 2006). Perhaps the first demonstration of implicit attitude formation through EC procedures was conducted by Olson and Fazio (2001). In study 2 of Olson and Fazio (2001), 56 participants were exposed to five blocks of 86 trials of images and words presented in an apparently random order. Within each block of trials were critical CS-US pairings. These critical pairings consisted of a neutrally valenced target Pokémon character (CS+) consistently paired with either positively valenced words or images (US). Another target Pokémon character (CS-) was consistently paired with negatively valenced words or images. All other trials were filler images consisting of other Pokémon characters and neutrally valenced words or images. After exposure to this conditioning procedure, participants completed an Implicit Association Test (IAT; Greenwald et al., 1998) to measure their implicit attitudes to the two target Pokémon characters. The results from the IAT revealed that participants evaluated the CS+ significantly more positively than the CS-, suggesting that EC procedures can successfully form implicit attitudes toward previously neutral stimuli (Olson & Fazio, 2001).

In support of the above findings, a study by Rydell and McConnell (2006) examined the influence of deliberative and associative information on explicit and implicit attitudes toward the same attitude target (an imaginary person called Bob).

This study was the first to expose participants to persuasive arguments targeting both explicit and implicit cognitions prior to measuring these cognitions. The authors adopted the systems of reasoning approach to attitude change proposed by Sloman (1996) to argue that explicit attitudes change through fast-learning, rule-based reasoning while implicit attitudes change through slow-learning and associative reasoning. The slow-learning system operates through the use of paired associations based on similarity and contiguity. Learning is hypothesized to occur through a slow accrual of information over time to both develop new and strengthen previous associations in memory. In contrast, the fast-learning system relies on logical, symbolic or verbal representations and can respond flexibly and deliberately to abstract information rather than accumulating associations in memory.

In Experiment 1 of their study, Rydell and McConell (2006) presented participants with information about an imaginative figure called Bob. On a computer screen, participants received 100 trials of particular behaviours (e.g. Bob helps the neighbourhood children) while a picture of Bob was shown. Participants were instructed to indicate whether they thought the behaviour was characteristic or uncharacteristic of Bob by pressing a particular response key. After each response, feedback was provided to indicate whether the participants were correct in their classification. In these 100 initial trials, the feedback given to participants portrayed Bob as either positive (positive condition) or negative (negative condition) in 100% or 75% of trials. In the condition with only 75% of the trials being either positively- or negatively-valenced, the other 25% of trials paired Bob with counter-attitudinal information. For example, if 75% of behaviours that were paired with Bob were classified as positive, the other 25% would be negative. After the initial 100 trials, participants received either 20 trials of neutral information (control condition, e.g. Bob

waited at the street corner), or 20 trials of oppositely-valenced information (counter-attitudinal condition; i.e. the behaviours described as characteristic of Bob were the opposite valence to those presented in the initial 100 trials). Participants then completed an explicit measure of Bob on an overall evaluation scale and five sematic differential scales. An IAT (Greenwald et al., 1998) was completed to assess implicit attitudes toward Bob.

The results from Experiment 1 indicated that participants in the counter-attitudinal condition showed a significant change in their explicit attitudes but not their implicit attitudes toward Bob in the direction of the counter-attitudinal information. For example, if shown positive information in the initial 100 trials and then negative information in the following 20 trials, explicit attitudes toward Bob were negative while implicit attitudes remained positive. In Experiment 2 when the same method as above was used but more counter-attitudinal information was presented (100 trials instead of 20), implicit attitudes were altered in the appropriate direction. For example, if initially presented with 100 pieces of positive information then given 100 pieces of negative counter-attitudinal information, participant's implicit attitudes toward Bob were negative. The results from these two experiments suggest that explicit attitudes are affected by a fast-learning system and implicit attitudes by a slow-learning system, as a small amount of counter-attitudinal information presented straight after initial evaluations affected explicit but not implicit attitudes (Experiment 1). However, with the presentation of more counter-attitudinal information, implicit attitudes were also affected (Experiment 2), suggesting that a slow-learning system may be responsible for attitude change.

Further support for the influence of different systems on explicit and implicit attitude change can be found in Experiment 5 by Rydell and McConnell (2006). An

overview of this study design can be seen in Table 3 below. In this study, the same explicit behavioural information procedure as used in Studies 1 and 2 were also used here; however most of this behaviour was neutrally valenced. In addition to the explicit presentation of neutral behavioural information, a valenced prime was presented subliminally before the presentation of Bob's face. These subliminal presentations were 10 negatively (e.g. death) or positively valenced (e.g. love) words that were directly targeted at the formation of implicit attitudes toward Bob (see Phase 1, Table 3). In this experiment, a positive or negative prime was presented in the center of a computer screen for 25 milliseconds prior to a screen with only a picture of Bob. Neutral behavioural information about Bob was then presented. During the initial 100 trials, participants in the positive prime condition were always presented with positively valenced primes prior to viewing Bob and participants in the negative prime condition were always presented with negatively valenced words. After these initial 100 trials, participants' implicit and explicit attitudes were assessed using the same measures described above (see Phase 1 measurement, Table 3). Once their initial attitudes were assessed, participants were exposed to another 100 trials where the valence of the prime presented before Bob was switched, so it was different to that presented in the 100 trials from Phase 1 (see Phase 2, Table 3). So if participants were shown positive primes in the initial phase, they were shown negative primes in Phase 2. After the second phase of trials, implicit and explicit attitudes were again assessed (see Phase 2 measurement, Table 3).

Table 3

Overview of Rydell and McConnell – Study 5 Design

Phase	Negative condition	Positive condition
Phase 1 100 trials	Neutral behavioural information paired with *negative* subliminal stimuli	Neutral behavioural information paired with *positive* subliminal stimuli
Phase 1 measurement	Explicit attitudes – overall evaluation scale and five semantic differential scales Implicit attitudes - IAT	Explicit attitudes – overall evaluation scale and five semantic differential scales Implicit attitudes - IAT
Phase 2 100 trials	Neutral behavioural information paired with *positive* subliminal stimuli	Neutral behavioural information paired with *negative* subliminal stimuli
Phase 2 measurement	Explicit attitudes – overall evaluation scale and five semantic differential scales Implicit attitudes - IAT	Explicit attitudes – overall evaluation scale and five semantic differential scales Implicit attitudes - IAT

Note. Shaded sections indicate attitude manipulation phases.

The results from Experiment 5 showed no evidence for any explicit attitude change toward Bob, suggesting that evaluative priming has no influence on explicit attitude formation or manipulation. In contrast, the priming technique had a significant influence on implicit attitudes; with participants in the negative prime condition reporting more negative implicit attitudes in their initial attitude measurement than in their second attitude measurement. The same pattern of results was found for participants in the positive prime condition, with their implicit attitudes being

significantly more positive in the initial attitude measurement than in the second

attitude measurement. Furthermore, participants were found to perform no better than

chance at recognizing the priming words, suggesting that awareness of associative

pairings was not necessary to produce implicit attitude change. The finding that

associative primes influenced implicit but not explicit evaluations of Bob suggests that

an associative system is responsible for implicit attitude formation and/or change. The

authors also highlight that the result supports the assumption that implicit attitude

change/formation may be due to a "…slow-learning system that is based on the slow

accrual of associations encountered across time" (Rydell & McConnell, 2006, p. 1006).

The results from Rydell and McConnell (2006) provide empirical evidence that implicit

and explicit attitude formation may occur through different processes, with deliberative

processes more influential on explicit attitude formation while associative processes

may be more influential on implicit attitude formation.

Implicit attitude change through Evaluative Conditioning. As well as being

able to develop new implicit attitudes toward certain objects, there is a growing body of

literature suggesting that Evaluative Conditioning (EC) can be a highly effective

method for manipulating pre-existing implicit attitudes. Interestingly, recent studies

applying EC in an attempt to alter implicit attitudes seem to have focused on health-risk

behaviours such as unhealthy eating (Hollands, Prestwich, & Marteau, 2011; Lebens et

al., 2011) and alcohol consumption (Houben et al., 2010a; Houben, Schoenmakers, &

Wiers, 2010b). This may be because, as argued in *Chapter 2: Implicit Attitudes and*

Alcohol Consumption, the performance of health-risk behaviours is considered

irrational and may be poorly predicted by an individual's deliberative or explicit

cognitions. In contrast, implicit attitudes may play a more important role in the

prediction of health-risk behaviour, as implicit attitudes are impulsive in nature and

have a more automatic influence on behaviour. This may mean that a decision is made to engage in the health-risk behaviour automatically and despite an individual's best intentions. Due to the apparent impulsive nature of health-risk behaviour, it makes sense for research to focus on manipulating implicit attitudes towards these behaviours in an attempt to produce a negative shift. This shift in attitudes may then lead to a reduction in health-risk behaviour. Following this reasoning, each of the studies described below have paired the target attitude object with negatively valenced USs in an attempt to make implicit attitudes more negative and reduce subsequent behaviour.

In the experimental condition of the study by Lebens et al. (2011), pictures of unhealthy snack foods (CS-) were paired with negatively valenced body shapes (US-) and pictures of fruits (CS+) with positively valenced body shapes (US+). In the control condition, the pictures of snacks and fruits were randomly assigned to either positively or negatively valenced body shapes. After this conditioning procedure, participants' implicit attitudes toward high-fat snack foods were measured on both a positive and negative unipolar Single Category Implicit Association Test. To assess behaviour, participants completed a virtual supermarket task where they could buy as much food or drink items as they wanted with $15. The results from this study found that participants in the experimental condition had more negative associations with high-fat food than their control group counterparts. However, participants in the experimental and control groups picked similar foods on the virtual supermarket task. These results suggest that while the EC paradigm had an effect on implicit attitudes toward snack foods, consumer behaviour was not affected.

A similar experiment by Hollands et al. (2011) also used an EC paradigm in order to make implicit attitudes toward snack foods more negative. In this experiment, participants in the experimental condition viewed images of snack foods paired with

images of potential adverse health outcomes (e.g. heart disease, obesity), while participants in the control condition simply viewed pictures of snack foods. Implicit attitudes toward snack foods were measured both before and after the conditioning intervention and an explicit measure of snack food attitudes and a food choice task were completed after the conditioning intervention. The food choice task required participants to choose from either a piece of fruit or high-fat snack (e.g. chocolate, chips) to take home with them as a reward for study participation. Results revealed that those in the experimental group who had a strong or moderate preference for snacks over fruit at baseline showed a significant decrease in their snack-related implicit attitudes in the post-test. No changes in implicit attitudes were found for participants who had a weaker initial preference for snacks over fruit and there was also no effect of the intervention on explicit snack-related attitudes. In regards to behaviour, participants in the experimental condition chose fruit over snacks more often than those in the control condition. These results replicate those of Lebens et al. (2011) by supporting the finding that an EC paradigm can influence implicit attitudes toward snack foods, as well as extending their results by showing that an EC paradigm can also affect subsequent behaviour.

Of more interest for the current research, EC paradigms have also recently been used to influence alcohol-related implicit attitudes. Houben et al. (2010a) investigated whether EC could alter alcohol-related implicit cognitions in a sample of 116 university students. In this study, participants were exposed to 120 trials of random CS-US pairings, with 30 trials presenting alcohol-related CSs, 30 presenting soft drink CSs and 60 showing filler CSs. The USs in this study were either pictures of smiling, frowning and neutral faces or general positive, negative and neutral non-face pictures such as a picture of a cockroach as a negatively valenced stimulus (Houben et al., 2010a). In the

experimental condition, alcohol-related CSs were repeatedly paired with negative USs,

while in the control condition alcohol-related CSs were repeatedly paired with neutral

USs. The results of this study indicated that participants in the experimental condition

reported more negative alcohol-related implicit attitudes than participants in the control

condition. The EC task was also found to have an influence on drinking behaviour,

with participants in the experimental condition reporting that they consumed

significantly less alcohol than control participants in the week following the EC

manipulation. The authors concluded by suggesting that EC may be a useful tool for

changing alcohol-related implicit cognitions and drinking behaviour (Houben et al.,

2010a). The above research (Hollands et al., 2011; Houben et al., 2010a; Lebens et al.,

2011) lends support to the argument that EC may be an effective way of changing

implicit attitudes

Implicit attitude change through non-associative processes. To date,

research on the manipulation of implicit attitudes has typically focused on EC

interventions, largely ignoring other methods for implicit attitude change. Although a

wide body of research now suggests that implicit attitudes can be formed or

manipulated through associative processes such as EC (Hollands et al., 2011; Houben et

al., 2010a; Lebens et al., 2011), there is less evidence for the manipulation of implicit

attitudes through non-associative processes. To overcome this gap in the literature,

Horcajo, Briñol, and Petty (2010) conducted research to assess whether implicit

attitudes can be affected by thoughtful processing of persuasive messages. In Study 1,

the researchers manipulated the extent to which participants were motivated to think

about messages to assess whether extensive message processing can influence implicit

attitudes (Horcajo et al., 2010). The sample was divided into a control condition, in

which a neutral message on interior design was presented, or an experimental condition

where a message composed of arguments in favour of consuming vegetables was presented. All participants were asked to think carefully about the message they were reading before completing an IAT assessing automatic evaluations relevant to the content of the message. The results from this study showed that implicit attitudes toward vegetables became more positive as a result of reading the positive vegetable message, suggesting that implicit attitudes can be influenced through non-associative processes such as the thoughtful processing of valenced messages (Horcajo et al., 2010).

Further evidence for the argument that non-associative processes can influence implicit attitudes was found in a study by Whitfield and Jordan (2009). In this study, the authors suggest that propositional statements may create contiguity between concepts, with statements like 'I like Bob,' and 'Bob is popular' perhaps creating an association between Bob and a positive evaluation, thus influencing implicit attitudes. When these propositions are novel, as opposed to being related to current associations that already exist in memory, they may contribute to the development of new associations and therefore mediate changes in implicit attitudes. The suggestion that propositions can influence implicit attitudes through the construction of new associative evaluations is also put forward in the APE model of attitude change mentioned earlier (Gawronski & Bodenhausen, 2006).

In an experimental manipulation of the influence of propositions on implicit attitudes, Whitfield and Jordan (2009) had participants in the control condition view pictures and names of made-up individuals. In the experimental conditions, participants viewed the pictures and names as well as either positive or negatively valenced information for two of the five individuals (Dan and Nathan), and only neutral information for the other three. The experimental conditions differed in that for one

group, positive information was given about Nathan and negative information about Dan (Nathan-positive condition), while negative information about Nathan and positive information about Dan was provided in the second experimental condition (Nathan-negative condition). Whereas the study by Rydell and McConnell (2006) mentioned previously provided a large amount of information about the target objects (usually 100 valenced statements), the current study only provided six or seven pieces of behavioural information about the target objects. After exposure to the behavioural information, participants' explicit and implicit attitudes were then assessed.

Results from Study 1 indicate that behavioural information influenced both explicit and implicit attitudes toward the target individual, with participants in the Nathan-positive condition holding significantly more positive explicit and implicit attitudes toward Nathan than control participants (Whitfield & Jordan, 2009). In addition, participants in the Nathan-negative condition reported significantly less positive implicit and explicit attitudes toward Nathan than control participants. Furthermore, explicit attitudes fully mediated the effect of information on implicit attitudes, suggesting that implicit attitudes were altered only when explicit attitudes were changed.

In Study 2, an EC procedure was introduced in an attempt to alter the attitudes toward two target individuals. The same behavioural information about the two target individuals (Dan and Nathan) as presented in Study 1 were again shown to all participants in Study 2. Additionally, all participants received the EC trials. In the EC procedure, several hundred images were randomly streamed on a computer screen, with 12 key CS-US pairings being presented in each of the five blocks (Whitfield & Jordan, 2009). These key pairings consisted of the picture and name of the one of the target individuals (either Dan or Nathan) paired with positively valenced words (e.g.

"delight") and images (e.g. kittens), while the other target individual was paired with negatively valenced words (e.g. "poison") and images (e.g. cockroach). Results from Study 2 suggest that the EC procedure and the behavioural information influenced participants' implicit and explicit attitudes toward the target individuals. For explicit attitudes, participants in the Nathan-positive behavioural information condition reported more positive explicit attitudes toward Nathan than control group participants, while Nathan-negative participants reported less positive explicit attitudes toward Nathan than control group participants (Whitfield & Jordan, 2009). It was also found that participants who received the Nathan-positive EC trials reported significantly more positive explicit attitudes toward Nathan than those in the Nathan-negative condition.

Both behavioural information and the EC procedure were also found to significantly influence implicit attitudes. Participants in the Nathan-positive behavioural information condition reported implicit attitudes that were significantly more positive toward Nathan than the implicit attitudes of participants in the control condition. Alternatively, participants in the Nathan-negative behavioural information condition reported implicit attitudes that were significantly less positive toward Nathan than the implicit attitudes reported by the control participants. Furthermore, participants in the Nathan-positive EC condition reported implicit attitudes that were significantly more positive than the implicit attitudes of those participants in the Nathan-negative EC condition. Therefore, the results from Studies 1 and 2 of Whitfield and Jordan (2009) suggest that implicit and explicit attitudes toward novel attitude objects can be influenced by both propositional (behavioural information) and associative (EC) information.

While the above two studies examined attitudes toward novel targets, Study 4 of Whitfield and Jordan (2009) examined the influence of behavioural information and EC

on attitudes toward known targets, namely Britney Spears and Paris Hilton. The experimental process as outlined above for Studies 1 and 2 of Whitfield and Jordan (2009) were the same as those used in Study 4, however instead of using neutral targets, celebrity images and names were used. The results of this study are similar to those reported above. Participants who received positive behavioural information about Paris Hilton reported significantly more positive explicit attitudes toward her than control participants, while participants in the Hilton-negative condition reported less positive explicit attitudes than control participants. Participants receiving the positive EC procedure reported significantly more favourable explicit attitudes toward Paris Hilton than participants who received the Hilton-negative EC procedure.

In regards to implicit attitudes, participants in the Hilton-positive behavioural information condition reported more positive implicit attitudes than participants in the control condition. Participants in the Hilton-positive EC condition also reported significantly more positive implicit attitudes toward Paris Hilton than participants in the Hilton-negative condition. Therefore, similar effects of propositional and associative information on novel and known targets were found. The results from this study indicate that "…efforts to change implicit attitudes need not target only implicit processes and efforts to change explicit attitudes need not target only deliberative processes to be effective" (Whitfield & Jordan, p. 757). This research is important, because it suggests that processes other than EC may be able to influence and/or form implicit attitudes toward both novel and familiar target objects. This opens the door for research to further explore the processes through which implicit attitudes can be created or altered.

Message Framing

The aforementioned study by Horcajo et al. (2010) found that implicit attitudes toward a health-protective behaviour (vegetable consumption) could be made increasingly more positive through the processing of a persuasive communication. However, it remains largely unknown whether persuasive messages can make implicit attitudes toward health-risk behaviour (e.g. alcohol consumption) more negative. A possible way to manipulate attitudes toward health-risk behaviours may be by presenting negative information about the risky behaviour to individuals. In regards to the presentation of health information, research suggests that gain- and loss-framed messages may be effective in manipulating attitudes and intentions toward health behaviours as well as influencing behaviour (Rothman, Bartels, Wlaschin, & Salovey, 2006). Loss-framed messages focus on the costs of engaging in a risky behaviour, while gain-framed messages focus on the benefits of avoiding a risky behaviour (Gallagher & Updegraff, 2012).

Rothman and Salovey (1997) suggest that individuals who engage in risky behaviour may be more responsive to messages that focus on the advantages of not engaging in health-risk behaviour (gain frame) than messages that focus on the disadvantages of continuing health-risk behaviour (loss frame). This argument has been supported by studies examining the influence of message framing on smoking behaviour, with gain-framed appeals focusing on the benefits of smoking cessation found to be effective in promoting anti-smoking beliefs (Schneider et al., 2001) and for producing stronger intentions to quit smoking (Steward, Schneider, Pizarro, & Salovey, 2003).

More relevant to the current study, Gerend and Cullen (2008) examined the influence of message framing on the performance of problem drinking among

university students. This study also examined the temporal context of message frames by highlighting either short- or long-term outcomes associated with alcohol consumption. A sample of 228 university-aged participants completed this study across two testing sessions over a one-month period. In the first testing session, participants were randomly assigned to one of four conditions in a 2 (gain- or loss-frame) x 2 (short- or long-term consequence) experimental design. Participants were given five minutes to read an information sheet which contained the relevant health message as well as other information related to alcohol consumption. These messages focused on alcohol-related outcomes for health, social interactions, psychological functioning and academic/career performance (Gerend & Cullen, 2008). Participants then returned to the lab one month later to complete an assessment of their alcohol use over the past month.

The results from this study indicate that participants exposed to health messages emphasising short-term consequences of alcohol consumption reported consuming fewer drinks per occasion than participants exposed to messages focusing on long-term consequences. Further analyses indicated that participants in the gain-framed, short-term consequence message condition reported a significantly lower number of drinks consumed per occasion than participants exposed to all other message frames. Participants exposed to the gain-framed, short-term consequence message also reported a significantly lower rate of binge drinking episodes and a lower frequency of alcohol consumption than all other participants. These results suggest that asking individuals to consider the benefits of not consuming alcohol may be more effective in reducing alcohol consumption than asking them to consider to costs of drinking, but only when those outcomes occur in the short-term (Gerend & Cullen, 2008).

The above study highlights the usefulness of persuasive communication in altering drinking behaviour. However, the mechanisms driving this change in behaviour remain relatively unknown. Of interest is whether these persuasive messages can influence attitudes toward alcohol consumption which may contribute to a reduction in drinking behaviour similar to that found in the study by Gerend and Cullen (2008). As mentioned previously, research suggests that positive implicit attitudes are a predictor of higher levels of alcohol consumption (Houben & Wiers, 2008a). Therefore, if implicit attitudes can be altered through processes such as reading framed persuasive communications, drinking behaviour may also be manipulated. A literature search returned little research that examined the influence of health framed messages on alcohol-related implicit attitudes, so whether or not these messages can influence implicit attitudes remains relatively unknown. This is of particular importance because recent research suggests that deliberative processing of information may influence implicit attitudes (Horcajo et al., 2010; Whitfield & Jordan, 2009). The influence of message framing on alcohol-related implicit attitudes will be explored further in *Chapter 7: Study 3.*

Evaluative Conditioning and Advertising

The studies mentioned earlier which found an influence of EC procedures on health-related implicit attitudes have all been conducted in a laboratory setting (Hollands et al., 2011; Houben et al., 2010a, 2010b; Lebens et al., 2011). Although the results of such studies are promising at an individual level, changing/forming implicit attitudes toward different objects at a population level may be far more difficult. It is not realistic to assume that, in an attempt to influence implicit attitudes, every single heavy drinker or overweight individual should be brought in to a lab and exposed to an EC procedure targeting their implicit attitudes. Therefore, when thinking about using a

population level intervention to produce implicit attitude change, other processes may need to be considered. It is argued here that advertising may be one such process which uses EC principles to produce a liking/disliking of certain brands, products or other attitudinal objects. From an advertising perspective, it can be argued that the brand or product being endorsed in an advertisement is the CS, while the valenced US can be a variety of things, including popular celebrities, humour or an appealing lifestyle (see Table 4). The aim of advertisements that use EC principles may be for consumers to develop an association between a brand or product and the positive attributes of the advertisement, therefore creating positive attitudes toward the brand or product itself. Furthermore, advertising plays a major role in today's society and individuals may be exposed to it on a regular basis. Therefore, changing or forming attitudes at a population level may be achieved through advertising.

Table 4

Evaluative Conditioning and Advertising

Neutral stimulus		Affective stimulus	Outcome
CS	$\rightarrow$	US	Change in valence of the CS
Brand	$\rightarrow$	Positive images	Increased liking of brand

Despite the apparent use of EC techniques in advertising, the effects that advertisements may have on implicit attitudes remains relatively unknown. With the development and application of a range of different implicit attitude measures in research fields such as social and health psychology (see De Houwer & Moors, 2010), it was only a matter of time before these measures began to be applied to consumer psychology as well (Dimofte, 2010). The growing importance of the application of implicit measures to the field of consumer psychology was highlighted recently by the fact that a special issue of *Psychology & Marketing* (2010) focused on the use of

implicit measures in marketing research. In this issue, Nevid (2010) refers to the implicit measurement of consumer response as the 'Holy Grail' of marketing research, as implicit measures may eliminate subjectivity in marketing research "…in favour of more objective indices of consumer preferences and attitudes that bypass conscious evaluative processes" (p. 914).

The application of implicit measures to the field of consumer psychology is particularly important because the influence of advertising on both attitudes and behaviour remains a mystery (Goodall & Slater, 2010). According to Slater (2006), a central task in health communication research is the identification of psychological mechanisms by which messages such as advertisements can affect behaviour and other persuasive outcomes. In other words, studies need to investigate what influence, if any, exposure to alcohol advertising can have on cognitive and psychological factors such as intention, expectancies or implicit attitudes. If a better understanding of the relationship between advertisement exposure and behaviour can be identified, a greater understanding of the mechanisms that enable advertising to influence behaviour, if it does at all, can be obtained.

The majority of research focusing on the effect advertising can have on alcohol-related cognitions has been done with youth or adolescent samples, as this population has the greatest exposure to alcohol advertising messages (see Anderson, de Bruijn, Angus, Gordon, & Hastings, 2009 for a review). This research has also focused on the influence advertisement exposure can have on explicit cognitions and has found that increased exposure to alcohol-related advertising may contribute to the development of positive alcohol-related expectancies and increased drinking behaviour (Austin, Chen, & Grube, 2006; Fleming, Thorson, & Atkin, 2004). Despite the above results that suggest alcohol advertisement exposure may have an effect on alcohol-related

cognitions, both studies found only weak to moderate effects. Additionally, both articles suggested that although alcohol advertising may play a role in developing alcohol-related expectancies in youth, other factors such as peer and parental drinking and gender may be more important influences (Austin et al., 2006; Fleming et al., 2004). In light of this, researchers have started to look for other psychological variables which may be influenced by advertisement exposure, with an increasing interest into more automatic and unconscious processes.

One study that has looked the influence of advertising exposure on implicit attitudes was conducted by Goodall and Slater (2010). This study focused on the concepts of *automatic attitude activation* and *attitude accessibility,* which refer to the ease in which a particular attitude may come to mind (Fazio, 1990). While some attitudes may be activated upon mere exposure of a stimulus, others may require high levels of deliberation and conscious effort to retrieve. These processes will be explained in greater detail later when describing the MODE model (Fazio, 1990; see Chapter 5: Study 2). Although not directly using the terms implicit and explicit attitudes, Goodall and Slater (2010) recognise that these two terms often appear in the literature on attitude accessibility and activation and are therefore related. In fact, it can be argued that the term 'implicit attitude' may be interchangeable with 'automatic attitude,' so the activation of an automatic attitude may also refer to the activation of an implicit attitude.

In the study by Goodall and Slater (2010), participants in the alcohol advertisement condition viewed four separate 30-second advertisements for alcohol, while those in the control condition viewed four advertisements for non-alcohol products and those in the alcohol PSA condition viewed four anti-drinking advertisements. After viewing the respective advertisements, participants completed an

alcohol-related affect misattribution procedure (Payne, Cheng, Govorun, & Stewart, 2005) to assess implicit attitudes. The results from this experiment indicate that those in the alcohol advertisement condition had more positive evaluations of alcohol primes than non-alcohol primes relative to participants in the control condition. In other words, viewing alcohol advertisements activated positive alcohol-related implicit attitudes in participants. In addition, viewing an alcohol advertisement had no influence on explicit attitudes toward alcohol, suggesting that "…alcohol advertisements may operate by activating positive attitudes toward alcohol in ways that might best be described as preverbal and preconscious" (Goodall & Slater, 2010, p. 636).

The above findings suggest that alcohol advertisements may act as a prime that triggers evaluative reactions toward alcohol. This argument is consistent with research into the media priming literature, which suggests that network models of memory can store information in the form of 'nodes' that represent different concepts (Roskos-Ewoldsen, Klinger, & Roskos-Ewoldsen, 2007). Related nodes are assumed to be connected through different associative pathways and when a node reaches its activation 'threshold,' it fires and possibly activates other connected nodes. Research into media priming suggests that priming effects may be influenced by two factors: intensity and recency. Whereas intensity refers to how frequently a prime is presented (e.g. single vs repeated exposure), recency refers to the amount of time between presentation of the prime and the measurement of the priming effect. Research examining the influence of stimulus intensity and recency on media priming effects is mixed (see Roskos-Ewoldsen et al., 2007), so further clarification of these issues is needed. However, the findings of Goodall and Slater (2010) suggest that alcohol advertisements may act as media primes that activate positive evaluations of alcohol. Furthermore, as measures of automatically-activated attitudes were taken straight after

advertisement exposure, the results suggest that the more recent the prime, the stronger the priming effect. In regards to intensity, because individuals are repeatedly exposed to alcohol advertisements pairing alcohol with positive stimuli, alcohol advertisements would be successful in activating positive automatic evaluations of alcohol. This is exactly what was found in Goodall and Slater (2010).

Another study looking at the influence of advertising on implicit attitudes was conducted by Vianello, Galliani, and De Carlo (2009). The authors investigated the effectiveness of subtle and blatant advertising on attitudes toward a brand of Cola. In the blatant advertisements group, participants viewed an advertisement containing famous and recognisable soccer players, as well as numerous images of the brand of Cola. In this advertisement, the product being endorsed was obvious. In the subtle advertisements condition, participants viewed an edited version of the advertisement described above. In this edited version, the majority of the Cola images were removed such that the Cola brand was only shown twice throughout the advertisement. Therefore, it was not obvious what the subtle advertisement was endorsing.

Participants in this study had a single pre- and 2 post-test assessments (10 minutes and 48 hours after viewing the advertisement) of their attitudes toward the Cola brand being advertised. Explicit attitudes were measured using semantic differential scales, while implicit attitudes were measured using a Go/No Go Association Task (GNAT; Nosek & Banaji, 2001). The GNAT is a reaction time test where participants press a certain key (e.g. space bar) when a particular target (e.g. alcohol- or soft drink-related words) or attribute word (e.g. positive or negative words) is shown on a computer screen and make no responses to all other irrelevant stimuli. In the GNAT used by Vianello et al. (2009), participants were instructed to press the space bar when the name of the Cola brand that was being advertised was shown (target) and do

nothing when other brands of Cola where shown. Participants' implicit attitudes were then measured by comparing the response times between the block where the Cola and positive words were paired to the reaction times when the Cola and negative words were paired (Nosek & Banaji, 2001). Positive implicit attitudes are shown by having faster reaction times when the Cola and positive words are paired than when Cola and negative words are paired.

The results from this study suggest that the implicit attitudes of participants who viewed the subtle advertisement were significantly more positive in the 10 minute post-test than the pre-test (Vianello et al., 2009). At the 48-hour post-test measure, it was found that participants' implicit attitudes had slightly decreased but still remained more positive than they were in the pre-test. In contrast, participants who viewed the blatant advertisement showed significantly greater negative implicit attitudes in the immediate post-test than in the pre-test (Vianello et al., 2009). At the 48-hour post-test measure, it was found that these negative implicit attitudes had disappeared such that their implicit attitudes were neutral. From these results, it can be suggested that if an advertisement is obviously promoting a product, individuals may have more negative attitudes towards it. On the other hand, if the advertisement is more subtle about the product they are selling, individuals may have more positive implicit attitudes toward the product it is selling.

Despite the above findings, research looking at the link between advertising and implicit attitudes is still in its infancy. No studies could be found that have examined the influence of advertising exposure on implicit attitudes as measured on an IAT, arguably the most well-used implicit attitude measure in social psychological literature (Dimofte, 2010). This is surprising because, as stated by Gibson (2008, p. 186) "…the areas of consumer research most likely to benefit from use of the IAT are those areas

based on associative learning." As mentioned previously, it is argued that advertising constantly uses associative learning (EC) in an attempt to alter or form attitudes toward different products and brands. Therefore, the IAT should be a useful measure for conducting research looking at the influence of advertising on implicit attitudes. Furthermore, although Vianello et al. (2009) used a pre- and post-test design, the study by Goodall and Slater (2010) used a post-test only design. This means that whether alcohol-related implicit attitudes are actually changing from a baseline assessment as a result of viewing an advertisement remains unknown. This issue will be explored further in Study 1 and Study 2 of this research project.

This chapter has focused on attitude change, with a particular emphasis on implicit attitude change. This chapter suggests that associative processes have dominated research aiming to form or alter implicit attitudes. However, recent research has indicated that deliberative processes may also be influential in changing or altering these attitudes (Horcajo et al., 2010; Whitfield & Jordan, 2009). In this chapter, a link is made between EC processes and advertising, with the suggestion that advertisements use EC techniques to form attitudes toward the product or brand being endorsed. As a result of research suggesting that EC is able to both form and manipulate implicit attitudes, advertising is highlighted as a possible method for altering implicit attitudes. The current chapter, as well as the two previous chapters, has examined the literature of interest for the first three studies of this research project. The next chapter focuses on the methods used in this research project, with a particular emphasis on implicit attitude measures.

Chapter 4: Methodology

What are Implicit Measures?

Previously (see Chapter 1: Dual-systems Modelling), a distinction was made between explicit and implicit attitudes based on certain characteristics that were ascribed to each. It was also briefly mentioned that another important difference between explicit and implicit attitudes is based on the measures used to assess each construct. Explicit attitude assessments usually ask participants to self-report their attitudes on measurement devices such as semantic differential, Likert, or Thurstone scales, all of which make it obvious that attitudes toward a particular object are being assessed. In contrast, implicit attitude measures are those that do not directly ask individuals to report their attitudes toward the relevant attitudinal object. Implicit measures differ from explicit measures in that they should have at least one of the following four characteristics: (1) reduced controllability over the response; (2) lack of intention; (3) reduced awareness of the origins, meaning or occurrence of a response; or (4) high efficiency of processing (Bargh, 1994).

Authors argue that implicit measures tap into automatic evaluative reactions that may come to mind spontaneously when a particular stimulus is present (De Houwer, 2006). This suggests that implicit attitude assessments measure attitudes that come to mind relatively spontaneously due to the mere exposure to a stimulus, rather than a deliberative evaluation that can occur when individuals are able to reflect upon the stimulus. Generally, individual's implicit attitudes are inferred from their bodily responses, overt behaviours or their performance on response latency measures (Petty et al., 2009). As implicit attitude measures do not directly ask the individual to report their attitude toward a certain stimulus, they are typically used when it is either undesirable or impractical to ask people what their opinions toward the attitude object

are or if there is some possibility that the person may not be willing to state what their attitudes actually are (e.g. racial attitudes).

Another major distinction between implicit and explicit attitude assessments focuses on the level of awareness attributed to the attitudes assessed on each measure. Whereas explicit attitude measures are thought to tap in to attitudes of which individuals are explicitly aware, implicit attitude measures may assess attitudes for which individuals are not consciously aware of and thus cannot report. However, there has been much conjecture over this issue, with authors arguing that implicit attitudes can actually be influenced by ones explicit cognitions, suggesting that implicit attitudes are not out of conscious awareness (see De Houwer, 2006; Fazio & Olson, 2003). This issue will not be discussed in any further detail here.

The development of implicit measures has not been without its difficulties, with much conjecture surrounding their meaning and use (De Houwer, 2006; Olson & Fazio, 2003). The processes that are assumed to underlie these implicit measures are not yet fully understood, with researchers suggesting that they can be a reflection of an individual's implicit attitudes toward the attitude object free from social desirability (Fazio, Jackson, Dunton, & Williams, 1995) or simply a new aspect of attitudes that cannot be assessed with explicit measures (Greenwald & Banaji, 1995). As Olson and Fazio (2003) suggest, the lack of understanding of the processes underlying implicit attitude measures may stem from the fact that research focused on implicit attitude measurement has been a methodological and empirically driven field. Therefore, the development of various measures hypothesised to tap in to implicit attitudes are based on little to no theoretical evidence. As Gawronski and Bodenhausen (2007) suggest "The initial enthusiasm for implicit measures seemed to be accompanied by a relatively loose and shifting conceptualisations of their meaning" (p. 266).

Despite this, psychological research in recent years has seen a large increase in the development of implicit attitude measures, with two of the most widely-used procedures being the Implicit Association Test (IAT; Greenwald et al., 1998) and evaluative priming techniques (Fazio et al., 1995). Due to the use of the IAT in the current research project, evaluative priming techniques will not be discussed here. The underlying assumption of these implicit measures is that evaluative associations an individual holds should produce different levels of interference or facilitation in response to both evaluative and categorical stimuli that represent an attitude object (Bohner & Dickel, 2011). Since their creation, implicit measures have been used to assess attitudes toward a wide range of attitudinal objects, including body image (Ahern & Hetherington, 2006), racial prejudice (Kawakami, Phills, Steele, & Dovidio, 2007), self-esteem (Greenwald & Farnham, 2000) political preferences (Arcuri, Castelli, Galdi, Zogmaister, & Amadori, 2008), consumer preferences (Brunel, Tietje, & Greenwald, 2004) and various health-risk and health-protective behaviours (Craeynest et al., 2005; Houben & Wiers, 2006, 2007; Huijding, de Jong, Wiers, & Verkooijen, 2005).

Why use implicit measures? A benefit of implicit over explicit attitude measurements is that the former may be less affected by individuals' deliberate attempts to control their responses. This is particularly evident when assessing attitudes toward socially sensitive topics where social desirability may influence answers provided on self-report measures. Support for this argument mainly comes from research examining implicit racial attitudes, with studies indicating that explicit and implicit attitudes toward minority racial groups are only highly correlated when motivations to control prejudice are maximised (Hofmann, Gschwendner, & Schmitt, 2005b).

Although there are still major issues with their use, implicit attitude measurements may be particularly useful for assessing attitudes toward certain

behaviours, namely, addictive behaviours such as alcohol consumption (see Chapter 2: Implicit Attitudes and Alcohol Consumption). Briefly, due to their relatively impulsive nature (Stacy, 1997), assessing a more automatic attitude toward health-risk behaviours may provide a greater understanding of why individuals initiate and continue to engage in these irrational behaviours. Indeed, as various authors have highlighted, it appears as though implicit attitude measures such as the IAT may be more successful in predicting behaviour that occurs without planning or deliberation, while explicit, self-report measures are better predictors of behaviours that are deliberate or planned (Greenwald & Nosek, 2009; Perugini, 2005). Therefore, the use of implicit attitude measurements such as an IAT in research related to alcohol consumption appears to be justified.

The Implicit Association Test

The IAT (Greenwald et al., 1998) is an implicit attitude measure which assesses the strength of associations between different concepts (Nosek et al., 2007). Perhaps the most commonly used variant of IAT (Fazio & Olson, 2003), and the one used most often in the current research project, is the bipolar IAT. This particular variant can be defined as a classification task which involves participants categorising two target categories (e.g. flowers and insects) and two attribute categories (e.g. positive and negative words) using two separate response keys. The central tenet of the IAT is that this classification task should be significantly easier for participants, as shown by faster reaction times in response to the stimuli, when the response assignment of the target and attribute categories are compatible or correspond to the subject's implicit associations (Greenwald et al., 1998). Therefore, the performance difference in reaction times between the two response assignments is suggested to reflect the strength of the associations of the attribute categories with the target categories, and thus the subject's implicit cognitions about that target (Houben & Wiers, 2007).

The main discussion of the design for the bipolar IAT used in this study will occur in the methods section of *Chapter 5: Study 1*. The following discussion will focus on the psychometric properties of the IAT, justifying the use of this measure for the current research project. Like all measures used in psychology, various psychometric properties need to be established in order to suggest that the IAT is a reliable and valid measure. However, assessing the reliability and validity of the IAT has been a difficult task as it is unlike traditional self-report measures of the attitude construct. Lane, Banaji, Nosek and Greenwald (2007) suggest that because the IAT can be adapted to measure a wide range of different concepts such as self-esteem, racial attitudes or alcohol-related attitudes, two IATs may have very little in common other than the basic structure of the task. However, unlike other implicit measures, various authors have reported moderate to good psychometric properties of the IAT.

As the current research project uses a pre- and post-test design with multiple IATs administered in the same testing session, statistics related to the test-retest reliability of the IAT are of great importance. In their analysis of test-retest reliability of the IAT, Lane et al. (2007) reported the correlation found between two IAT testing sessions found in 13 different studies. The median for the test-retest correlation across these studies was found to be $r = .50$, suggesting moderate test-retest reliability for the IAT. Furthermore, studies that had participants complete two IATs in the same testing session reported test-retest reliabilities that varied from $r = .39-.68$ (Lane et al., 2007). The IAT has also found to produce greater test-retest reliability than other measures of implicit self-esteem, suggesting that the IAT may have the best test-retest reliability of all implicit measures (Bosson, Swann Jr., & Pennebaker, 2000). Similar to the figures reported above, Egloff, Schwerdtfeger, and Schmukle (2005) found that across various

studies, the IAT showed stable test-retest reliability (median $r = .56$) that varied minimally with the re-test interval.

A study by Greenwald and Nosek (2001) showed that the IAT has split-half reliabilities ranging from $r = .70-.90$. The same study also showed that the IAT effect is not influenced by familiarity of items and that the test scores cannot be faked, suggesting the IAT has strong internal validity (Greenwald & Nosek, 2001). In regards to fakeability, the IAT has been shown to be less easy to fake than self-report measures and the likelihood that participants fake scores on an IAT only increases when participants are explicitly told to try and fake scores or they have experience with the IAT (Asendorpf, Banse, & Mücke, 2002; Steffens, 2004). As multiple IATs were performed in one testing session in this study, participants may become more experienced with the IAT and the issue of fakeability may be raised. However, by counterbalancing the order of the critical blocks and using the D-score algorithm to calculate IAT scores (described below), the influence of IAT experience is significantly reduced.

Unfortunately, construct validity for implicit measures is generally found to be quite low. A number of studies comparing the IAT with variations of the evaluative priming task have shown relatively weak correlations (Bosson et al., 2000; Olson & Fazio, 2003). The low levels of construct validity for the IAT and other implicit measures has been argued to be the result of the generally low reliability statistics found with these measures (Nosek et al., 2007). When assessing the relationship between explicit and implicit measures, a meta-analysis has indicated an average correlation of $r = .24$ between the two measures. Across a range of 57 different content domains, Nosek (2005) reported an average correlation of $r = .37$ between explicit and implicit measures, suggesting that relationships between the two measures are moderate. As a

result of these correlations, it is important to determine whether explicit and implicit assessments are actually measuring separate and distinct constructs. In a multitrait-multimethod investigation of the IAT and self-report measures across seven different attitude domains, Nosek and Smyth (2007) used standard equation modelling to demonstrate that explicit and implicit attitudes are related but distinct constructs. This provides support for the evidence of both convergent and discriminant validity of the IAT measure.

D-Score. There have been various scoring methods used to produce an overall score for the IAT. Greenwald, Nosek and Banaji (2003) compared the original scoring method of the IAT to an updated method of scoring called the D-score. To summarise the D-score method, all participant responses from blocks 3, 4, 6, and 7 (see Table 1 above) are used in the D-score calculation. Participant's IAT score cannot be calculated if they have more than 10% of their responses with a latency of 300ms or less, while all responses of greater than 10000ms are removed. In addition, there is no log transformation of scores, with the average of scores from blocks 3, 4, 6 and 7 calculated and then used to create an overall IAT score. See Appendix A for a table adapted from Greenwald et al. (2003) which provides the changes between the original IAT method and improved D-score method for calculating IAT scores.

In their study, Greenwald et al. (2003) used the original and updated scoring methods in a range of different testing situations and found that the D-score algorithm strongly outperformed the original scoring method. The results from this study indicated that the D-score algorithm was less resistant to contamination by differences in response speed, produced IAT scores which showed stronger correlations with explicit attitude measures, lowered the influence of prior experience with the IAT method on IAT scores, as well as reducing other known effects (e.g. older age) that may

influence IAT scores. Therefore, based on the recommendations from Greenwald et al. (2003), the D-score method of IAT scoring was used throughout this research project in order to produce overall IAT scores.

Various studies have found support for the use of the D-score as the best scoring method for the IAT. A study by Nosek et al. (2007) found that although not eliminating practice effects completely, the D-score method does reduce the influence of such effects on IAT scores. This is particularly important for the current research project as multiple IATs are administered in the same testing session. The D-score also reduces the effect of slower responding rates altering IAT scores. For each IAT used in this study, the D-score was calculated such that higher positive scores indicated more positive implicit attitudes toward the target object, while higher negative scores indicated more negative implicit attitudes. For example, someone reporting a D-score of 0.45 would have more positive implicit attitudes than someone reporting a D-score of 0.12.

Web-based Implicit Association Tests. Another important aspect of the IAT is that it can be administered online, with this method of administration used throughout the current project. The IAT has been frequently administered online, with more than 4.5 million respondents completing various IATs on a website (www.implicit.harvard.edu). The results from these online administrations have demonstrated strong and robust associations with different attitudinal domains, suggesting that the IAT can be delivered online effectively (see Lane et al., 2007). Furthermore, the effects of web-based IATs in regards to stereotype-consistent associations between different domains (e.g. White-American and male-science) have found to be consistent with those found when the IAT is administered in a laboratory setting (Devos & Banaji, 2005; Greenwald et al., 1998).

Using an online administration of the IAT also allows for ease of recruitment, with the ability to provide participants with a hyperlink to perform the study in their own time at home or in a more appropriate location instead of coming in to a laboratory. As mentioned by Houben and Wiers (2008b), laboratory based research may be limited in the ability to recruit participants from outside of a university student sample. A non-university sample may be unwilling to participant in lab-based research because they do not want to travel into the university to complete it, or they do not trust the anonymity of participating in psychological research conducted in a laboratory (Houben & Wiers, 2008b). This may mean that certain populations are more willing to participate in research conducted outside of the laboratory and this can be achieved through online recruitment.

Although there are upsides for the use of online IAT administration, there are also some negatives associated with the process. First, experimenters need to make sure that the software they are using to run the IATs can provide measurements that are as sensitive to differences in reaction times than software used in the laboratory (Houben & Wiers, 2008b). This is not an issue for this study, as the software used to run the online IATs (Inquisit v3.0.4 Millisecond Software, 2010) is the same as the software used to run laboratory based IATs. Assuming that participants have a stable internet connection at home, it is assumed that there should be no difference in reaction time measurement found in the online or lab-based IAT variants.

Another issue with online testing is that it is difficult to produce a test setting that is standard for all participants, with the Internet reducing the ability to set up the experiment in a standard test environment or through a standard computer setup (Houben & Wiers, 2008b). Unfortunately, there is no way to control for the unstandardized testing for online administrations. However, a study by Houben and

Wiers (2008b) examined the utility of web-based IATs compared to lab-based alternatives by examining the influence of testing implicit alcohol-related attitudes online or in a laboratory. In this study, 115 participants completed a bipolar and unipolar IAT related to implicit alcohol-related attitudes as well as explicit measures of their alcohol attitudes and self-reported alcohol behaviour. Participants completed each of these measures once at home and once in the laboratory in testing sessions two weeks apart.

The results from this study indicate that IAT versions can be validly administered online through participant's home computers, with relationships between both home and lab-based IAT variants being similarly related to explicit alcohol-related attitude measures. There was also no difference found between IAT effects on the online or lab-based variants, indicating that online IATs may be equally as sensitive to individual differences in implicit alcohol-related associations as lab-based variants (Houben & Wiers, 2008b). Online versions also showed stronger relationships with drinking behaviour than IATs completed in the laboratory, suggesting that the predictive validity of online IATs may actually be greater than lab-based assessments. Therefore, administering IATs online in a home environment does not influence results on an IAT compared to lab-based administrations, providing support for the future use of online IATs focused on measuring alcohol-related implicit attitudes.

This study also found support for the use of the Inquisit software that was used to create the studies used in this research. It was found that there was a discrepancy in results for participants who completed IATs that were either Flash-based or created with Inquisit, with results suggesting that IATs run with Inquisit may produce more valid results than IATs using the Flash-based alternative (Houben & Wiers, 2008b). Although a different version of Inquisit (v2.0) was used in the study by Houben and

Wiers (2008b) compared to the one used in the current study (v3.0), it still provides support for the use of Inquisit software for developing and using IATs online.

The current chapter has provided justification for the use of the IAT as the measure of implicit attitudes used throughout this research project. Although the psychometric properties of the IAT have been shown to be moderate at best (Greenwald & Nosek, 2001; Lane et al., 2007), they still continue to be better than those found for other implicit attitude measures. Furthermore, research suggests that internet-based IATs are equally effective, if not better, at measuring implicit attitudes than lab-based versions (Houben & Wiers, 2008b). This provides further validation for the methods used here, as participants in this project will be completing IATs online. The next chapter will outline the first experimental study of this project and will examine the immediate influence of advertisement exposure on implicit attitudes.

Chapter 5: Study 1

As highlighted in previously in *Chapter 2: Implicit Attitudes and Alcohol Consumption*, implicit attitudes may be an important variable for the prediction of addictive behaviours such as alcohol consumption. Due to the intoxicating effect of consuming alcohol, more deliberate decision-making processes may become inhibited when alcohol is consumed (Peele & Grant, 1999). This may lead to drinking behaviour being influenced by cognitions assumed to be automatic or impulsive in nature such as implicit attitudes. This assumption is supported by research findings which suggest that positive implicit attitudes are related to greater levels of alcohol consumption and can predict unique variance over and above explicit cognitions for drinking behaviour (Houben & Wiers, 2006, 2008a; McCarthy & Thompsen, 2006). Due to the link between alcohol-related implicit cognitions and drinking behaviour, there has been an increased interest in the processes through which implicit attitudes can be formed or altered.

This increased interest has led to research suggesting that associative processes such as Evaluative Conditioning (EC) are influential in forming new, or changing existing, implicit attitudes (Houben et al., 2010a, 2010b; Olson & Fazio, 2001). Although such studies have produced promising results regarding the creation or alteration of implicit attitudes, all of these studies have exposed participants to an EC procedure using a computer in a laboratory setting. Therefore, these results are restricted to the individuals being exposed to these procedures and may be limited in their generalizability to the wider population. With research findings suggesting that EC can be useful for producing attitude change, it is important to highlight processes that may use EC to target larger audiences. When thinking about such a process, it is hard to ignore the possible influence of advertising, which uses the basic principles of

EC in an attempt to form or alter attitudes toward the brand or product being endorsed. Due to the apparent use of EC in advertising, it is argued that exposure to advertisements may manipulate implicit attitudes, and this argument has been supported by recent research indicating that advertisement exposure can trigger positive implicit attitudes (Goodall & Slater, 2010).

Despite an increased interest in the topic, the investigation of implicit attitude change remains a study in its infancy and further investigation in to the processes through which such change can occur is necessary. Of particular interest for the current study is the influence advertising may have on implicit attitudes. Research into this field has been limited, with very few studies found examining the influence of advertisement exposure on implicit attitudes (Goodall & Slater, 2010; Vianello et al., 2009). Furthermore, only one of these studies focused on the influence of alcohol advertising on alcohol-related implicit attitudes. Therefore, the aim of the current study was to investigate immediate alcohol-related implicit attitude change following advertisement exposure. By focusing on this issue, a greater understanding of the influence advertising may have on implicit attitudes can be highlighted.

Current Study

Although recent research has suggested that viewing alcohol advertisements can produce positive implicit attitudes toward alcohol (Goodall & Slater, 2010), this study used only a post-test assessment of implicit attitudes. Therefore, the observed results from this study may have occurred because pre-existing alcohol-related implicit attitudes held by participants viewing alcohol advertisements may have been more positive than those held by participants who did not view alcohol advertisements. Even if exposure to the alcohol advertisement had little to no effect on implicit attitudes, such a situation means that individuals in the alcohol advertisement condition would have

reported more positive implicit alcohol-related attitudes on a post-test assessment than participants viewing non-alcohol advertisements. This means that whether advertisement exposure can produce a change in implicit attitudes from a baseline assessment remains unknown. By taking a pre-test measure of implicit attitudes this knowledge gap may be filled and the influence of advertising in producing a *change* in implicit attitudes can be identified.

To address limitations in the study by Goodall and Slater (2010), Study 1 of the current research project was designed as an initial investigation of the immediate influence of advertisement exposure on implicit attitudes using a pre- and post-test IAT design. In this study, implicit attitudes toward both beer and chocolate were assessed. Beer advertisements were chosen because previous research (Goodall & Slater, 2010) has used alcohol advertisements to alter implicit attitudes and the current study hopes to replicate and extend these findings. Chocolate was chosen as the second product being advertised because research indicates that implicit attitudes for impulsive behaviours such as unhealthy eating may be better predictors of behaviour than more deliberative cognitions (Stacy, 1997). The addition of the chocolate advertisement condition extends the results from Goodall and Slater (2010) by further examining the influence of advertising on implicit attitudes toward a non-alcoholic product.

By examining the effect of advertising for products other than alcohol on implicit attitudes, a greater understanding of if and how advertisement exposure can influence implicit attitudes can be obtained. Further support for the use of beer and chocolate products as targets comes from research using EC to alter implicit attitudes toward snack foods (e.g. chocolate) and alcohol. This research has consistently found that EC can be successfully used to alter implicit attitudes toward these products (Hollands et al., 2011; Houben et al., 2010a). Based on the above information, it is

hypothesised that participant's implicit attitudes for the product being advertised will positively shift from pre- to post-test on an IAT as a result of exposure to a relevant advertisement.

Method

Participants

Participants were 80 undergraduate students, 35 males and 45 females ($M =$ 23.16 years, $SD = 6.13$). Participants were randomly allocated to the beer advertisement or chocolate advertisement condition, with 40 individuals in each condition. There were 19 males in the beer advertisement condition and 16 in the chocolate advertisement condition. Participants were recruited through the James Cook University Research Participation Pool and could acquire course credit as a result of participation. Ethical approval for this study was obtained from the University's Human Research Ethics Committee.

Study 1 and 2 are experimental pre- and post-test designs with participants randomly assigned into separate conditions. There are both between (chocolate or beer conditions) and within (pre- and post-test IAT scores) variables of interest for these studies. As a result of the pre- and post-test nature of this experimental design, it is important to note that previous research has produced changes to implicit attitudes within a small time period (Gibson, 2008; Vianello et al., 2009). Therefore, it is possible that implicit attitudes can be altered within the time period being used in the current study.

Materials

Advertisements. A study by Goodall (2009) influenced the advertisements chosen for use in the current study. In Study 1 of Goodall (2009), advertisements that were no longer running on actual television programming were used and the results

from that study found that these outdated advertisements had no influence on automatically activated attitudes. Therefore, the advertisements chosen for the current study were advertisements that were currently being shown in regular television programming at the time the study was conducted. Both advertisements went for 30-seconds each and were chosen because they shared similar characteristics. Both advertisements had seemingly no connection to the product they were advertising and individuals watching the advertisements should have had very little idea of what is being advertised until the brand was shown at the end. Therefore, it can be argued that both advertisements were endorsing their respective products subtlety. In light of the findings of Vianello et al. (2009), these subtle advertising techniques would suggest that the two advertisements used here may be more successful in producing a change in implicit attitudes. Furthermore, both advertisements attempted to use humour to sell their product.

Alcohol advertisement. The alcohol advertisement chosen for this study was for the popular Australian beer XXXX Gold. The characters in the advertisement are part of a continuing chain of advertisements for XXXX Gold using the same characters, so the audience may have been familiar with the characters being shown. In this particular advertisement, a group of typical-looking men are standing on a beach. One man places a squid in a slingshot device tied between two trees and a car. As another man drives the car forward, the slingshot pulls back and releases from the car, sending the squid flying into the distance. The scene then cuts to two men in a fishing boat, and the squid goes flying above their heads. The scene cuts back to the men on the beach who are looking into the distance laughing. The XXXX Gold logo then comes up on the screen with the motto "Good as Gold."

Chocolate advertisement. The chocolate advertisement used for this study was for the popular chocolate company Cadbury. This advertisement portrays a gorilla drumming to the song 'In the Air Tonight,' a piece of music that most people would be familiar with. The advertisement ends with the Cadbury logo and the motto "A glass and a half of joy." Pictures of the advertisements used in this study can be seen in Appendix B2.

Implicit attitudes. Implicit attitudes were measured using a bipolar affective Implicit Association Test (IAT) design (Greenwald et al., 1998). The basic premise of the IAT (see Chapter 2: Implicit Attitudes and Alcohol Consumption) and a detailed description of the IAT's psychometric properties (see Chapter 4: Methodology) have been covered in other chapters. Therefore, the design of the IAT that was used for both Studies 1 and 2 will be highlighted here. The basic overview of the blocks and trials used in the bipolar IAT for Study 1 and Study 2 can be seen in Table 5 below. The categories used in the IAT are meant to be representative of the topics of interest for the study (Nosek et al., 2007). As the current studies were interested in implicit evaluations toward beer and chocolate, the target stimuli used were beer and soft drink words for the beer-related IAT and chocolate and fruit words for the chocolate-related words. The attribute stimuli were always positively or negatively valenced alcohol-affective words adapted from Houben et al. (2010c). The category labels for the IATs used in Study 1 and Study 2 were '*beer'* and '*soft drink'* for the beer-related IAT and '*chocolate'* and '*fruit'* for the chocolate-related IAT. '*Positive'* and '*negative'* were the labels used for the attribute categories. For each block in all IATs used in this study, the appropriate category labels appeared in the top left and right of the computer screen to remind participants of the response key allocation (Nosek et al., 2007). The contrasting categories of soft drink for the beer-IAT and fruit for the chocolate-IAT were used for

Study 1 and Study 2 because they had been used in previous studies with successful

results (Houben & Wiers, 2006, 2007; Scarabis, Florack, & Gosejohann, 2006).

Table 5

Overview of IAT Procedure for Studies 1 and 2

Block	Number of trials	Left-key response ('q')	Right key response ('p')
B1	20	Beer words	Soft drink words
B2	20	Positive words	Negative words
B3	40	Beer + Positive	Soft drink + Negative
B4	40	Beer + Positive	Soft drink + Negative
B5	20	Soft drink words	Beer words
B6	40	Soft drink + Positive	Beer + Negative
B7	40	Soft drink + Positive	Beer + Negative

Once the category labels were identified, exemplars for each category were

chosen. Based on research suggesting that a significant reduction in psychometric

properties of the IAT was only found when there were one or two exemplars per

category in the IAT (Nosek, Greenwald, & Banaji, 2005), four exemplars were chosen

for each category. The four words used for each category in the IATs for Study 1 and

Study 2 are shown in Table 6. These words were chosen as they were believed to be

good examples representing the category labels. As seen in Table 6, each of the beer-

related words are examples of popular beer companies that all participants should have

been familiar with. The chocolate-related words are all examples of Cadbury chocolate

products. Both the beer- and chocolate-related words contained the products actually

being endorsed in the advertisements used for Study 1 and Study 2.

Table 6

Stimuli for IATs in Studies 1 and 2

	Stimuli
Beer-related words	*XXXX Gold, Victorian Bitter, Hahn, Tooheys*
Soft drink-related words	*Coca Cola, Lemon Squash, Fanta, Pepsi*
Chocolate-related words	*Crunchie, Flake, Freddo, Cadbury*
Fruit-related words	*Apple, Orange, Apricot, Banana*
Positive words	*Cheerful, Happy, Funny, Sociable*
Negative words	*Nausea, Awful, Miserable, Annoying*

Word length and syllables were also taken into account when considering the stimuli used in IATs. This was done because word or syllable length may influence responding on the IAT. For example, if each positive word was five letters long but each negative word was ten letters long, it may be that participants are classifying each word based on word length alone and not on their respective valence. The current study aimed to eliminate this confound by taking words of approximately the same length for use in each category. For example, the positive and negative words chosen (see Table 6 above) are all of similar length, so participants would not be able to make the distinction between positive or negative words based on word length alone. In addition to this, if a beer company was two words (e.g. Victorian Bitter), then a soft drink with two words (Lemon Squash) was purposely chose to counteract being able to identify the target words based on wording alone. Furthermore, the positive and negative words were adapted from the study by Houben et al. (2010c) who found that IAT variants using alcohol-related affective stimuli showed the strongest relationship with explicit alcohol-related attitudes and actual drinking behaviour.

For each IAT in this research project, the left response key was the 'q' key, while the right response key was the 'p' key. When stimulus items were incorrectly categorised with the wrong response key, an error indication in the form of a red 'X' appeared on the middle of the computer screen. Participants were then required to press the appropriate response key before the next trial was shown. The intertrial interval between stimuli presentations was set to 250ms for all IATs, which allows the measure to be completed rapidly with little delay (Nosek et al., 2007).

Authors suggest using multiple cues for the identification of exemplars to their relevant categories so that they can be more easily and quickly classified (e.g. Nosek et al., 2007). For example, using distinct colours or fonts for different categories may help participants to identify them more easily. Although it may assist participants in their classification, no IATs used in this research project used different cues to indicate different categories, with each stimulus presented in the same font and colour regardless of their category. Due to the consistency of the IAT process used throughout this research project, any confounding influence based on ease of classification of different categories is minimised. Additionally, stimuli in an IAT can be presented as words, images, sounds or a combination of all three. However, for each IAT used in this research project, the stimuli used were always words.

As Nosek et al. (2007) reports, in the majority of studies using the IAT, samples are usually split in half based on which pairings are placed in initial critical phases. For example, in Studies 1 and 2, approximately half of all participants completed the alcohol-positive pairings in B3 and B4 and alcohol-negative pairings in B6 and B7, while the other half of participants received the alcohol-negative pairings in B3 and B4 and the alcohol-positive pairings in B6 and B7 (see Table 5). The counter-balancing of these blocks is done in order to overcome extraneous influences, namely the fact that

IAT effects are slightly biased in indicating that the associations in the initial critical IAT pairings (B3 and B4) are stronger than those in the second critical pairings (Nosek et al., 2007). However, Nosek et al. (2005) noted that this extraneous influence is reduced by using 40 trials in the critical blocks as opposed to just 20, the same method that is used throughout this research project (see Table 5). Therefore, this extraneous influence should be limited in its effect on IAT performance throughout this research project.

In Studies 1 and 2, participants in both conditions completed both the beer- and chocolate-related IAT in the pre-test, and then completed the same IATs in a post-test. This means that all participants completed 4 IATs in a single testing session. Participants were asked to complete both a beer and chocolate IAT so that practice effects could be minimised as an explanation for any shift in implicit attitudes between pre- and post-test measurements. For example, if participants who watched the chocolate advertisement showed more positive implicit attitudes toward chocolate from the pre to post-test but their attitudes toward beer stayed similar across testing sessions, it can be suggested that the advertisement may have had an influence on chocolate-related implicit attitudes only. The completion of the chocolate and beer IATs were counterbalanced such that some participants completed the beer IAT first and some completed the chocolate IAT first. This counterbalancing occurred in both the pre- and post-test sessions.

Another important aspect for this study is the order in which implicit and explicit assessments were completed. Research has suggested that completing explicit measures before implicit ones may make concepts more accessible, thus influencing scores on an IAT and correlations between explicit and implicit measures (Bosson et al., 2000). However, research has also suggested that the order of measures has no such

effect, with a meta-analysis of studies using explicit and implicit measures finding that implicit-explicit correspondence did not differ based on whether explicit measures were completed prior to or after an IAT (Hofmann et al., 2005a). Another study by Nosek et al. (2005) varied the order of implicit and explicit measures administered online and found that the relationship between the two separate measures did not differ based on the order in which they were completed. Therefore, it can be argued that the order of explicit and implicit measures has a minimal effect on the relationship between the two measures. As a result of these findings, participants always completed implicit attitude assessments prior to any explicit assessments.

Participants were shown instructions at the beginning of every IAT which informed them of the reaction-time nature of the IAT task. The instructions also outlined that words representing categories (e.g. beer, positive) would appear in the upper corners of their screen and stay there throughout the IAT task. Participants were prompted at the start of each block of the IAT to familiarise themselves with the categories being shown in the corners of the screen. Participants were asked to place their left and right index fingers over the 'q' and 'p' keys so they could respond to stimuli which would be shown one-by-one on the middle of their screen. They were told that the 'q' key corresponded to the category shown in the left corner, while the 'p' key corresponded to the category shown in the right corner. If they made an error, participants were told that a red 'X' would appear on their screen, and they would need to press the correct key in order to see the next stimulus. Participants were asked to complete the task as quickly as possible, while trying to minimise their mistakes. These instructions were given before participants completed each IAT used throughout this study.

D-score. As highlighted in *Chapter 4*: *Methodology*, the D-score method has been found to be the best scoring method for the IAT (Greenwald et al., 2003). This was the scoring method used throughout this research project, with the D-score calculated such that higher positive scores indicated more positive implicit attitudes toward the target object (beer in the beer-related IAT or chocolate in the chocolate-related IAT), while higher negative scores indicated more negative implicit attitudes.

Product preference. Participants were asked to indicate their preference for various alcoholic beverages and food products. For alcoholic beverages, participants were asked to rank their preferences for *beer, spirit nip with/without mixer, wine* or *premix spirits* from 1= most preferred to 4= least preferred. For food, participants were asked to rank their preferences for *a piece of fruit, a chocolate bar, a small tub of yoghurt, a bowl of ice-cream,* or *a block of chocolate* from 1= most preferred to 5= least preferred.

Alcohol consumption. For quantity of alcohol consumption, participants were asked to indicate how much of a particular drink (e.g. can of mid-strength beer, premixed spirit etc.) they would drink in an average drinking session on both a weekday (operationalised as Sunday-Wednesday) and a weekend day (operationalised as Thursday-Saturday). Thursday was included as a weekend day because it is the typical night that university students attend the bar on the local University campus. Therefore, including Thursday as a weekend day would capture the drinking behaviour of university students (who are the majority of the individuals in the current sample) for these particular sessions. Weekend drinking sessions were used in this study as this was thought to be a better indicator of drinking behaviour for the target audience of this study. Research suggests that university students may be more likely to consume alcohol, and do so in greater quantities, on a weekend as opposed to a weekday (Del

Boca, Darkes, Greenbaum, & Goldman, 2004; Maggs, Williams, & Lee, 2011). This may be because they may have fewer restrictions on their drinking behaviour on weekends compared to weekdays (e.g. not wanting to be hungover for class the next day).

These responses were then recalculated into units of Australian drinking standards [National Health and Medical Research Council (NHMRC), 2009]. A measure of drinking frequency was also obtained in this questionnaire. This measure asked participants to provide their best estimate of how many weekdays and weekend days in the past month they drank the amount of alcohol they reported in the quantity of alcohol section. If participants did not consume alcohol they were asked to leave the sections blank.

Explicit alcohol-related cognitions. Although the focus of this research project was on implicit attitudes toward alcohol, explicit assessments of alcohol-related cognitions were also assessed. These cognitive processes were chosen as they have been extensively used by literature examining the influence of explicit processes in the prediction of drinking behaviour (Norman et al., 1998; Wiers et al., 2002). In the current research project, these variables act more as manipulation checks so that participants in the different conditions did not significantly differ in their explicit alcohol-related cognitions and confound results.

Alcohol-related expectancies. Alcohol-related expectancies were measured by showing participants the statement "After drinking I feel…" followed by 12 different responses. These responses were: *active, funny, miserable, uncomfortable, energetic, awful, sociable, nauseous, sad, cheerful, excited* and *unpleasant.* Participants indicated their responses to each word on a 7-point Likert scale with the anchors 'Not at all' and

'Extremely.' Scores for the words *miserable, uncomfortable, awful, nauseous, sad* and *unpleasant* were reverse scored to indicate positive responses. An average measure of alcohol-related expectancies was calculated by adding up all scores and dividing them by 12. Higher scores on this variable indicated greater alcohol-related expectancies.

Explicit alcohol-related attitudes. The explicit attitude measure was adapted from Houben et al. (2010a). Participants were shown the following statement 'I consider consuming alcohol to be:' followed by four 7-point Likert scales with the anchors: *Unpleasant-Pleasant, Boring-Fun, Bad-Good* and *Wise-Foolish.* Answers for the last scale were reversed scored before an average score for explicit alcohol-related attitudes was calculated by adding up all the scores and dividing by four. Higher scores on this measure indicated more positive explicit alcohol-related attitudes.

Behavioural intention. Behavioural intention was assessed using two questions. The first question asked participants "Do you intend to drink alcohol in the next month?" This question was followed by a Likert scale with four response options: *Definitely not, Probably not, Probably yes* and *Definitely yes.* The second question asked participants "How likely is it that you will drink alcohol in the next month?" This question was followed by four response options: *Very unlikely, Unlikely, Likely* and *Very likely.* An average measure of behavioural intention was calculated by adding the answers for the two questions together and dividing by two. Higher scores on this variable indicated greater intention to consume alcohol.

Subjective norms. To assess subjective norms, participants read two statements and gave their responses on a 5-point Likert scale with the anchors 'Strongly disagree' and 'Strongly agree.' The two statements were "In my circle of friends, it is expected that I consume alcohol during an evening of socialising" and "When my

friends are drinking, I feel like I should drink too." An average measure of subjective norms was calculated by adding the answers for the two questions together and dividing by two. Higher scores on this variable indicated subjective norms more favourable toward drinking.

Advertising questionnaire. Participants' attitudes toward the advertisement they had just seen as well as attitudes toward advertising in general were also assessed. Participants were asked whether they had seen their respective advertisement before, how many times they had seen it, and whether or not they knew what brand the advertisement was for before the brand was shown at the end of the advertisement. The advertisement evaluation measure was adapted from Slater, Rouner and Long (2006) and asked participants to indicate how *enjoyable, likeable, funny* and *appealing* they found the advertisement they had just watched on a scale from 1= Not at all to 7= Extremely. Answers from the four items were then added together and averaged to provide an overall advertisement favourability measure. Higher scores on this variable indicated more positive advertisement evaluations. Participants were also asked to indicate which of the following advertising mediums they were regularly exposed to: *television, radio, internet, magazines* and *billboards*. A total score of exposure to advertisement mediums was generated by adding together all the mediums participants indicated they were regularly exposed to. A full copy of all questions from the above measures can be found in Appendix B1.

Procedure

Upon arrival to the laboratory, participants were issued an information sheet and informed consent form (see Appendix C). After providing consent, participants were randomly assigned to the chocolate or beer condition before completing both a chocolate- and beer-related IAT. These IAT tasks were administered on a desktop computer using the Inquisit v3.0.4 (Millisecond Software, 2010). After completing the pre-test IATs, participants were shown either the chocolate or alcohol advertisement depending on the condition they were in. All advertisements were shown on the computer. Immediately after viewing the advertisement, participants completed the post-test IATs for chocolate and beer. Participants were then provided with the paper copies of the questionnaires assessing explicit alcohol cognitions and the advertising variables. Participants were then thanked for their time and given course credit where applicable. Non-university students received no compensation for their participation.

The order of completion of the chocolate and beer IATs in both the pre- and post-test sessions were counterbalanced such that some participants completed the chocolate IAT and some completed the beer IAT first. The order of the target-attribute pairings was also counter-balanced such that some participants completed the target-positive phases first and some completed the target-negative phases first.

<div align="center">

Results

</div>

Randomisation Checks

The average number of standard drinks of alcohol consumed in a typical drinking session on a weekend was not significantly different between the alcohol advertisement ($M = 5.7$, $SD = 4.3$) and chocolate advertisement ($M = 5.2$, $SD = 4.13$) conditions, $t(78) = .48$, $p = .636$. Randomisation checks also indicated no significant differences in participant age, any of the explicit alcohol-related cognitions or pre-test

implicit attitudes toward beer and chocolate based on condition (see Table 7, all p's >

.05). In regards to the advertisement favourability scales, it was found that participants

in the chocolate advertisement condition found the chocolate advertisement

significantly more appealing (M = 4.68, SD = 1.34) than participants in the beer

condition found the beer advertisement (M = 3.83, SD = 1.66), $t(78)$ = -1.55, p = .014.

No other significant differences in advertisement favourability based on condition were

found. There was no significant difference in exposure to advertising mediums based on

condition (all p's > .05). The relevant statistics for each of the advertisement measures

can be seen below in Table 8.

A chi-square analysis did not detect a significant difference in preference for

beer between conditions, $\chi^2(1, N = 80)$ = 3.74, p = .291. Within the conditions, eight

(20%) participants from the beer advertisement condition rated beer as being their most

preferred drink, while six (15%) participants from the chocolate advertisement

condition rated beer as being their most preferred drink.

Table 7

Mean (SD) Scores for Study 1 Randomisation Checks

Variable	Beer condition	Chocolate condition
Age	23.45 (7.37)	22.88 (4.66)
Alcohol expectancies	5.11 (.72)	5.18 (.88)
Explicit attitude	4.04 (1.14)	4.03 (1.04)
Intention	3.18 (1.02)	3.25 (.94)
Subjective norms	2.79 (1.07)	2.99 (1.09)
Willingness	4.03 (1.16)	4.31 (1.06)
Pre-test beer	-.13 (.42)	-.14 (.42)
Pre-test chocolate	.03 (.49)	.19 (.52)

Table 8

Mean (SD) Scores for Advertisement Favourability and Exposure

Advertisement characteristic	Beer condition	Chocolate condition
Enjoyable	4.83 (1.38)	5.28 (1.22)
Funny	4.78 (1.64)	5.03 (1.54)
Likeable	4.83 (1.47)	5.33 (1.21)
Overall favourability	4.56 (1.36)	5.08 (1.18)
Exposure to advertising mediums	3.15 (1.05)	3.45 (.99)

Implicit Attitude Change

A 2 (Testing session) x 2 (Condition) ANOVA was performed to examine the influence of advertisement exposure on chocolate-related implicit attitudes. Pre- and post-test IAT scores for chocolate were entered as the dependent variable. The relevant means (SD) for this analysis can be seen below in Table 9. The results from this analysis revealed no significant main effect for testing session, $F(1,78) = .014$, $p = .905$. There was also no significant main effect for condition, $F(1,78) = 1.75$, $p = .190$. No significant interaction effect was found, $F(1,78) = .109$, $p = .742$. This suggests that viewing an advertisement for either beer or chocolate had no influence on implicit attitudes toward chocolate for participants in this sample.

Another 2 (Testing session) x 2 (Condition) ANOVA was performed to examine the influence of advertisement exposure on beer-related implicit attitudes. Pre- and post-test IAT scores for beer were entered as the dependent variable. The relevant means (SD) for this analysis can be seen below in Table 10. The results from this analysis revealed no significant main effect for testing session, $F(1,78) = 1.89$, $p = .174$. There was also no significant main effect for condition, $F(1,78) = 2.92$, $p = .091$. However, there was a significant interaction effect, $F(1,78) = 10.85$, $p = .001$. By examining the means (SD) in Table 10, it appears as though beer-related implicit attitudes are significantly changing from pre- to post-test for those participants who viewed an advertisement for beer. This suggests that viewing an advertisement for beer may produce a significant positive shift in implicit attitudes from pre- to post-test.

Table 9

Mean (SD) Scores for Chocolate-related Implicit Attitudes

IAT Scores	Condition (Advertisement viewed)	
	Chocolate	Beer
Pre-test chocolate	.19 (.52)	.03 (.49)
Post-test chocolate	.18 (.63)	.06 (.49)

Table 10

Mean (SD) Scores for Beer-related Implicit Attitudes

IAT Scores	Condition (Advertisement viewed)	
	Chocolate	Beer
Pre-test beer	-.14 (.42)	-.13 (.42)
Post-test beer	-.21 (.42)	.07 (.44)

Previous advertisement exposure. As a result of the finding that a significant shift in beer-related implicit attitudes is apparent in the beer advertisement condition, further analyses were run to examine what factors, if any, may influence this implicit attitude change. One factor that appeared to influence MD scores was previous advertisement exposure to the advertisement being shown in this study. This was particularly evident for participants in the beer advertisement condition. Previous advertisement exposure was operationalised as whether or not participants had seen the beer advertisement prior to seeing it in the current study. There were seventeen participants who had not seen the beer advertisement before, and twenty-three that reported having seen the beer advertisement prior to the study. For participants in the

beer advertisement condition only, a 2 (Testing Session) x 2 (Previous Advertisement Exposure) ANOVA was performed. The relevant means (SD) for this analysis can be seen in Table 11 below. An independent samples t-test revealed no significant difference in pre-test IAT scores for beer based on previous advertisement exposure, $t(38) = .11$, $p = .916$.

As expected, this analysis revealed a significant main effect for testing session, $F(1,38) = 9.90$, $p = .003$. There was no significant main effect for previous advertisement exposure, $F(1,38) = 2.13$, $p = .153$. This analyses also revealed a significant interaction effect between implicit attitude change and previous advertisement exposure, $F(1,38) = 4.70$, $p = .037$. By viewing the means (SD) in Table 11, it appears as though there is significant positive implicit attitude change for those participants who had previous exposure to the beer advertisement. Those without any previous exposure appear to show no significant beer-related implicit attitude change.

For the chocolate condition, nineteen participants reported having seen the chocolate advertisement before, while twenty-one reported having never seen the advertisement before. The same analysis for examining the influence of previous advertisement exposure on implicit attitude change was run for chocolate-related implicit attitudes, however there were no significant results (p's > .05) (see Appendix L1.1 for the output for this analysis).

Table 11

Mean (SD) Scores for Beer-related Implicit Attitude Change Based on Previous
Advertisement Exposure

IAT Scores	Previous advertisement exposure	
	Yes	No
Pre-test beer	-.06 (.49)	-.14 (.44)
Post-test beer	.24 (.54)	-.09 (.40)

In order to further analyse the influence of previous advertisement exposure on beer-related implicit attitude change, participants were split into groups based on how many times they had previously seen the beer advertisement. As the previous advertisement exposure variable was categorical, participants were placed into groups based on their responses to this question. The groups included participants who had never seen the advertisement before ($N = 17$), having seen the advertisement 1-5 times ($N = 15$) and having seen the advertisement 6 or more times ($N = 8$). For this analysis, a mean difference (MD) score for beer-related implicit attitudes was created. The MD score was formulated by subtracting participants' pre-test IAT scores from their post-test IAT scores. Therefore, positive MD scores indicate a positive shift in implicit attitudes from pre- to post-test, while negative scores indicate a negative shift. These MD scores can be seen in Table 12 and were used to examine the influence of the number of previous advertisement exposures on implicit attitudes.

A one-way ANOVA for participants in the beer condition only revealed that the number of previous advertisement exposures had a significant influence on beer-related implicit attitudes, $F(2,39) = 3.61$, $p = .037$. In order to break this finding down, contrast analyses comparing each of the three groups were performed. As seen in Table 12, it

appears as though as the number of previous advertisement exposures increases, so too does the level of implicit attitude change. However, a significant difference in implicit attitude change was only found between the participants who had never seen the beer advertisement before and participants who had seen the advertisement before 6 or more times, $t(37) = -2.67$, $p = .011$. This suggests that participants who had seen the advertisement most often reported a greater beer-related implicit change than those participants who had never seen the advertisement before. No other significant differences between groups were found (all p's $> .05$). The same analysis to that above was run for chocolate-related implicit attitudes, however there were no significant results (p's $> .05$) (see Appendix L1.2 for the output for this analysis).

Table 12

Mean Difference (SD) Scores for Beer-related Implicit Attitude Change Based on Number of Previous Advertisement Exposures

	Number of previous advertisement exposures		
	0	1-5	6+
MD Score	.06 (.27)	.22 (.45)	.45 (.24)

Discussion

Study 1 aimed to provide an initial investigation into the immediate influence of advertisement exposure on implicit attitudes. Previous research has indicated that viewing advertisements for alcoholic products can activate positive alcohol-related implicit attitudes (Goodall & Slater, 2010). However, this research was limited by having no pre-test measure of implicit attitudes, thus not being able to examine whether implicit attitudes actually change as a result of advertisement exposure. Overcoming this limitation, the current findings suggest that exposure to a single beer advertisement

can produce an immediate positive shift in beer-related implicit attitudes from pre-to post-test on an IAT. In line with the definition of implicit attitudes as an associative evaluative network, these results suggest that when exposed to a positive portrayal of alcohol such as those found in alcohol advertisements, positive evaluations of alcohol can be activated to produce a positive shift in implicit attitudes. This study also expanded the literature on advertisement exposure and implicit attitudes by assessing whether chocolate advertisements could influence chocolate-related implicit attitudes. Interestingly, viewing an advertisement for a chocolate product had no influence on chocolate-related implicit attitudes.

The shift found in implicit attitudes for beer but not for chocolate may be due to the different evaluative associations held by each target object. Both beer and chocolate have obvious positive characteristics associated with them, whether it is enjoyment of the taste or the relaxing qualities associated with their consumption. However, one aspect that may separate beer from chocolate is the positive social aspect associated with beer consumption. Due to the fact that the majority of participants in this study were young adults, most participants would probably enjoy drinking with their friends in a social environment, whether it is at a party or a nightclub. In fact, among young adults, some of the main reasons given for consuming alcohol are socially-based, with individuals reporting that they consume alcohol to enhance their social environment or to increase their own social confidence (Kuntsche, Knibbe, Gmel, & Engels, 2005). The social aspect of drinking is portrayed heavily in beer advertisements, as they often show people consuming alcoholic products in a social environment while having a good time. The beer advertisement used in this study is no exception, as it portrayed a group of friends consuming the beer product while talking and laughing. Therefore, the beer advertisement may have been directly appealing to the social nature of alcohol

consumption, something which the majority of participants in this study (being young adults) could relate too.

A positive social aspect is something that chocolate products lack, as it is not common for friends to gather around and enhance their social experience with chocolate. This may mean that the conceptualisation of alcohol in one's memory may have more positive social evaluative associations linked to it than the conceptualisation of chocolate. Therefore, exposure to a stimulus like an advertisement that uses EC principles to pair alcohol with positive social outcomes may highlight the positive social aspects of drinking and automatically trigger these positive evaluations. The successful use of EC in alcohol advertising may then lead to the activation of positive beer-related implicit attitudes which influence scores on an IAT, as was shown in this study.

An alternative explanation for the null findings related to chocolate implicit attitudes can be related to ceiling effects. When looking at the IAT scores for the pre-test chocolate measure, it is evident that these implicit attitudes are already positive in nature compared to implicit attitudes for beer. This is not surprising because most people enjoy consuming chocolate and there may not be many obvious negatives associated with the chocolate product as there is with alcohol (e.g. feeling nauseous or vomiting after consuming too much alcohol). Therefore, a ceiling effect may have occurred in that when viewing an advertisement attempting to portray chocolate in a positive light, participants attitudes could not get any more positive than they already were prior to advertisement exposure. Therefore, advertising for products in which individuals have initial negative attitudes toward such as alcohol may be far more effective in producing positive implicit attitude change. This may be why there is so much alcohol advertising shown on television today and why large amounts of money

is invested into promoting alcoholic products (Australian Medical Association, 2012; Victorian Department of Human Services, 2009), as companies battle to change what appear to be implicitly negative attitudes toward alcohol.

Previous Advertisement Exposure

Findings from the current study suggest that beer-related implicit attitudes significantly shifted from pre- to post-test for participants that had prior exposure to the beer advertisement. More specifically, participants in the beer condition who indicated that they had seen the beer advertisement before reported significantly greater implicit attitude change than participants who had not. This result suggests that it may be easier to activate a positive automatic evaluation of alcohol if an individual has had previous exposure to the beer advertisement. Furthermore, results suggest that the more often a participant had seen the beer advertisement, the greater the beer-related implicit attitude change from pre- to post-test.

A possible interpretation of the previous advertisement exposure findings stems from a learning theory perspective which assumes that the more often one is exposed to a particular stimulus pairing; the more likely the association is to be formed in memory (Hofmann et al., 2010). In regards to the current study, this suggests that the more often an individual is exposed to an alcohol advertisement pairing alcohol with positively-valenced stimuli, the more likely an association will be developed between alcohol and positive in memory. Participants who had seen the beer advertisement pairing alcohol with positive stimuli before may have been more likely to hold stronger associations between alcohol and positive evaluations than participants who had not seen it before. Therefore, it is suggested that participants who had seen the beer advertisement before seeing it in the study had been exposed to the EC pairing of alcohol-positive before and the association between these two concepts may have been stronger than those

participants who had not seen the beer advertisement before. This stronger association between alcohol-positive may then have influenced scores on the IAT to produce a positive shift in implicit attitudes from pre- to post-test as a result of viewing an alcohol advertisement.

The learning theory explanation for these findings gains further support from the finding that beer-related implicit attitude change increased as the number of times the beer advertisement had been seen also increased. According to EC, an association requires various stimuli exposures in order to produce effective attitude change (Hofmann et al., 2010). Therefore, those who reported seeing the advertisement more often would have been exposed to more beer-positive associations that are evident in the beer advertisement. This may mean that the association between beer and positive is stronger and easier to trigger upon exposure to the beer advertisement itself.

The results from Study 1 indicate that viewing an advertisement for beer can produce a significant shift in beer-related implicit attitudes as assessed on pre- and post-test IATs. Chocolate-related implicit attitudes were found to not be significantly influenced by advertisement exposure, suggesting that individuals may hold more evaluative associations with alcohol-related stimuli than chocolate-related stimuli. Furthermore, previous advertisement exposure was found to play a role in the beer-related implicit attitude change. That is, participants who had seen the beer advertisement prior to seeing it in the current study produced a greater beer-related implicit attitude change than participants who had not seen the beer advertisement before. Study 2 aims to replicate the implicit attitude changes found in Study 1, as well as expanding upon the findings reported here by examining whether implicit attitude change can influence immediate consumption behaviours.

Chapter 6: Study 2

The results from Study 1 indicated that viewing an advertisement for beer can produce a significant positive shift in beer-related implicit attitudes. Of interest for Study 2 is whether the change in beer-related implicit attitudes found in Study 1 also leads to an immediate increase in consumption behaviour. Although longitudinal studies have found a relationship between increased alcohol advertisement exposure and onset and continuation of drinking behaviour in youth (for a review see Anderson et al., 2009), the immediate influence exposure to advertisements has on consumption behaviour remains unclear. An extensive literature search into the effect of alcohol advertising on immediate exposure found only three recent studies, with authors suggesting that this issue has been overlooked (Engels, Hermans, van Baaren, Hollenstein, & Bot, 2009). The lack of research into this area may be because the influence of alcohol advertising exposure on behaviour is predicted to occur over a longer time period, rather than immediately, through changes in alcohol-related cognitions (Engels et al., 2009).

Despite the current lack of empirical evidence, experimental research is well suited to test the immediate effects of alcohol advertisement exposure on actual drinking or snacking behaviour. The logic behind immediate behaviour studies is that, since television watching is often associated with drinking and/or snacking behaviours, exposure to alcohol advertisements may trigger an increased likelihood of consuming beverages or snacks if they are readily available. It is also argued that viewing actors engaging in drinking behaviour on television or in movies may prime individuals to mimic the actor's behaviour or provoke cravings and subsequently influence consummatory behaviours (Engels et al., 2009; Koordeman, Kuntsche, Anschutz, van Baaren, & Engels, 2011a). Therefore, a recent interest in the immediate influence of

advertisement exposure on eating and drinking behaviour has arisen. Research findings to date have produced mixed results, with some studies finding an influence of advertisement exposure on immediate behaviour (Engels et al., 2009; Harris, Bargh, & Brownell, 2009; Koordeman, Anschutz, van Baaren, & Engels, 2011b) and some studies finding no effect (Koordeman, Anschutz, & Engels, 2012).

The study by Engels et al. (2009) was the first randomised and controlled experiment to investigate the effect of alcohol advertising on immediate drinking behaviour. In this study, a sample of 80 college-aged males was split in pairs to encourage drinking and each pair was randomly assigned to one of four conditions: an alcohol movie/neutral advertisement condition, non-alcohol movie/neutral advertisement condition, alcohol movie/alcohol advertisement condition or non-alcohol movie/alcohol advertisement condition. Participants in the alcohol movie conditions viewed a clip of a movie with 41 positive references to alcohol, while participants in the non-alcohol movie conditions viewed a clip of a movie with only 18 positive references to alcohol. The alcohol advertisement conditions contained advertisements for alcoholic products, while the neutral advertisement conditions contained advertisements for neutral (e.g. cars, video cameras) products. Participants were placed in a naturalised setting with a comfortable couch, big screen television and a fridge containing alcohol (beer or wine) and soft drink. The movie clip the participants viewed depended on the condition, but all clips went for approximately an hour and were broken up by two advertisement breaks lasting three and a half minutes each.

During the viewing of the video clip, the number of bottles of alcohol consumed by participants was recorded. After controlling for weekly drinking behaviours, analyses found that those participants in the alcohol movie conditions consumed significantly more alcohol than those in the non-alcohol movie conditions, while those

in the alcohol advertisement conditions consumed more alcohol than those in the neutral advertisement conditions. Furthermore, participants in the alcohol movie/alcohol advertisement condition drank, on average, 1.5 more glasses of alcohol than those in the non-alcoholic movie/neutral advertisement condition. These results suggest that the portrayal of alcohol on television, whether it is through movies or advertisements, can have an immediate influence on the amount of alcohol an individual will consume while exposed to these stimuli.

Another study assessing the immediate influence of alcohol advertisements on drinking behaviour was conducted by Koordeman et al. (2011b). This study expanded upon the Engels et al. (2009) study by making the setting more naturalistic, as testing took place in a local cinema complex. One hundred and eighty-four participants, of which approximately 50% were males, were exposed to either four alcohol and six non-alcohol advertisements (alcohol condition) or six non-alcohol advertisements only (control) before watching a two and half hour movie. This experiment used a between-subjects design, so participants were randomly allocated to either the control or alcohol conditions. Participants could use their own money to order snacks and drinks during the movie viewing. After the movie was finished, participants provided a self-report of the amount of alcohol they consumed while watching the movie. The results showed no influence of the type of advertisements played before the movie began on the self-reported overall amount of alcohol consumed. Further analyses of drinking behaviour showed that participants in the alcohol condition that were classified as high weekly drinkers (i.e. reported drinking large amounts of alcohol during the week prior to the movie) consumed more alcohol than participants classified as high weekly drinkers in the control condition. This suggests that individuals who consume large amounts of alcohol may have their drinking behaviour influenced by alcohol advertisements. The

authors argue that cue reactivity can explain the results, with exposure to alcohol-related cues in advertisements possibly increasing craving for alcoholic products and increased alcohol consumption in heavy drinkers (Koordeman et al., 2011b).

A similar study by Koordeman et al. (2012) focused solely on the effects of television alcohol advertisement exposure on immediate alcohol consumption using a sample of 80 male college-aged participants. The participants of this study viewed a one hour movie clip which was interrupted by three 2½ minute advertisement breaks, all showing five different advertisements each time. In the alcohol condition, 2 of the 5 advertisements shown each break were for an alcoholic beverage (e.g. beer and spirits) and three neutral advertisements (e.g. cars), while participants in the control condition were exposed to only neutral advertisements. While watching the movie clip, participants were told that they could get free drinks from a fridge containing beer, wine, soda or water in bottles. After viewing the movie clip, the amount of bottles and centilitres of alcohol consumed by participants was measured. Results showed that there was no significant difference between the alcohol advertisement and control group conditions in the amount of alcohol consumed during the viewing of the movie clip (Koordeman et al., 2012). This suggests that alcohol advertisements, when viewed between movies played on television, have no effect on actual alcohol consumption behaviour.

The findings from the above studies are mixed, with no clear indication as to when or why some alcohol advertisements can immediately influence behaviour while others seem to have no influence. Recently, Engels and Koordeman (2011) wrote an commentary on the state of research looking at the influence of alcohol advertisements on behaviour, stating that "…the immediate effects [of alcohol advertising] are not as straightforward and clear as one might expect" and that "We sincerely hope that other

groups are setting up experiments to replicate our findings as this is the most important step to move forward" (p. 472). These statements suggest that the jury is still out about the effect alcohol advertising can have on behaviour and further research is needed in this area in order to clarify, extend or replicate findings. Furthermore, all of the aforementioned research has focused purely on the direct link between viewing the advertisement and behaviour. This means that any influence that advertisement exposure may have on cognitive processes which may subsequently influence behaviour has been largely ignored. Given the results found in Study 1 of the current research project, it is argued that advertisement exposure may produce a change in implicit attitudes for alcohol. This implicit attitude change may then guide subsequent consumption behaviours. Therefore, Study 2 aims to examine the relationship between advertisement exposure, implicit attitude change and actual behaviour.

MODE Model

Despite predating the current focus of research into implicit attitudes, Fazio's (1990) MODE model may be used in an attempt to explain the link between implicit attitude activation and behaviour. The MODE model is a dual-process account of the link between attitudes and behaviour and suggests that behaviour can be influenced by either deliberative- or spontaneous-processes. The spontaneous-process aspect of the model is focused on automatic attitude activation, whereas the deliberative-process is more concerned with rational thinking and decision-making. Although two separate processes are suggested in the MODE model, these processes may also interact with one another to influence behaviour. For example, a spontaneously accessible attitude can serve as a retrieval cue that enhances the likelihood an individual may explicitly consider attribute information that is evaluatively congruent with the spontaneous attitude (Fazio & Towles-Schwen, 1999). The MODE model also makes assumptions

about two determinants that influence whether behaviour will be guided by the spontaneous- or deliberative-processes: motivation and opportunity. Put simply, if an individual's motivation and opportunity to engage in thoughtful processing are high, then behaviour will be influenced by deliberative-processes. However, if opportunity and motivation are non-existent or low, behaviour is hypothesised to be guided by the spontaneous-process (Sanbonmatsu & Fazio, 1990; Schuette & Fazio, 1995).

Despite the possible application of the MODE model to implicit attitude activation, the use of this model for explaining attitude-behaviour links for different attitude objects has been fairly limited. In two separate reviews of the MODE model (Fazio & Towles-Schwen, 1999; Olson & Fazio, 2009) there has been a focus on the application of the MODE model to racial attitudes and prejudice. Therefore, much of the supporting evidence for the MODE model comes from studies examining attitudes toward people of different races (Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997; Jackson, 1997, as cited in Fazio & Olson, 2003), so how well the MODE model can be applied to predict health behaviour remains relatively unknown.

Of particular interest for the current study is the spontaneous-process side of Fazio's MODE model (1990). The strength of an individual's attitude toward particular objects is of high importance in the spontaneous-process aspect of the MODE model, as it is assumed that strongly held attitudes have more accessible object-evaluation associations and can be automatically accessed through mere exposure to the attitude object of interest. As well as mere exposure, attitudes can be activated by a number of different situational cues including contextual cues or media exposure (Goodall & Slater, 2010). Once activated, attitudes can guide behaviour in an automatic manner independent of the individual actively considering the appropriate attitude and without the individual's awareness of its influence (Olson & Fazio, 2009). If a particular

automatically-activated attitude is strong enough to be activated upon exposure to the attitude object, then attitude-relevant behaviour can flow spontaneously from the attitude, independent of more controlled processes. Therefore, behaviour can occur rather spontaneously and can be influenced through the automatic activation of evaluative associations of the relevant stimulus object.

In regards to implicit attitudes, the above explanation suggests that behaviour can be influenced by the positive activation of an individual's implicit attitudes toward a certain attitudinal object. As demonstrated in Study 1, when an individual is exposed to an advertisement for beer, a positive implicit evaluation of beer is activated for some participants and this is shown by the positive shift from pre- to post-test scores on the beer-related IAT. It can be argued then the positive-beer evaluation is strong enough to be activated upon exposure to an attitude object (i.e. the advertisement). Due to the apparent impulsive nature of both alcohol consumption and snack-food consumption (Stacy, 1997), once positive implicit attitudes toward these products have been activated, individuals may automatically approach and engage in consummatory behaviour. This is supported by the assumptions of the MODE model, as when an attitude is activated it should be strong enough to influence behaviour in a spontaneous manner. Therefore, it is argued that the activation of positive implicit attitudes as a result of viewing an advertisement may also immediately influence alcohol and snack food consumption.

Current Study

Study 2 aims to further examine the immediate influence of advertisement exposure on implicit attitudes and consumption behaviour. The study expands on current literature (Goodall & Slater, 2010) and attempts to replicate the findings of Study 1 by using a pre- and post-test assessment of implicit attitudes. Furthermore,

after the post-test assessment of implicit attitudes, participants will be given chocolate and beer products to examine the influence of implicit attitude change via advertisement exposure on consumption behaviour. As no previous studies have used a similar method to that used here, important questions about the influence of implicit attitude activation through advertisement exposure on consumption remain largely unanswered (Goodall & Slater, 2010). Hopefully, the results from Study 2 will shed some light on the relationship between advertisement exposure, implicit attitudes and behaviour.

Implicit attitudes toward chocolate and beer will be examined again here, as they were in Study 1. Based on the results from Study 1, it is predicted that viewing an advertisement for beer will produce a significant positive shift in beer-related implicit attitudes from pre- to post-test on an IAT. No such change is expected to be shown for implicit attitudes toward chocolate. Furthermore, due to predictions of the MODE model, it is expected that this immediate implicit attitude change in beer-related implicit attitudes will influence immediate consumption behaviour. In other words, participants who demonstrate an implicit attitude change will consume more beer in the taste test than participants who do not report an implicit attitude change.

Method

Participants

A total of 54 participants took part in Study 2 with a mean age of 22.41 ($SD =$ 5.48) years. Participants were randomly assigned to either a beer advertisement ($N =$ 28) or chocolate advertisement condition ($N = 26$). There were 13 males in the beer advertisement condition and 12 in the chocolate advertisement condition. Participants were recruited through the James Cook University Psychology Research Participation Pool and could acquire course credit as a result of participation. Prior to signing up for this study, participants were told that they must like both beer and chocolate products in

order to participate. Ethical approval for this study was obtained from the University's Human Research Ethics Committee.

Materials

The bipolar affective IAT design (Greenwald et al., 1998) as used in Study 1 was again used in Study 2. The same IAT stimuli and block designs for both the chocolate- and beer-related IAT as explained in the Materials sections for Study 1 (see Chapter 5: Study 1) were again used here. The blocks of the IAT were again counterbalanced such that some participants completed the positive-beer pairings first, while some completed the negative-beer pairings first. All IAT scores were calculated using the D-score algorithm, with higher scores indicating more positive implicit attitudes. In an effort to replicate the implicit attitude change findings as reported in Study 1, the same two advertisements from Study 1 were also used again for Study 2. The advertisement questionnaire as used in Study 1 was again used in Study 2. However, due to the interest being on implicit attitude change, the explicit alcohol-related cognition measures as used in Study 1 were removed from Study 2. The questionnaire used for Study 2 can be seen in Appendix D.

Reaction-time taste classifications. In an attempt to hide the true purpose of the study, participants completed a reaction time task similar to the IAT where they classified different types of foods and beverages based on their taste. For example, participants would be asked 'Are the following foods or beverages *bitter*?' Participants were instructed to press the 'q' key if the product shown was bitter or the 'p' key if the product was not. Participants completed four of these tasks and the taste categories used were *salty, bitter, fizzy* and *sour*. There were 10 different food or beverage stimuli in each taste category and each word was shown twice so each category had 20 trials.

As this task was used to hide the purpose of the true study, data from it were not used in data analyses.

Alcohol consumption in the laboratory. Participants were given 150mL of a non-alcoholic beer product in a clear plastic cup to control for influence of product branding. Participants were not told that the beer was non-alcoholic until after they had finished consuming and rating the product. None of the participants reported knowing it was non-alcoholic prior to being told. The cup with beer was weighed before being given to the participant and again after consumption. The difference between pre- and post-weight was recorded and used as the measure of beer consumption.

Chocolate consumption in the laboratory. Participants were given 15 Cadbury chocolate buttons in a white plastic bowl. Participants were not aware of the brand of chocolate they were given as there was no wrapping on the chocolates. The number of chocolate buttons consumed was recorded and used as the measure of chocolate consumption.

Taste tests. Participants rated the chocolate and beer products they consumed on a range of variables as well as providing an overall rating of their liking for the product. For the beer product, participants were asked to indicate how *'bitter', 'fizzy', 'sweet', 'strong-tasting'* and *'light'* the beer was. For the chocolate product, participants were asked to indicate how *'sweet', 'strong-tasting', 'smooth', 'rich'* and *'creamy'* the product was. All ratings were on a 7-point Likert scale ranging from 1= Not at all to 7= Extremely. The overall liking rating that participants gave for both the beer and chocolate products was the variable used in data analyses, with higher scores indicating more positive evaluations of the product.

Hunger and thirst levels. Participants were also asked to indicate how hungry and thirsty they currently felt. Answers were recorded on separate Likert scales with anchors ranging from 1= Not at all to 7= Extremely, with higher scores indicating greater levels of hunger or thirst.

Procedure

A similar procedure as used in Study 1 was implemented in Study 2. First, all participants read an information sheet and indicated their consent to participate (see Appendix E). The IATs and advertisements were administered on a desktop computer in a laboratory. Participants completed the advertisement questionnaire and the taste test questions on paper using pens provided by the experimenter. Participants first completed the IATs assessing implicit attitudes toward beer and chocolate. The completion of these measures was counterbalanced such that some participants completed the beer-related IAT first and some completed the chocolate-related IAT first. Participants then viewed the relevant advertisement for the condition to which they had been randomly assigned before completing the post-test implicit attitude assessments. After completing the post-test assessment of their implicit cognitions, participants were given the chocolate and beer products to consume. Participants were presented with the beer and chocolate products at the same time and were told they could consume as little or as much of the products as they would like in five minutes. At this time the experimenter handed participants the taste test rating sheets and instructed participants to fill them out while consuming their products before leaving the room. After five minutes, the experimenter re-entered the room to remove the remainder of the products and participants were asked to complete the advertisement questionnaire. Upon completion participants were asked if they could identify the aim of the study then thanked for their time.

Results

Randomisation Checks

Although 5 participants did report the hypotheses of the study after its conclusion, their results did not significantly differ from the other participants so their results were included in all data analyses. Randomisation checks indicated no significant differences between participants in the two conditions on self-reported alcohol consumption ($p > .05$). There were also no significant differences between conditions based on age, pre-test beer- and chocolate-related implicit attitudes or hunger and thirst levels (see Table 13, all p's $> .05$). There was no significant correlation between thirst levels and the amount of beer consumed, ($r = .04$, $p = .78$) or between hunger levels and the amount of chocolate consumed, ($r = .21$, $p = .10$) suggesting no influence of hunger or thirst on consumption in the lab. There were also no significant differences in any advertisement favorability or exposure measures based on condition (see Table 14, all p's $>.05$).

A chi-square analysis did not detect a significant difference in preference for beer between conditions, $\chi^2(1, N = 54) = 1.72$, $p = .632$. Within the conditions, 12 (42.9%) participants from the beer advertisement condition rated beer as being their most preferred drink, while seven (26.9%) participants from the chocolate advertisement condition rated beer as being their most preferred drink.

Table 13

Mean (SD) Scores for Study 2 Randomisation Checks

Variable	Beer condition	Chocolate condition
Age	21.75 (4.12)	23.12 (6.65)
Alcohol consumption	6.11 (3.30)	6.88 (2.88)
Hunger	3.54 (1.23)	3.23 (1.48)
Thirst	3.93 (1.49)	3.77 (1.39)
Pre-test implicit attitudes – beer	-.08 (.45)	-.12 (.43)
Pre-test implicit attitudes - chocolate	-.10 (.37)	.04 (.53)

Table 14

Mean (SD) Scores for Advertisement Familiarity and Exposure

Advertisement characteristic	Beer condition	Chocolate condition
Enjoyable	4.50 (1.35)	4.35 (1.65)
Appealing	3.86 (1.65)	3.73 (1.49)
Funny	5.04 (1.37)	4.46 (1.14)
Likeable	5.11 (1.40)	4.62 (1.10)
Overall favourability	4.63 (1.30)	4.29 (1.08)
Exposure to advertising mediums	2.57 (1.03)	3 (1.23)

Implicit Attitude Change

A 2 (Testing session) x 2 (Condition) ANOVA was performed to examine the influence of advertisement exposure on chocolate-related implicit attitudes. Pre- and post-test IAT scores for chocolate were entered as the dependent variable. The relevant means (SD) for this analysis can be seen below in Table 15. The results from this analysis revealed no significant main effect for testing session, $F(1,52) = .24$, $p = .624$.

There was also no significant main effect for condition, $F(1,52) = 2.76$, $p = .103$. No significant interaction effect was found, $F(1,52) = 1.20$, $p = .279$. This suggests that viewing an advertisement for either beer or chocolate had no influence on implicit attitudes toward chocolate for participants in this sample. These results replicate those found in Study 1.

Another 2 (Testing session) x 2 (Condition) ANOVA was performed to examine the influence of advertisement exposure on beer-related implicit attitudes. Pre- and post-test IAT scores for beer were entered as the dependent variable. The relevant means (SD) for this analysis can be seen below in Table 16. The results from this analysis revealed no significant main effect for testing session, $F(1,52) = .329$, $p = .568$. There was also no significant main effect for condition, $F(1,52) = 1.75$, $p = .192$. However, there was a significant interaction effect, $F(1,52) = 9.74$, $p = .003$. By examining the means (SD) in Table 16, it appears as though beer-related implicit attitudes are significantly changing from pre- to post-test for those participants who viewed an advertisement for beer. This suggests that viewing an advertisement for beer may produce a significant positive shift in implicit attitudes from pre- to post-test. Again, these findings replicate those from Study 1.

Table 15

Mean (SD) Scores for Chocolate-related Implicit Attitudes

IAT Scores	Condition (Advertisement viewed)	
	Chocolate	Beer
Pre-test chocolate	.04 (.53)	-.10 (.37)
Post-test chocolate	.10 (.42)	-.12 (.38)

Table 16

Mean (SD) Scores for Beer-related Implicit Attitudes

IAT Scores	Condition (Advertisement viewed)	
	Chocolate	Beer
Pre-test beer	-.12 (.43)	-.08 (.45)
Post-test beer	-.21 (.42)	.05 (.48)

Previous advertisement exposure. As a result of the finding that a significant shift in beer-related implicit attitudes is apparent in the beer advertisement condition, further analyses were run to examine what factors, if any, may influence this implicit attitude change. One factor that appeared to influence MD scores was previous advertisement exposure to the advertisement being shown in this study. This was particularly evident for participants in the beer advertisement condition. Previous advertisement exposure was operationalised as whether or not participants had seen the beer advertisement prior to seeing it in the current study. For participants in the beer advertisement condition only, a 2 (Testing Session) x 2 (Previous Advertisement Exposure) ANOVA was performed. The relevant means (SD) for this analysis can be seen in Table 17 below. An independent samples t-test revealed no significant difference in pre-test IAT scores for beer based on previous advertisement exposure, $t(26) = .69$, $p = .494$.

As expected, this analysis revealed a significant main effect for testing session, $F(1,26) = 5.18$, $p = .031$. There was no significant main effect for previous advertisement exposure, $F(1,26) = 2.25$, $p = .145$. This analyses also revealed a significant interaction effect between implicit attitude change and previous

advertisement exposure, $F(1,26) = 9.48$, $p = .005$. By viewing the means (SD) in Table 17, it appears as though there is significant positive implicit attitude change for those participants who had previous exposure to the beer advertisement. Those without any previous exposure appear to show no significant implicit attitude change. For the chocolate condition, twelve participants reported having seen the chocolate advertisement before, while fourteen reported having never seen the advertisement before. The same analysis for examining the influence of previous advertisement exposure on implicit attitude change was run for chocolate-related implicit attitudes, however there were no significant results (p's > .05) (see Appendix L2.1 for the output of this analysis). These results replicate those found in Study 1.

Table 17

Mean (SD) Scores for Beer-related Implicit Attitude Change Based on Previous Advertisement Exposure

IAT Scores	Previous Advertisement Exposure	
	Yes	No
Pre-test beer	-.03 (.49)	-.15 (.40)
Post-test beer	.20 (.49)	-.19 (.38)

In order to further analyse the influence of previous advertisement exposure on beer-related implicit attitude change, participants were split into groups based on how many times they had previously seen the beer advertisement. As the previous advertisement exposure variable was categorical, participants were placed into groups based on their responses to this question. These groups included participants who reported having never seen the advertisement before ($N = 11$), having seen the advertisement 1-5 times ($N = 7$) and having seen the advertisement six or more times (N

= 10). For this analysis, a mean difference (MD) score for beer-related implicit attitudes was created. The MD score was formulated by subtracting participants' pre-test IAT scores from their post-test IAT scores. Therefore, positive MD scores indicate a positive shift in implicit attitudes from pre- to post-test, while negative scores indicate a negative shift. These MD scores can be seen in Table 18 and were used to examine the influence of the number of previous advertisement exposures on implicit attitudes.

A one-way ANOVA for participants in the beer condition only revealed that the number of previous advertisement exposures had a significant influence on beer-related implicit attitudes, $F(2,27) = 5.05$, $p = .014$. In order to break this finding down, contrast analyses comparing each of the three groups were performed. As seen in Table 18, it appears as though as the number of previous advertisement exposures increases, so too does the level of implicit attitude change. However, a significant difference in implicit attitude change was only found between the participants who had never seen the beer advertisement before and participants who had seen the advertisement before six or more times, $t(25) = 3.11$, $p = .005$. This finding again replicates the results from Study 1 and suggests that participants who had seen the advertisement most often reported a greater beer-related implicit change than those participants who had never seen the advertisement before. No other significant differences between groups were found (all p's > .05). The same analysis to that above was run for chocolate-related attitudes, however there were no significant results (p's > .05) (see Appendix L2.2 for the output of this analysis).

Table 18

Mean Difference (SD) Scores for Beer-related Implicit Attitude Change Based on

Number of Previous Advertisement Exposures

	Number of previous advertisement exposures		
	0	1-5	6+
MD Score	-.03 (.26)	.18 (.13)	.27 (.24)

Consumption Behaviour

Independent sample t-tests were used to examine whether viewing a chocolate

or beer advertisement had an effect on consumption behaviour. Means (SD) for beer

and chocolate consumption in the lab are shown below in Table 19. There was no

significant difference found between the amount of beer consumed in the laboratory

based on condition, $t(52) = .206$, $p = .837$. There was also no significant difference

between the amount of chocolate consumed in the laboratory based on condition, $t(52)$

$= .648$, $p = .520$. These results suggest that viewing an advertisement for a chocolate or

beer product has no effect on immediate consumption behaviour.

Table 19

Mean (SD) Scores for Consumption in the Laboratory

Product	Beer condition	Chocolate condition
Beer consumed (in mL)	90.36 (33.86)	79.46 (59.32)
Chocolate pieces consumed	6.18 (4.49)	5.96 (3.05)

Correlations were run to explore the relationship between consumption

behaviour and implicit attitude change. It was argued that, because beer-related implicit

attitudes became more positive from pre- to post-test for participants in the beer

condition, post-test implicit attitudes may show a relationship with immediate drinking behaviour. As a result, correlations between implicit attitudes and beer consumption in the laboratory were performed for participants in the beer advertisement condition ($N = 28$). Firstly, a correlation between pre-test implicit attitudes and beer consumed in the laboratory showed no significant relationship, $r = .35$, $p = .07$. Another correlation was performed between post-test implicit attitudes and consumption behaviour, and this produced a significant positive relationship between the two variables, $r = .43$, $p = .023$. This suggests that, once they have been positively shifted as a result of viewing an advertisement for beer, more positive beer-related implicit attitudes are significantly related to increased immediate beer consumption.

Previous advertisement exposure. Participants in the beer advertisement condition who reported having seeing the beer advertisement before also consumed significantly more beer ($M = 109.41$, $SD = 62.71$) in the lab than those participants in the beer advertisement condition who reported not having seen the beer advertisement before ($M = 60.91$, $SD = 56.10$), $t(27) = -2.08$, $p = .048$. The means indicate that those participants who had seen the beer advertisement before consumed almost twice as much beer after viewing the beer advertisement than those participants who had not seen the advertisement before. This is an interesting finding as participants who reported having seen the beer advertisement before were those who had a significant positive shift in beer-related implicit attitude, suggesting that this shift may have indirectly influenced alcohol consumption in the lab.

Moderation Analyses

Due to the above results suggesting that previous advertisement exposure has a significant influence on both implicit attitude change and beer consumed in the laboratory, a moderation analysis was performed. This analysis aimed to examine

whether the relationship between post-test implicit attitudes and beer consumption in the laboratory was moderated by previous advertisement exposure. Moderation was performed because it was predicted that there would only be a significant relationship between post-test implicit attitudes and beer consumed in the laboratory when participants had reported seeing the advertisement before.

The moderating effects of previous advertisement exposure on the relationship between post-test implicit attitudes and immediate consumption behaviour were examined by using procedures outlined by Baron and Kenny (1986). To test for moderating effects, the predictor variable (post-test implicit attitudes) and the moderator (previous advertisement exposure) were converted into standardized z-scores to account for multicollinearity. The previous advertisement exposure variable was dummy coded such that 0= have not seen advertisement and 1= have seen advertisement. The product of the moderator and predictor was then calculated, creating an interaction term for these two variables. In order to examine moderating effects, regression analyses were then conducted using these standardized scores and the interaction variable. The first regression included the standardized predictor and moderator variables predicting immediate consumption behaviour.

The results of this regression found that post-test implicit attitudes and previous advertisement exposure accounted for a significant 17.3% of variance in immediate beer consumption in the lab, $F(2,27) = 3.82$, $p = .036$. Neither post-test IAT scores or previous advertisement exposure were significant predictors of immediate beer consumption in this regression (p's > .05). Next, another regression analysis was performed with the standardized moderator and predictor variables and the interaction term. For this regression, the moderator and predictor were entered into Block 1 of the regression, and the interaction term was added in Block 2. The addition of the

interaction term added a significant 10% of variance to the prediction of immediate beer consumption, $F_{change} = 4.45$, $p = .046$. Furthermore, the interaction term was the only significant predictor of immediate beer consumption in the laboratory, $\beta = .688$, $p = .046$. These findings suggest that previous advertisement exposure may moderate the relationship between implicit attitudes and immediate consumption behaviour (see Appendix L2.3 for an output of this analysis).

Discussion

The findings from the current study replicated those found in Study 1 in that viewing an alcohol-related advertisement for beer produced a significant positive shift in implicit attitudes as shown on pre- and post-test scores on an IAT. Other replicated findings included the influence of previous advertisement exposure on implicit attitude change and that greater exposure to the beer advertisement prior to the study produced greater beer-related implicit attitude change. The results of this study indicated that if participants had reported seeing the beer advertisement before, their implicit attitudes toward beer were significantly shifting in a positive direction from pre- to post-test. In contrast, those participants who reported having not seen the beer advertisement before showed no significant change in their implicit attitudes. Possible reasons for these findings are given in the Discussion section for Study 1 and will not be repeated here.

Study 2 expanded the design of Study 1 by assessing whether exposure to an alcohol advertisement had an influence on actual consumption behaviour. The results from Study 2 replicated the results of Koordeman et al. (2012) by finding that exposure to an advertisement had no direct effect on immediate behaviour, as participants did not consume significantly more of the product that was being advertised. This was found for both chocolate and beer consumption. This result is not particularly surprising given that the overall goal of advertising is to influence attitudes and not directly

influence behaviour (Walther & Langer, 2008). However it is of interest as it lends support to the suggestion that viewing an advertisement for an alcoholic or snack food product does not produce an immediate increase in consummatory behaviour.

The results of the current study suggest that previous advertisement exposure moderates the relationship between implicit attitude change and consumption behaviour. More specifically, implicit attitude change only influenced consumption behaviour when participants reported having seen the beer advertisement prior to seeing it in this study. This may be due to the fact that because participants had seen the advertisement before, they can remember that it was positively endorsing an alcoholic product, thus triggering automatic positive evaluations of beer. For participants who have not seen the advertisement before, they may not have known what the advertisement was for, so no such positive beer evaluation would be activated.

As predicted by the MODE model, automatic attitudes that can be activated by exposure to an attitude object can guide subsequent behavior (Fazio, 1990). Therefore, because positive implicit attitudes toward beer in participants who reported seeing the beer advertisement before were activated by exposure to the advertisement, these cognitions may have guided consumption behaviour. This may have contributed to the increased beer consumption in the lab that was demonstrated by these participants. The previous advertisement exposure and consumption behaviour finding is of particular importance for alcohol advertisements, which frequently use similar characters, music, or situations in order to make their advertisements more familiar to viewers. That is, viewers of certain alcohol advertisements may know what the advertisement is for prior to the product being shown at the end simply because they recognize a character or music from the advertisement itself. The use of recognizable elements in advertising may be a clever or dangerous initiative (depending on your perspective), as this

familiarity may trigger automatic positive evaluations of alcohol which, as seen in the results from this study, can influence drinking behaviour.

The results from Study 2 replicated those from Study 1 by showing that viewing an advertisement for beer can produce beer-related implicit attitude change on pre- and post-test IATs. Again, no chocolate-related implicit attitude change was found. Also replicating Study 1, previous advertisement exposure influenced implicit attitude change, with participants who had seen the beer advertisement before reporting significantly greater implicit attitude change than those who had not seen it before. Study 2 expanded the findings of Study 1 by introducing a behavioural measurement of beer and chocolate consumption, with participants who were previously exposed to the beer advertisement also consuming significantly more beer in the taste test than participants unfamiliar with the advertisement, suggesting an indirect influence of implicit attitude change on beer consumption.

The findings from Studies 1 and 2 indicate that advertisement exposure may have an influence on beer-related implicit attitudes. This suggests that exposing participants to a positively valenced message can produce a positive shift in implicit attitudes. In the next chapter, Study 3 again examines implicit attitude change. However, instead of attempting to make implicit attitudes more positive using advertisements, Study 3 aims to make implicit alcohol-related attitudes more negative through health message framing. Therefore, the processes through which implicit attitude change can occur will be further explored.

Chapter 7: Study 3

The results from Studies 1 and 2 indicate that viewing an advertisement for beer can produce a positive shift in beer-related implicit attitudes from pre- to post-test on an Implicit Association Test (IAT). As mentioned previously, it is argued that advertising uses basic Evaluative Conditioning (EC) paradigms in order to create or manipulate attitudes toward the brands or products being endorsed. Therefore, advertisements may attempt to influence an individual's implicit attitudes through associative processes, as found in the results of Studies 1 and 2. Study 3 again examines implicit attitude change; however, a non-associative approach to produce this change is tested. Additionally, although Studies 1 and 2 attempted to make implicit attitudes more positive through advertisement exposure, Study 3 aims to produce a negative shift in implicit attitudes.

Alcohol Public Service Announcements

As mentioned previously, implicit attitudes are particularly important to the study of alcohol consumption as research suggests that positive implicit alcohol-related attitudes are significant predictors of greater alcohol consumption (Houben & Wiers, 2008a; McCarthy & Thompsen, 2006). Therefore, it can be suggested that if an individual's implicit alcohol-related attitudes can be made more negative, this may have the subsequent effect of reducing their drinking behaviour. In line with the advertisement exposure method adopted in Studies 1 and 2, a possible way to make implicit attitudes more negative may be to show participants an alcohol-related Public Service Announcement (PSA) highlighting the dangers and risks of alcohol consumption. Much like alcohol advertisements use EC to pair alcohol with positive stimuli, PSAs attempt to pair alcohol with negative stimuli such as car crash images or negative facts about alcohol-related violence in an attempt to make attitudes toward

alcohol more negative. However, research into the effectiveness of PSAs has shown that they have little to no effect on participant's automatic attitudes toward alcohol (Goodall, 2009; Goodall & Slater, 2010).

One argument for the ineffectiveness of PSAs in young adult samples is that due to the well-learned positive evaluations of alcohol, any reference to alcohol even if paired with negative images, may elicit positive attitudes (Goodall, 2009). Therefore, any visual exposure of an alcohol stimulus in a PSA may trigger positive-alcohol evaluations as opposed to the alcohol-negative associations the PSA is aiming for. This is exactly what was found in the results of Goodall (2009), with participants exposed to alcohol PSAs containing images of alcohol reporting more positive automatically-activated attitudes than participants exposed to a PSA with no visual reference to alcohol. Additionally, PSAs that did not show alcohol were found to have no effect on automatically-activated attitudes (Goodall, 2009), further highlighting the ineffectiveness of PSAs in producing negative shifts in implicit attitudes.

Message Framing

The results of Goodall (2009) suggest that methods other than exposure to visual cues of alcohol as presented in anti-drinking PSAs may be more effective in producing negative alcohol-related implicit attitude change. As mentioned previously, the majority of research examining implicit attitude change has focused on associative processes such as EC (Houben et al., 2010a, 2010b). However, in *Chapter 3: Evaluative Conditioning and Implicit Attitude Change* it was suggested that implicit attitudes may also be manipulated through non-associative processes (Horcajo et al., 2010; Whitfield & Jordan, 2009). Horcajo et al. (2010) exposed participants to either a health message concerning the benefits of vegetable consumption or a neutral message about interior design. Implicit attitudes toward vegetables were then assessed using an

IAT. Post exposure, participants who read the vegetable consumption message were found to have more positive implicit attitudes toward vegetables than participants who read the neutral message. Despite the promising results found by Horcajo et al. (2010), there is still limited evidence for the influence of non-associative processing on implicit attitude change. Therefore, Study 3 attempted to replicate the above findings by using a non-associative process to make implicit attitudes toward alcohol more negative. The non-associative process used for attempting this attitude change was message framing of persuasive health communications. An overview of health message framing is provided in *Chapter 3: Evaluative Conditioning and Implicit Attitude Change* so major discussion of it will not occur again here. Briefly, whereas loss-framed messages focus on the costs of engaging in a risky behaviour such as alcohol consumption, gain-framed messages focus on the benefits of avoiding such behaviour (Gallagher & Updegraff, 2012). Research examining framing effects suggests that gain- and loss-framed messages are able to manipulate attitudes and intentions toward health behaviours as well as influence behaviour (Rothman et al., 2006).

Research examining the influence of message framing on health-risk behaviours has been limited but suggests that gain frames may be more influential than loss frames for producing explicit attitude change. Support for this argument was found with smoking behaviour, as gain-framed messages have been found to be more effective in promoting anti-smoking beliefs (Schneider et al., 2001) and for producing stronger intentions to quit smoking (Steward et al., 2003). In regards to alcohol consumption, research suggests that exposure to gain-framed messages emphasising short-term consequences of alcohol consumption reduced drinking behaviour in a one-week follow-up period (Gerend & Cullen, 2008). These results provide evidence suggesting

that gain-framed health messages may be effective for influencing attitudes toward, as well as reducing actual performance of, health-risk behaviour.

Alcohol-related Consequences

In regards to the content of the health messages to be used for Study 3, research concerning alcohol-related consequences was explored. Recent research has begun to explore the frequency with which individuals endorse consequences of alcohol consumption as being positively or negatively valenced, and how often these consequences are experienced as a result of alcohol consumption. One such study by Park (2004) found that the most commonly endorsed positive consequence of drinking alcohol was related to having fun and socialising. In contrast, the most commonly endorsed negative consequences of alcohol consumption tended to be physical outcomes such as the experience of hangovers or nausea. Another study exploring the negative and positive consequences associated with alcohol consumption was conducted by Lee, Maggs, Neighbors, and Patrick (2011). In this study, 742 recent high school graduates indicated how often in the past year they had experienced various positive and negative consequences associated with consuming alcohol. Participants reported experiencing positive consequences of their drinking behaviour more frequently than negative ones, with fun/social consequences being identified most often followed by negative physical consequences. This supports previous findings regarding the most frequently endorsed positive and negative consequences of alcohol consumption (Park, 2004).

Experience with different positive and negative outcomes such as those reported above is particularly important for the development of implicit cognitions toward attitude objects. In one of the first articles to focus on implicit cognitions, Greenwald and Banaji (1995) defined implicit cognitions as "The introspectively unidentified (or

inaccurately identified) trace of past experience that mediates a response" (p. 8). Therefore, the past experience that an individual has had with a particular object may have a large influence on the development of their implicit attitude toward it. If individuals are frequently experiencing both positive social and negative physical consequences related to their drinking, it can be argued that they may develop social-positive and health-negative associations with alcohol in memory. In other words, it is argued here that individuals may develop separate health- and social-related implicit attitudes toward alcohol consumption. In line with this argument, Study 3 examined the ability of health- or social-focused framed messages to influence implicit attitudes toward alcohol.

Current Study

The study by Gerend and Cullen (2008) discussed earlier in *Chapter 3: Evaluative Conditioning and Implicit Attitude Change* highlights an interesting relationship between health message framing and alcohol consumption by suggesting that gain-framed messages may be more influential than loss-framed messages in reducing drinking behaviour. However, it did not assess what influence, if any, alcohol-related messages may have on attitudes. Research suggests that more positive implicit attitudes toward alcohol may predict increased self-reported alcohol consumption (Houben & Wiers, 2006, 2008a). Therefore, in order to reduce behaviour, it can be argued that implicit attitudes toward alcohol may need to be made more negative. It is argued that this reduction in implicit attitudes can perhaps be achieved through health message framing.

The aim of Study 3 was to examine the influence of health- and social-focused messages on implicit attitudes using a pre- and post-test design. An extensive literature search found limited evidence for the influence of message framing on implicit

attitudes. This may be due to the argument that implicit attitudes may only be formed or manipulated through associative processes such as EC. However, further research needs to be conducted to examine whether health message framing can manipulate implicit attitudes as well. Therefore, Study 3 aims to manipulate implicit attitudes by presenting participants with gain- or loss-framed messages related to consequences of drinking alcohol.

Study 3 also aims to expand on the findings of Gerend and Cullen (2008) in relation to the framing effects of temporal context. Instead of focusing on short-term and long-term consequences of alcohol consumption, the current study emphasised health- and social-based consequences related to alcohol consumption. The division of messages into health- and social-based consequences is in line with alcohol consequence research suggesting that social and health consequences of drinking are commonly reported (Lee et al., 2011; Park, 2004). It is argued that due to these experiences, participants should hold strong alcohol-social and alcohol-health associations in memory and these may be able to be manipulated through message framing. Therefore, Study 3 exposed participants to a 2 (message frame: gain or loss) x 2 (message content: health or social related) x 2 (pre-post testing session) experimental design in order to examine the influence of message framing and message content on alcohol-related implicit attitudes. Due to the lack of research into the influence of message framing on implicit attitudes, no hypotheses were created.

Method

Participants

A total of 243 participants took part in Study 3. Participants were recruited through the James Cook University Research Participation Pool and could acquire course credit as a result of participation. Ethical approval for this study was obtained

from the University's Human Research Ethics Committee. Of the initial 243 participants, only 221 participants were included in data analyses, as twenty-two participants were unable to report any consequences that they read in the health message on a recall task (see Materials below). These participants were screened out of any analyses as it was assumed that a lack of recall indicated inattention to the presented health message. The following participant information relates to the 221 participants who were included in the data analyses.

The average age of participants was 24.47 ($SD = 9.15$) years, with 78 males and 143 females in the final sample. Participants were randomly assigned into one of four conditions based on the messages they viewed: health-loss ($N = 58$), health-gain ($N = 52$), social-loss ($N = 53$) and social-gain ($N = 58$). In regards to participants who were screened out of analyses, four were from the health-loss group, six were from the health-gain group, seven were from the social-loss group and five were from the social-gain group. Across all conditions, there was an average alcohol consumption of 4.03 ($SD = 3.93$) standard drinks per typical weekend drinking session and an average 2.93 ($SD = 3.18$) drinking sessions per month.

Study 3 is an experimental study with participants randomly allocated to one of four conditions. There are both between (message frame) and within (pre- and post-test IAT scores) variable of interest for this experiment.

Materials

Messages. Based on the condition participants were randomly assigned to, they were exposed to one of four messages. These messages were manipulated based on whether they were health- or social focused or framed in a loss or gain statement. Message length varied from 100 to 112 words and all messages attempted to highlight

various negative health- or social-related consequences that may be associated with consuming alcohol. The consequences shown in these messages were a mix of both short-term and long-term consequences to control for the influence of temporal context, as this was found to be an influential factor in other studies (Gerend & Cullen, 2008). The health-based messages were adapted from Gerend and Cullen (2008) while the social-based messages were created by the researcher. All messages were shown on a computer screen and participants were asked to read the message carefully as they were told they would have to recall them later. These instructions were given so that participants would engage in thoughtful processing of the message they were viewing. As an example of the type of message used in this study, the health-focused, loss-framed message is shown below. All other messages used for this study can be seen in Appendix F.

"If you are going to drink, irresponsible alcohol use can lead you to experience various negative health consequences. Irresponsible drinking can increase the likelihood of reckless driving and being involved in car accidents where you can be seriously injured or killed. Drinking irresponsibly can also contribute to an increase in your blood pressure and body weight, increasing your chances of developing a range of chronic health issues including diabetes and/or cardiovascular diseases. If you drink irresponsibly you are more likely to engage in risky sexual behaviour placing yourself at a greater risk for catching sexually transmitted diseases. Drinking irresponsibly also significantly increases your chances of having liver failure or developing liver cancer."

Message recall. Participants were asked to provide as many of the consequences from the message as they could remember in a text box. The number of consequences that were reported and that were actually in the message (i.e. correct recalls) as well as the overall number of reported consequences (even if they were not

in the message) was recorded. For example, if participants were in the health-loss condition (see message above) and reported 'increased blood pressure,' 'risky sexual behaviour' and 'lung cancer;' in the recall task, they would have reported three consequences, but only two that were actually in the message.

Alcohol consumption. For quantity of alcohol consumption, participants were asked to indicate how much of a particular drink (e.g. can of mid-strength beer, premixed spirit etc.) they would drink in an average drinking session. A measure of drinking frequency was also obtained in this questionnaire. This measure asked participants to provide their best estimate of how many weekdays and weekend days in the past month they drank the amount of alcohol they reported in the quantity of alcohol section. If participants did not consume alcohol they were asked to leave the sections blank.

Alcohol-related implicit attitudes. Alcohol-related implicit attitudes were assessed on a bipolar alcohol-related IAT (Greenwald et al., 1998). Although the same method for the IAT as used in Studies 1 and 2 (e.g. same number of stimuli, trials and blocks; see Chapter 5: Study 1) was used for Study 3, the target stimuli used for the IAT in Study 3 differed from those used previously. Instead of using only beer-related words, the current IAT used alcohol-related words as one of the target attributes. Therefore, implicit attitudes toward alcohol, not just beer, were assessed in Study 3. The category label of '*beer'* as used in Studies 1 and 2 was changed to '*alcohol.'* The soft-drink related words also differed from those used in Studies 1 and 2 to control for word length as a possible influence on IAT performance. There were no changes to the positive or negative stimuli as used in Studies 1 and 2. The stimuli used for the IAT in Study 3 can be seen below in Table 20. No other changes to the IAT were made. The counterbalancing of IAT blocks was again used here, such that some participants

completed alcohol-positive pairings first and some completed alcohol-negative pairings
first. The D-score scoring algorithm was again used to clean the IAT data as well as
produce the IAT score, with more positive scores indicating positive implicit attitudes
toward alcohol. The chocolate-related IAT was not used in Study 3. Participants
completed the alcohol-related IAT in both a pre- and post-test assessment to examine
implicit attitude change toward alcohol.

Table 20

Stimuli for Study 3 IAT

	Stimuli
Alcohol-related words	*Vodka, Beer, Scotch, Wine*
Soft drink-related words	*Fanta, Pepsi, Coke, Sprite*
Positive words	*Cheerful, Happy, Funny, Sociable*
Negative words	*Nausea, Awful, Miserable, Annoying*

Procedure

The current study used Inquisit v3.0.4 (Millisecond Software, 2010) web edition
to create a script containing all relevant measures to put on the internet. As a result of
being a web-based study, all participants needed access to a computer and the internet
in order to participate. Participants were instructed to open a link to the script created
through the Inquisit website and complete the experiment. Research suggests that the
effects of an IAT do not vary systematically based on whether the IAT is completed at
home, on the internet or in a laboratory on a desktop computer (Houben & Wiers,
2008b).

Upon opening the script, participants read information about the study (see
Appendix G) and gave their consent to participate by clicking a button. Participants

first completed the pre-test alcohol-related IAT. They were then exposed to the relevant alcohol-related message, which was shown on the computer screen until participants made a response to move to the next screen. Participants were instructed to read the alcohol message carefully as they were told they would be asked to recall aspects of it later. After reading the message, participant's implicit attitudes were assessed again on the alcohol-related IAT. Participants were then asked to recall as many of the consequences that they read in the message in an open text box. Last, participants completed the alcohol consumption measures before being thanked for their participation.

Results

Randomisation Checks

There were no significant differences between age, average quantity and frequency of alcohol consumption based on condition (all p's > .05). There were no significant differences in pre-test IAT scores based on condition (p > .05). On average, participants correctly recalled 3.21 (SD = 1.43) pieces of information from the messages. A significant difference between correct consequences recalled from the message based on condition was found, $F(3,240) = 3.13$, $p = .026$, with participants in the loss-health condition reporting significantly more terms from their message than participants in the loss-social ($p = .035$) condition. No other significant differences in recall were found (p's > .05). See Table 21 for an overview of the means (SD) for these randomisation checks.

Table 21

Mean (SD) Scores for Study 3 Randomisation Checks

Condition	Condition			
	Gain-health	Gain-social	Loss-health	Loss-social
Age	23.88 (8.66)	24.05 (9.19)	25.15 (9.00)	24.38 (9.24)
Alcohol Quantity*	4.34 (4.34)	4.54 (4.30)	3.61 (3.66)	4.15 (3.55)
Alcohol Frequency	2.72 (3.14)	3.16 (3.41)	2.81 (3.14)	2.90 (2.75)
Pre-test IAT	-.30 (.55)	-.26 (.48)	-.29 (.45)	-.24 (.45)
Recall	2.84 (1.77)	2.75 (1.51)	3.45 (1.70)	2.63 (1.51)

Note. *Quantity reported in standard drinks

Implicit Attitude Change

Before any analyses were performed, mean difference (MD) scores between
pre- and post-test IAT scores were calculated. The MD score was formulated by
subtracting participants' pre-test IAT scores from their post-test IAT scores. Therefore,
negative MD scores indicate a negative shift in implicit attitudes from pre- to post-test,
while positive scores indicate a positive shift. These MD scores were calculated for
each condition and then used to examine the influence of health message exposure on
implicit attitudes (see Table 22).

A 2 (message frame) x 2 (message content) ANOVA was performed to examine
the influence of health message exposure on implicit attitudes. MD scores were entered
as the dependent variable. The results from this analyses revealed a significant main
effect for message content, $F(1,242) = 5.08$, $p = .025$. By examining the MD scores in
Table 22, it appears as though social-based messages may be more effective than
health-based messages in producing a negative shift in alcohol-related implicit attitudes,
regardless of message frame. The main effect for message frame was marginally non-

significant, $F(1,242) = 3.68$, $p = .056$). There was no significant interaction effect between message frame and message content, $F(1,242) = .16$, $p = .686$.

Table 22

Mean Difference (SD) Scores Based on Condition

Frame	Content		Total
	Health	Social	
Gain	.03 (.43)	-.11 (.37)	-.04 (.40)
Loss	-.08 (.37)	-.20 (.39)	-.14 (.39)
Total	-.03 (.40)	-.15 (.38)	

Message recall effects. Independent samples t-tests were run to investigate whether the number of correct pieces of information recalled from the message influenced implicit attitude change. Firstly, the variable for correct recalls was categorised such that participants who correctly recalled 1-2 correct pieces of information from the message were placed in a 'low recall' group ($N = 93$) and participants who recalled 3+ correct pieces of information from the message were placed in a 'high recall' group ($N = 150$). Results from an analyses using the whole sample indicated that participants in the 'high recall' ($M = -.11$, $SD = .39$) group had significantly greater negative implicit attitude change than participants from the 'low recall' group ($M = .05$, $SD = .44$), $t(241) = 2.60$, $p = .01$. This suggests that for participants who engaged in greater processing of the message leading to more correct recalls, implicit attitudes were becoming significantly more negative. In contrast, implicit attitudes for participants who engaged in lesser processing of the message were not shifting negatively.

Discussion

The results from Study 3 suggest that viewing health messages can influence implicit attitudes toward alcohol consumption. More specifically, it appears as though messages focusing on the social consequences of drinking alcohol are more influential on alcohol-related implicit attitudes than those focusing on the health-related consequences of this behaviour. The findings from Study 3 add further evidence for the influence of non-associative processing on implicit attitude change by showing that implicit attitudes can be altered through exposure to messages targeting the relevant behaviour. The majority of previous research on implicit attitude change has looked at the effectiveness of associative processes such as EC in changing implicit attitudes. However, the current results support those of Horcajo et al. (2010) by finding that implicit attitudes may be altered through exposure to different messages. The findings from Study 3 opens the door for future research examining the nature of implicit attitude change and adds messages framing as a possible process through which implicit attitudes can be manipulated.

Furthermore, this study found results suggesting that the greater the level of processing of the message, the greater the implicit attitude change. This suggestion arises from the finding that participant's implicit attitude change was significantly greater when they could correctly recall more pieces of information from the message they were exposed to. Therefore, it is argued that because individuals could correctly recall more pieces of information from the message, they were processing it at a greater level than those with less correct recalls. This finding provides further evidence that more deliberative processing of a message can contribute to implicit attitude change and expands upon Horcajo et al. (2010) by showing a change in implicit attitudes toward the health-risk behaviour of alcohol consumption.

The finding that when individuals could recall more negative information about alcohol consumption their implicit attitudes were becoming more negative is perhaps not surprising. As a result of being exposed to and remembering this negative information, associations between alcohol and negative may have been activated in participant's memory and performance on the IAT may have been influenced as a result. With previous research suggesting that the presentation of negative information about alcohol consumption in the form of PSAs may not influence implicit attitudes (Goodall, 2009), the results from this study suggest that individuals may need to be exposed to multiple pieces of negative alcohol-related information before an implicit attitude change will occur.

The results from this study also indicate that negative information about alcohol consumption should focus on social as opposed to health-related aspects of drinking, with significant implicit attitude change only found for participants exposed to a social-focused message. This is surprising considering that research suggests that positive-social and negative-health consequences are some of the most commonly reported consequences associated with alcohol consumption (Lee et al., 2011; Park, 2004). Therefore, one could argue that individuals may hold strong associative clusters in memory between 'alcohol-positive-social' and 'alcohol-negative-health.' However, a message focusing on the health-related negative outcomes of drinking had no significant influence on implicit attitudes, suggesting that there may not be a strong association in memory between these concepts.

Although the messages in this study tried to control for temporal context of alcohol-related consequences by including both short-term and long-term consequences, the influence of temporal context cannot be ignored. For young adults, the majority of major health outcomes (e.g. liver failure) may not influence them

significantly until later in life. Therefore, young adults may not be thinking about health-related consequences of their drinking behaviour. Furthermore, associations between alcohol and negative health outcomes may not be fully developed when individuals are still young. Research suggests that long-term consequences may not be influential on the performance of drinking behaviour (Gerend & Cullen, 2008) and the results from the current study suggest that long-term consequences such as health-related outcomes may also not be influential in manipulating alcohol-related implicit attitudes.

Research also suggests that despite the negative health consequences associated with alcohol consumption, individuals continue to engage in drinking behaviour in the hope of experiencing the positive social consequences of drinking (Lee et al., 2011). This suggests that perhaps the health consequences of alcohol are not that important, particularly for adolescent and young adult samples, when making decisions about whether or not to engage in drinking behaviour. Due to the social nature of alcohol consumption within a young adult sample, associations with alcohol and social aspects may be stronger than those between health and alcohol. Therefore, when negative social consequences are targeted such as in anti-drinking messages, they may have a greater influence on attitudes toward alcohol. This is exactly what was shown in the results of this study, and suggest that targeting the social aspects of drinking may be more influential than health-based messages in manipulating implicit attitudes toward alcohol consumption. These findings provide important information regarding the nature of alcohol-related attitudes and ways in which these attitudes can be manipulated. The results from Study 3 of the current research project suggest that if one wants to manipulate implicit attitudes toward alcohol, socially-focused messages should be used. This may be particularly important when targeting drinking in a young

adult sample considering the large social role drinking plays in the lives of these individuals.

The current study added to the implicit attitude change literature by producing such change through message exposure, a non-associative process. This study also further highlights the importance of the social aspect of drinking alcohol in young adults, with socially-focused messages more effective in reducing implicit attitudes toward alcohol consumption than health-focused messages. Furthermore, it was found that participants who engaged in greater processing of the messages also reported a greater implicit attitude change. The implications of these results for the nature of alcohol-related attitudes will be further explored in the next chapter on attitudinal ambivalence.

Chapter 8: Attitudinal ambivalence

The results from the previous three studies within this research project indicate that alcohol-related implicit attitudes can be altered through viewing an advertisement or reading a persuasive message. In contrast, chocolate-related implicit attitudes showed no signs of change after exposure to the same stimuli. This suggests that individuals may hold both positive and negative associative evaluations towards alcohol in memory and exposure to a positive (advertisement) or negative (persuasive message) stimulus may activate either of these evaluations. Based on the results from Studies 1-3, it can be argued that positive and negative evaluations of alcohol are held simultaneously and may be equally accessible as they both appear to be able to be activated through brief exposure to valenced stimuli.

The apparent bi-dimensionality of implicit alcohol-related attitudes is in direct opposition to dominant theories of attitudes, with past research defining attitudes as the tendency to evaluate a target object with a certain degree of positivity *or* negativity (Eagly & Chaiken, 1993; Petty & Cacioppo, 1986). In line with this definition, the evaluation of attitude objects is assumed to be unidimensional. That is, attitude objects are evaluated as either positive *or* negative *or* neutral and cannot be evaluated as both positive and negative simultaneously (Jonas, Broemer, & Diehl, 2000). Conner and Armitage (2008) argue that the unidimensional approach to attitudes oversimplifies the basic construction of an attitude, as individuals may have both positive *and* negative evaluations toward the same target object or behaviour. For example, an individual may enjoy drinking alcohol because it helps them relax and be more sociable but they may also dislike it as it produces feelings of nausea. Therefore, it is suggested that there can be an evaluative inconsistency in attitudes and this inconsistency has been labeled as attitudinal ambivalence.

As Conner and Sparks (see Table 2.1; 2002) highlight, the concept of attitudinal ambivalence has had many different definitions. However, in its simplest form, attitudinal ambivalence can be defined as a psychological state in which individuals hold simultaneous mixed feelings of both positivity and negativity toward a single target object. In regards to the psychological study of attitudes, the concept of ambivalence and its application to attitudes is relatively new, with Scott (1969) credited with the introduction of attitudinal ambivalence to social psychological research.

Increased interest in attitudinal ambivalence arose as a result of the work of Kaplan (1972), who focused on the problem surrounding the selection of the midpoint (or neutral value) on a semantic differential scale. Kaplan (1972) suggested that by selecting this midpoint, subjects could be indicating that they held attitudes toward the target object which were neither negative nor positive *or* equally positive and negative. By making this suggestion, Kaplan (1972) highlighted the difference between attitudinal indifference (attitudes that are neither negative nor positive) and attitudinal ambivalence (attitudes that are equally positive and negative), and raised the argument that attitudes could be ambivalent in nature. Since the research of Kaplan (1972), interest surrounding attitudinal ambivalence has risen, with a strong research interest in explicit attitudinal ambivalence emerging in the 1990s and 2000s (Conner & Armitage, 2008; Conner & Sparks, 2002; Thompson, Zanna, & Griffin, 1995). This research has helped shed some light on issues surrounding the effects of holding ambivalent attitudes and how best to measure ambivalence, both of which will be discussed in greater detail below.

Explicit Ambivalence

When assessing explicit attitudes using self-report measures, it is not uncommon for individuals to be *explicitly ambivalent* in that they endorse both negative and

positive aspects of a certain attitude object (Kaplan, 1972). A growing body of research is concerned with the consequences of holding ambivalent attitudes (see Conner & Sparks, 2002 for a review). Perhaps the major consequence of ambivalence surrounds the strength of such attitudes, with higher levels of ambivalence generally associated with more weakly held attitudes. This argument is in line with a dominant view that attitudinal ambivalence is strongly related to attitude strength (Conner & Sparks, 2002). Attitude strength consists of four different aspects of a particular attitude: persistence, resistance, impact on information processing and judgments and guidance of behaviour (Krosnick & Petty, 1995). An attitude is considered to be 'strong' if it persists over time, is resistant to counter-attitudinal information, influences information processing and can guide behaviour.

In regards to ambivalent attitudes persisting over time (attitude stability), research has produced mixed results. A study by Craig, Kane and Martinez (2002) examined the effects of attitudinal ambivalence on the temporal stability of attitudes toward abortion. The results from this research indicated that univalent attitudes were more temporally stable than ambivalent attitudes, even when other attitude dimensions such as importance, certainty and intensity were statistically controlled. Research by Fournier (2005) examined ambivalence in political attitudes and found similar results to those found by Craig et al. (2002) in that ambivalent attitudes were found to be less temporally stable than univalent attitudes.

In opposition to these findings, Bassili (1996) and Armitage and Conner (Study 1, 2000) showed that ambivalence was not related to the stability of attitudes. The study by Bassili (1996) examined attitudes toward pornography twice within a two week period. This study found no negative relationship between ambivalence and attitude stability on both felt and potential ambivalence measures. In the study by

Armitage and Conner (2000), attitudes toward low-fat diets were assessed in three different testing sessions across a period of three, five and eight months. Potential ambivalence toward low-fat diets was assessed using split semantic differential scales (discussed in greater detail later). The stability of attitudes across these three testing sessions was not found to be correlated with attitudinal ambivalence. With the mixed results reported above, no clear conclusions regarding attitude stability and ambivalence can be generated.

Of particular relevance for the current study is the relationship between attitude pliability and ambivalence. If ambivalent attitudes are the result of conflicting evaluations, it could be argued that they should be more pliable than univalent attitudes (Armitage & Conner, 2000). This is because an individual who has ambivalent attitudes will have both positive and negative evaluations of the same target object. If presented with a positively valenced stimulus, the individual may perceive that the stimulus is consistent with their dominant evaluation. This individual may then report a positive attitude toward the target object. The opposite could occur if the individual is presented with a negatively valenced stimulus (Conner & Armitage, 2008). In contrast, an individual holding a univalent negative attitude who is presented with positive information about a target object may simply reject this positive information, leading to no influence on attitudes. Therefore, ambivalent attitudes should be more susceptible to change via persuasive communication than non-ambivalent attitudes.

An empirical investigation into the pliability of ambivalent attitudes looked at attitudes toward low-fat diets (Study 2, Armitage & Conner, 2000). In this study, 344 participants' attitudes towards low-fat diets were assessed at baseline. After a period of five months, participants were randomly assigned to an attitude change or control condition, both of which received information about fat intake and dieting. Participants

in the attitude change condition also received information designed to change their attitudes toward low-fat diets. Participants within both conditions were split into higher and lower levels of ambivalence and attitude change was assessed. The results from this study found that attitudes became more positive across both groups but a greater positive shift in attitudes was found for the experimental group (Armitage & Conner, 2000). Of particular interest was the level of attitude change based on participants' ratings of ambivalence. For participants with lower levels of reported ambivalence, attitude change did not significantly vary based on whether the participant was in the experimental or control group. In contrast, attitudes became significantly more positive following the experimental investigation for the higher ambivalence group compared to highly ambivalent individuals in the control group. Therefore the relationship between ambivalence and pliability was supported, as the attitude change intervention had a greater influence on more ambivalent attitudes. However, further empirical evidence for the relationship between attitude pliability and ambivalence is limited, so further research is needed to explore these two concepts.

Research suggests that individuals will engage in more effortful information processing relevant to a target object/behaviour if they hold ambivalent attitudes towards it (Bell, Essess, & Maio, 1996; Nordgren, van Harreveld, & van der Pligt, 2006). An example of this was shown in a study by Bell et al. (1996) who examined explicit ambivalence toward immigration to Canada. Participants were shown a message containing either strong or weak arguments highlighting the positives of immigration from Hong Kong to Canada. The results from this study indicated that participants high in explicit attitudinal ambivalence toward immigration to Canada were more influenced by the argument quality than those participants low in attitudinal ambivalence (Bell et al., 1996). Therefore, participants high in attitudinal ambivalence

are more likely to engage in enhanced scrutiny of a message, perhaps in an attempt to resolve the ambivalence toward the attitude object.

Another study examining the relationship between ambivalence and information processing was conducted by Hodson, Maio, and Esses (2001). The authors were interested in the effect that consensus information from other individuals would have on attitudes toward social welfare. In this study, 81 participants viewed a videotaped debate regarding both the pros and cons of social welfare. Participants then viewed how other participants had allegedly responded to the same video by viewing a fake response sheet allegedly completed by other participants which either indicated that the pro-team had won the debate (positive consensus information) or the con-team had won the debate (negative consensus information). Measurements of participants' attitudes were taken before viewing the debate and after viewing the consensus information. As predicted, participants whose attitudes were assessed as high in ambivalence toward social welfare were significantly influenced by the consensus information. More specifically, highly ambivalent participants showed a significant positive shift in attitudes toward social welfare from baseline after exposure to the positive consensus information. A corresponding effect was seen for participants who viewed the negative consensus information, with highly ambivalent individuals indicating a negative shift in attitudes when exposed to this information (Hodson et al., 2001). These results suggest that the attitudes of peers may be more influential on individuals who are high in ambivalence toward a certain attitude object. Furthermore, the authors argue that individuals high in ambivalence may use the attitudes of their peers in order to resolve their ambivalence toward the target object (Hodson et al., 2001).

Research exploring the link between ambivalent attitudes, intentions and behaviour has found that less ambivalence toward an attitude object is related to

stronger attitude-intention and attitude-behaviour relationships (Armitage & Conner, 2000). The study by Armitage and Conner (2000) examined the relationship between ambivalent attitudes, intentions and the behaviour of consuming a low-fat diet. Ambivalent attitudes were measured using split semantic differential scales, and responses on these measures were used to divide participants in to high and low ambivalence groups. As hypothesized by the authors, the results from this study found stronger pathways between attitude to intention and attitude to behaviour for the lower as opposed to the higher ambivalence groups (Armitage & Conner, 2000).

Supporting these findings, Conner, Sparks, Povey, James and Sheperd (2002) examined the influence of attitudinal ambivalence on behaviour by measuring food intake over one and two month periods. Ambivalence was assessed using split semantic differential scales. The results of these studies were as predicted, with lower levels of ambivalence being associated with attitudes that were greater predictors of actual behaviour. The research noted above suggests that attitudinal ambivalence may moderate the relationship between attitudes and intentions and attitudes and behaviour such that greater attitudinal ambivalence leads to poorer links to both intentions to engage in and actual performance of behaviour.

The above research suggests that ambivalent attitudes may be described as relatively weak attitudes, as they are easily influenced by persuasive communications, produce greater levels of information processing to alleviate ambivalence and have poorer prediction of behaviour than univalent attitudes. Although results concerning their stability over time are mixed, there is still some evidence to suggest that ambivalent attitudes are less stable across testing sessions than univalent attitudes.

Measurement of Attitudinal Ambivalence

The assumption of evaluative undimensionality underlies nearly every popular technique of attitude measurement including semantic differential scales, Thurstone scales and Likert scales (Jonas et al., 2000). As Thompson et al. (1995) highlight, the very nature of measures such as semantic differential scales construe attitudes as evaluations which fall along dimensions as measured on bipolar scales such as *favourable-unfavourable* and *like-dislike*. This means that individuals must make an evaluation of an object which can either be positive (I like flowers) *or* negative (I dislike flowers), and not positive *and* negative. Due to the inability of these scales to provide negative and positive responses to the same target object, the use of them has often led to the lack of acknowledgement of attitudinal ambivalence (Thompson et al., 1995). Furthermore, there is a continuing argument regarding the correct measurement of attitudinal ambivalence, one which is yet to provide a definitive answer.

It is generally accepted that there are two separate groups of measures for ambivalence, with one approach focusing on subjective feelings of experienced ambivalence (Priester & Petty, 1996) and the other using formula-based measures integrating both positive and negative evaluations of a single target object (Thompson et al., 1995). More recent research into ambivalence has labeled these different approaches as 'felt' and 'potential' ambivalence, with experienced-based measures of ambivalence assumed to tap in to the former and formula-based approaches assumed to measure the latter (Conner & Armitage, 2008). The terms 'potential' and 'felt' ambivalence will be used throughout the rest of this text.

Felt ambivalence refers to one's subjective feelings of ambivalence toward a target object. Measures of felt ambivalence are assumed to be a relatively conscious approach to ambivalence measurement in that individuals are predicted to be aware of

their ambivalent feelings and are directly able to report them (Jonas et al., 2000).

Therefore, felt ambivalence measures ask respondents to make meta-judgments

regarding their own levels of ambivalence. Felt ambivalence is also assumed to be

related to the psychological discomfort felt as a result of holding conflicted beliefs

and/or feelings toward the same target object (van Harreveld, van der Pligt, & de Liver,

2009). An example of a felt ambivalence measure was shown in Preister and Petty

(1996). These researchers asked participants to rate their ambivalence toward an

attitude object on 11-point Likert scales with the anchors *feel no conflict at all* (0) and

feel maximum conflict (10). With felt ambivalence measures, ambivalence is reported

as the mean or sum score across a number of questions related to the target object.

Scores on this measure are said to reflect the discomfort an individual experiences as a

result of holding ambivalent attitudes (Conner & Armitage, 2008).

In contrast, Kaplan (1972) proposed that the ideal way to measure ambivalence

was to split semantic differential scales and ask respondents to indicate how positively

and how negatively they rate the target object. For example, participants could be

asked, 'considering only the positives of X, please indicate how positive these qualities

are on the following scale: not at all positive; slightly positive; quite positive; extremely

positive.' Participants would then be asked about their negative evaluations of the

target object using the same scale as above, but substituting in negative where it says

positive (Kaplan, 1972). The idea of measuring positive and negative evaluations on

separate scales laid the groundwork for research into and the measurement of what is

known as potential ambivalence.

Potential ambivalence measures use separate measures of positive and negative

thoughts, feelings or beliefs toward the same attitude object. As mentioned previously,

the work of Kaplan (1972) increased the interest in measures related to potential

ambivalence. Since this initial research, there have been arguments regarding the best way to measure potential ambivalence (Jonas et al., 2000; Thompson et al., 1995). Kaplan (1972) suggested that a good measure of ambivalence should produce higher scores in ambivalence as the positive and negative evaluations both become larger in value and similar in absolute value. Although multiple formulas have been used to achieve the above characteristics (see Jonas et al., 2000; Thompson et al., 1995), perhaps the most popular measure for potential ambivalence uses split semantic differential scales to assess the positive and negative evaluations toward the attitude object. These separate measurements of positivity and negativity toward the attitude object are then combined to produce a continuous measure of attitudinal ambivalence.

The most widely accepted equation to calculate potential ambivalence was devised by Griffin and presented in Thompson et al. (1995). In this calculation, labelled the Griffin Index, two key characteristics of attitudinal ambivalence are taken in to account. The first of these characteristics argues that the positive and negative evaluations of an object must be similar in nature. As the evaluations become less similar, the attitude becomes more polarized in the direction of the stronger evaluation (Thompson et al., 1995). That is, the attitude becomes less ambivalent and more positive or negative, depending on which of these evaluations is stronger. Second, in order to be considered ambivalent, the separate positive and negative evaluations must be at least rated at a moderate intensity (e.g. three or above on a 7 point scale). The Griffin Index takes in to account both the similarity and intensity characteristics of ambivalence and is calculated as half of the sum of the intensity of the positive (P) and negative (N) evaluative judgments, minus the absolute difference between the positive subtracted by the negative evaluations. The equation for the Griffin Index is as follows:

$$[(P+N)/2] - |P-N|$$

The Griffin Index is calculated such that higher scores indicate greater potential ambivalence toward the attitude object. By taking into account both the similarity and intensity aspects of ambivalence, the Griffin Index has become arguably the most commonly used formula for the calculation of potential ambivalence. Therefore, it is the formula used for the calculation of potential ambivalence in this study. To obtain a further understanding of how the Griffin Index calculates ambivalence scores, Table 23 presents a range of possible positive and negative evaluations participants can provide on a potential ambivalence measure and shows how these evaluations are used to provide an overall potential ambivalence score. As seen in Table 23, increased similarity (e.g. score of 1 for both positive and negative evaluations) between the positive and negative evaluations leads to higher scores for potential ambivalence. Furthermore, as these evaluations become more intense (e.g. move from '1' to '3' for positive and negative evaluations), higher scores for potential ambivalence are produced. Therefore, the Griffin index produces higher ambivalence scores when respondents' positive and negative evaluations are more similar to one another and when these evaluations are higher in intensity (see shaded sections of Table 23). Alternatively, as positive and negative evaluations become less similar, scores calculated by the Griffin Index gradually become smaller before becoming negative (see dotted cells in Table 23). Negative scores on the Griffin Index thus indicate a clear distinction between negative and positive evaluations, which can be interpreted as having no potential ambivalence.

Table 23

Overview of the Griffin Index

Negative evaluation	Positive evaluation			
	1	2	3	4
1	1	.5	0	-.5
2	.5	2	1.5	1
3	0	1.5	3	2.5
4	-.5	1	2.5	4

Note. This table is adapted from Table 14.4 of Thompson et al. (1995, p. 370)

The difference between felt and potential ambivalence measures is highlighted by research projects that have measured both forms of ambivalence. These research studies have found that scores on felt and potential ambivalence measures are not strongly correlated with one another, with studies reporting correlations between the two measures of $r = .18$ (Newby-Clark, McGregor and Zanna, 2002), $r = .28$ (Armitage & Arden, 2007) and $r = .44$ (Priester & Petty, 1996). These low correlations suggest that the two measures may be tapping in to two separate constructs.

Strengths and weaknesses of ambivalence measures. Despite the general acceptance that there are two separate ways to measure ambivalence, "There is currently a lack of consensus about the best way to measure ambivalence" (Conner & Sparks, 2002, p. 41). When assessing their effectiveness in measuring ambivalence, it is argued that both measures have their strengths and weakness. For example, Preister and Petty (1996) argued that felt ambivalence measures are superior to potential ambivalence measurements, going so far to say that even the most effective potential ambivalence measure would only be as predictive as a measure of felt ambivalence. In contrast, Jonas et al. (2000) argue that the superiority of felt ambivalence measures may

be flawed because these measures make the "…debatable assumption that respondents have conscious access to the degree of their ambivalence" (p. 49). The authors argue that individuals may not be consciously aware of their ambivalent feelings and ambivalence is assumed to be dependent on salient aspects of the underlying attitude structure. Following this reasoning, various factors such as the recency of attitude activation or the context an individual finds themselves in may influence the salience of a particular attitude. Therefore, felt ambivalence may vary over time or different testing sessions, which becomes problematic for consistent measurement. On the other hand, it is argued that potential ambivalence approaches to assessing ambivalence do not make the assumption that participants are consciously aware of their ambivalence (Jonas et al., 2000). By asking participants about their separate positive and negative evaluations toward a target object, only accessible aspects of the attitude should be activated and reported.

Research examining felt and potential ambivalence using social issues such as abortion and capital punishment has shed some light on the consequences of holding these ambivalent attitudes (Holbrook & Krosnick, 2005). Firstly, felt and potential ambivalence appear to be similarly related to resistance to persuasion, with those found to be higher in both forms of ambivalence also found to be less resistant to attitude change through exposure to persuasive communications. Importantly, this research has also shown that the consequences of reporting potential or felt ambivalence may be different, with individuals high in felt ambivalence also more likely to avoid stimuli that bring their discomfort to mind (Holbrook & Krosnick, 2005). Potential ambivalence may be related to the perception of attitude-relevant information, with those high in potential ambivalence being aware of a range of positively and negatively valenced information. This may mean that persuasive communications, whether highlighting the

positives or the negatives, "…are likely to be interpreted as being consistent with their own attitudes, thus making their attitudes more pliable" (Conner & Armitage, 2008, p. 280).

Another difference between the two measurements is their relationship with attitude strength, with authors arguing that potential ambivalence shares a relationship with attitude strength in that those reporting higher levels of potential ambivalence also hold weaker attitudes toward the target object (Conner & Armitage, 2008). In contrast, measures of felt ambivalence may show a more complex but largely unknown relationship with attitude strength. In their discussion on future research to provide a greater understanding of ambivalence, Conner and Armitage (2008) indicate that research needs to explore the inter-relationship between the two measures, as well as identifying the antecedents to both factors. This suggests that attitudinal ambivalence remains a relatively understudied concept.

Why are some Attitudes Ambivalent?

In their discussion on how attitudinal ambivalence develops in individuals, Conner and Armitage (2008) divided their approach into top-down and bottom-up processes. From a top-down perspective, the authors look at the influence of psychological factors such as value conflict, personality and individual differences on the development of ambivalent attitudes. However, very little research has produced evidence to suggest that attitudinal ambivalence is influenced by these top-down processes (see Conner & Armitage, 2008 for discussion). Instead, it may be that ambivalence results from bottom-up processes, namely the attitude object itself. Conner and Armitage (2008) argue that some objects are likely to produce greater ambivalence than others. The problem with this argument is that little to no research

has addressed the issue of which objects are more likely to produce ambivalence than others.

One attempt to understand why certain attitudes toward behaviours are ambivalent has suggested that behaviours likely to produce different emotional outcomes when focusing on the immediate compared to the distant future are most likely to produce greater attitudinal ambivalence (Ortony, Clore, & Collins, 1988). These contrasting distal outcomes are particularly important when considering health-risk behaviours, with the immediate pleasantness of the behaviour generally contrasting with the negative health outcome of that particular behaviour (Conner & Sparks, 2002). For example, the consumption of alcohol may produce immediate positive social outcomes as a result of consumption (e.g. feel more relaxed and sociable) but will also produce future negative health outcomes in terms of nausea or hangovers experienced the morning after. Therefore, according to the assumption of Ortony et al. (1988) attitudes toward alcohol consumption are likely to be ambivalent.

Supporting this argument, research by Conner, Povey, Sparks, James, and Sheperd (1998) examined the positive and negative evaluations of 12 different health behaviours. In this study, 143 participants completed a potential ambivalence measure toward the different behaviours, with higher scores indicating greater ambivalence. This research found that the 'consumption of alcohol' produced the highest degree of attitudinal ambivalence, followed by 'reducing fat intake' and 'using illicit drugs.' These results suggest that individuals may hold both positive and negative evaluations toward alcohol consumption. Although this research showed that alcohol-related attitudes are ambivalent, it failed to find any clear patterns of ambivalence across health-risk and health-protective behaviours. This suggests that which sets of health

behaviours (i.e. health-risk or health-protective) are related to ambivalent attitudes remains relatively unknown and requires further investigation.

Another study supporting the ambivalence of alcohol-related attitudes was conducted by Waterman and Conner (1999; as cited in Conner & Sparks, 2002). Participants in this study ($N = 102$) were asked to indicate, with an answer to an open-ended question, things that made them feel either just positive or just negative, neither positive nor negative, or both positive and negative. The most commonly reported objects/behaviours causing feelings of both positivity and negativity were 'eating', 'drinking alcohol' and 'personal relationships'. In support of the ambivalence argument by Ortony et al. (1988), consuming high calorie foods and drinking alcohol were considered ambivalent because of the conflict between immediate pleasant outcomes and distant negative outcomes that participants were reporting. In reference to the two previously mentioned studies (Conner et al., 1998; Waterman & Conner, 1999, as cited in Conner & Sparks, 2002), Conner and Sparks (2002) note that attitudes toward ingestive behaviours were most commonly associated with ambivalence. This may be because these types of behaviours can have both positive and negative outcomes.

Implicit Ambivalence

While a significant body of research has examined explicitly ambivalent attitudes, the study of implicitly ambivalent attitudes remains in its infancy. Researchers have only recently highlighted the phenomenon of implicit ambivalence, which has been defined as holding differing explicit and implicit evaluations toward the same attitude object (Petty & Briñol, 2009; Petty et al., 2012). For example, an individual's explicit attitudes toward chocolate as assessed on self-report measurements may be positive while their implicit attitudes, as measured by reaction-time tasks, may be negative. According to Petty et al. (2012), individuals with implicitly ambivalent

attitudes do not label their attitudes as being ambivalent because at the explicit level they only endorse one aspect of the attitude. In other words, individuals may express their attitudes toward a certain object as being positive even though their implicit attitudes are negative. Therefore, implicit ambivalence may occur when individuals are unaware of an evaluative conflict toward an object, or if they are aware of having both positively and negatively valenced evaluations but explicitly deny one of these evaluations (Petty et al., 2012).

The depiction of implicit ambivalence and how it can occur as outlined by Petty and colleagues (2009; 2012) makes certain assumptions about the structure of attitudes that can be best explained by the Meta-Cognitive Model (MCM) of attitudes (see Petty, Briñol, & DeMarree, 2007 for further information). As the MCM is not a main focus of this study, it will only be discussed briefly here. The MCM is a model of attitude structure which assumes that attitude objects are linked in memory to global evaluative associations that can vary in their ability to be accessed (Fazio, 2007). It is predicted that the ability of these attitudes to be accessed depends upon a variety of factors, including the number of evaluative experiences an individual has had with the attitude object and how recently these experiences have occurred (Petty et al., 2012). According to the MCM, the majority of attitude objects have a dominant evaluation that represents an individual's knowledge and/or experience toward that particular object. However, some attitude objects, namely those that are ambivalent in nature, can be linked in memory to evaluative associations that are opposite in valence to the dominant evaluation. Applying the MCM to implicit ambivalence allows for the assumption that individuals can hold two oppositely valenced and accessible evaluations; one which is seen as valid and one that is rejected. It is assumed that a denied evaluation can either

be a past attitude or an evaluative association made salient by one's culture (e.g. the media) but never fully endorsed by the individual.

According to Petty and Briñol (2009), implicit ambivalence can be detected in three separate ways. First, as with explicit ambivalence, individuals should "…show evidence of both positivity and negativity being linked to the attitude object on measures of automatic association…" (Petty & Briñol, 2009, p. 134). Support for this factor was found in a study by de Liver, van der Pligt and Wigboldus (2007) who showed that for objects which participants held ambivalent attitudes toward, both positive and negative evaluations can come to mind relatively quickly. In this study, participants were first asked to generate attitude objects for which their attitudes were either solely positive, solely negative, or ambivalent. Participants then completed a single target Implicit Association Test (ST-IAT; Wigboldus et al., 2006) where the participant-generated words were paired with either positive or negatively valenced words. The results from this study found that, as predicted, words that participants considered positive were more easily associated with positive words, while words that participants considered negative were more easily associated with negative words. However, there was no significant difference in reaction time when classifying the ambivalent words as either positive or negative, suggesting that ambivalent attitudes can be linked to both implicit positive and negative evaluations (de Liver et al., 2007). Furthermore, it appears as though these positive and negative evaluations can be activated relatively quickly and without much thought.

Another characteristic of implicit ambivalence is that individuals showing implicit ambivalence should behave as if they were ambivalent. That is, individuals should engage in greater information processing when faced with information that may be helpful in reducing their ambivalence. This pattern of information processing is

shown in individuals who are explicitly ambivalent (Bell et al., 1996), so it is argued

that it should also be shown in those who are implicitly ambivalent. Support for this

factor was found in a study by Petty, Tormala, Briñol and Jarvis (2006) who produced a

discrepancy in participant's explicit and implicit attitudes toward a target individual.

Firstly, participants were conditioned to either dislike or like a target individual,

producing either positive or negative implicit attitudes in participants. Participants were

then given explicit information about the target individual's attitudes on important

topics. This information was designed to create either positive or negative explicit

attitudes toward the target individual by having the target's attitudes consistent or

inconsistent with participant's attitudes toward the same topic (Petty et al., 2006). The

information provided to the participant either had the same valence as the conditioning

part of the experiment (no attitude discrepancy) or the opposite valence (attitude

discrepancy). Participants were then told that the target individual was a candidate for a

vacant job at their university and were provided with a strong or weak resume outlining

the target individual's previous work experience. The results from this study indicate

that for those participants with a discrepancy between their explicit and implicit

attitudes (i.e. were implicitly ambivalent), resume quality had a greater influence on

attitudes toward the target individual as a possible employee. The authors conclude by

suggesting that the attitude discrepancy group engaged in greater information

processing about the target individual because they were attempting to resolve an

underlying ambivalence regarding their attitudes toward the target (Petty et al., 2006).

Third, individuals with implicit ambivalence may show signs of discomfort

when faced with the attitude object. Whereas there has been supporting evidence for

both the first (de Liver et al., 2007) and second ways (Petty et al., 2006) for detecting

implicit ambivalence, there has been no definitive evidence that implicit ambivalence

can produce discomfort in individuals when thinking about an ambivalent object. Therefore, further evidence for this aspect of implicit ambivalence is required.

Implicit Ambivalence in Alcohol-related Attitudes

As the concept of implicit ambivalence is relatively new, the application of it to certain attitudes has been limited. In fact, the research on implicit ambivalence has only been applied to racial attitudes and attitudes toward the self (see Petty et al., 2012). Due to the findings that suggest explicit attitudes toward alcohol are ambivalent (Conner et al., 1998; Waterman & Conner, 1999, as cited in Conner & Sparks, 2002), it is not unreasonable to hypothesise that implicit attitudes toward alcohol may also be ambivalent. According to Petty et al. (2012), attitudes can be considered implicitly ambivalent when there is a discrepancy between implicit and explicit attitudes toward the target object.

In relation to alcohol-related attitudes, there is some evidence to suggest that alcohol-related attitudes fit the criteria for being considered implicitly ambivalent. Although there has been multiple studies which have examined both explicit and implicit attitudes toward alcohol in the same study (Houben & Wiers, 2007; 2008a, Wiers et al., 2002; Houben et al., 2010a), most of these studies have used these two measurements to then predict behaviour. Therefore, the direct examination of a possible discrepancy between explicit and implicit attitudes, although sometimes reported in research (see below), has not been fully highlighted. Additionally, possible reasons for this attitude discrepancy and what this means in terms of the structure of attitudes toward alcohol consumption, has not been fully explored.

A study by Wiers et al. (2002) assessed both explicit and implicit alcohol-related attitudes, with higher scores for both variables suggesting more positive

attitudes toward alcohol. This study found a significant negative correlation between implicit and explicit alcohol-related attitudes. This inverse relationship indicates that explicit and implicit attitudes toward alcohol consumption may have been discrepant. Unfortunately, the mean scores for these variables were not presented in the article, so it is unknown if explicit alcohol-related attitudes were positive and implicit alcohol-related attitudes were negative or vice versa. Another study by Houben et al. (2010a) also assessed explicit and implicit attitudes toward alcohol consumption in a sample of young adults. The results from this study indicate that participants typically held negative implicit attitudes toward alcohol consumption, as shown by negative alcohol-related IAT scores. In contrast, although not directly tested by the researchers, it appears that individuals held typically positive explicit attitudes toward alcohol consumption. This was suggested as individuals reported mean scores of approximately 4.5 on a scale of 1-7 for their explicit alcohol-related attitudes, with higher scores indicating more positive explicit attitudes.

The above results, taken with the findings by Wiers et al. (2002), suggest that individuals may have a discrepancy between their implicit and explicit alcohol-related attitudes. This assumption fits with that of Petty et al. (2012) in regards to labelling alcohol-related implicit attitudes as implicitly ambivalent. However, due to the limited amount of research directly focusing on the discrepancy between implicit and explicit alcohol-related attitudes, it appears as though more research needs to focus on this issue. Implicit ambivalence in alcohol-related attitudes was directly examined in the current research project (see Chapter 10: Study 5).

Why may attitudes toward alcohol be ambivalent? As a result of limited research suggesting that alcohol-related attitudes are ambivalent, the reason for alcohol-related ambivalence remains unknown. One possible reason may be due to the

individual experience of various positive and negative consequences related to the consumption of alcohol. In regards to alcohol attitudes, de Visser and Smith (2007) stated that "ambivalence is not surprising given the paradoxical effects of alcohol, which may produce positive or negative outcomes at different stages of a single drinking episode" (p. 351). For example, after consuming a few drinks an individual may feel more relaxed and sociable which may be classified as a positive consequence of consuming alcohol. However, after consuming more alcohol the likelihood of negative consequences occurring such as becoming nauseous or engaging in anti-social behaviour also increases.

Research also suggests that the positive consequences from drinking alcohol may also become negative as more alcohol is consumed (de Visser & Smith, 2007). For example, after a few drinks individuals may become more socially confident which is seen as a positive consequence of consuming alcohol. However, after more alcohol is consumed, this confidence can turn into negatively-valenced arrogance. This suggests that how the consequences of alcohol consumption are viewed may also be ambivalent in that they have a positive valence earlier in a drinking session but can take on a negative valence as the individual consumes more alcohol. In relation to the type of ambivalence felt by participants in the study by de Visser and Smith (2007), the authors argue that it is potential as opposed to felt ambivalence. This is because, during the interviews, it appeared that it was perhaps the first time that respondents had consciously thought about the positives and negatives of their drinking behaviour. This lack of conscious processing of their ambivalent attitudes suggests that potential ambivalence is more likely than felt ambivalence, as potential ambivalence is assumed to be unrelated to conscious processing of attitudinal ambivalence (Jonas et al., 2000).

As mentioned previously, research looking at alcohol-related consequences has found that the most commonly endorsed consequences related to alcohol consumption were having fun and socialising (positive) and the experience of hangovers/sickness (negative) (Lee et al., 2011; Park, 2004). This alcohol consequence literature has also examined the influence of experiencing these consequences on drinking behaviour, with Park (2004) finding that all measures of drinking behaviour (frequency and quantity of alcohol consumed, frequency of binge drinking, being drunk and feeling lightheaded) showed stronger positive correlations to mean levels of negative consequences reported by participants than to positive consequences. This suggests that heavier drinkers report high levels of negative consequences associated with consuming alcohol but still continue to engage in drinking behaviour.

The study by Lee et al. (2011) also found that greater experience of physical negative consequences and fun/social positive consequences were found to be significant predictors of drinking frequency and quantity as well as frequency of heavy drinking episodes. This suggests that as individuals engage in greater alcohol consumption at riskier levels, they are more likely to experience negative physical consequences but positive fun/social ones as well. The authors argue that participants may value the positive consequences of alcohol so greatly that they were willing to suffer from the negative consequences in order for the positives to be achieved (Lee et al., 2011). Therefore, increased drinking behaviour may lead to an increased experience with both the positive and negative consequences associated with alcohol consumption. It is argued that the experience of these consequences may contribute to ambivalent attitudes toward alcohol consumption.

This chapter has introduced the concepts of explicit and implicit attitudinal ambivalence, as well as providing an overview of how ambivalence is measured and the

consequences of holding ambivalent attitudes. Attitudinal ambivalence toward alcohol

consumption is also given a possible reason for the findings from Studies 1-3. In the

next chapter (Study 4), explicit ambivalence toward alcohol consumption and how

ambivalence relates to drinking behaviour is examined. This chapter will attempt to

provide further support to the limited evidence that alcohol-related attitudes are

explicitly ambivalent.

Chapter 9: Study 4

The previous chapter introduced the concept of attitudinal ambivalence and an argument was raised that attitudes toward alcohol may be ambivalent in nature. The major basis for this argument arises from findings in the previous three studies of this research project which suggest that individuals may hold both positive and negative automatic evaluations toward alcohol. These automatic evaluations are hypothesised to be activated as a result of exposure to valenced stimuli. By producing a shift in implicit attitudes, the findings of the previous three studies may also support one of the major characteristics assigned to ambivalent attitudes, which is that these attitudes are more pliable than univalent attitudes (Armitage & Conner, 2000). The findings from Studies 1 and 2 of this research project support this argument by finding that beer-related implicit attitudes, but not chocolate-related implicit attitudes, significantly shifted from pre- to post-test. Therefore, it can be argued that attitudes toward alcohol consumption may be ambivalent, while attitudes toward chocolate may be univalent with a dominant positive evaluation. Furthermore, another characteristic of ambivalent attitudes is that they may be particularly susceptible to change when individuals are exposed to persuasive communications (Conner & Sparks, 2002) such as health messages or advertisements, as was shown in the results of Studies 1-3.

Although the results from the first three studies of the current project suggest that alcohol-related attitudes may be ambivalent, until this point this argument has not been directly tested. That is, no measure of ambivalence in attitudes toward alcohol consumption was used in Studies 1-3, so the underlying nature of alcohol-related attitudes remains unknown. Therefore, the aim of Study 4 is to directly examine the ambivalent nature of explicit alcohol-related attitudes. Study 4 examines explicit attitudes toward alcohol in order to establish whether these attitudes are ambivalent in

nature. Attitudinal ambivalence toward other health behaviours was also assessed in Study 4 in order to compare whether attitudes toward alcohol are more or less ambivalent when compared to attitudes toward other health behaviours.

The current study also aimed to examine whether alcohol-related attitudes share the same relationship with behaviour as do attitudes toward other health-related behaviours. The health behaviours used as exemplars for this study were either health-risk or health-promoting behaviours, as dual-systems theories (see Chapter 1: Dual-systems Modelling) suggest that deliberative and automatic processes may influence the performance of these behaviours to different degrees. For example, automatic and unconscious processes may influence health-risk behaviours due to the suggested irrational and impulsive nature of such behaviour (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008; Stacy, 1997). The study by Stacy (1997) found that implicit cognitions, which are automatic in nature, could predict health-risk behaviour over and above explicit cognitive processes. In contrast, deliberative and conscious processes may be more influential for health-promoting behaviours due to the goal-driven nature of this behaviour. Support for this suggestion comes from a meta-analysis by Webb and Sheeran (2006) who found that intention, a deliberative and conscious cognitive variable, is found to be less predictive of behaviour considered socially-reactive or impulsive than it is for more deliberative and planned behaviour (Webb & Sheeran, 2006).

As automatic and deliberative cognitive processes may have a differential effect on different health behaviours, it is suggested that felt and potential ambivalence may also differ in their relationship with health-risk and health-promoting behaviours. By assessing attitudinal ambivalence toward both health-risk and health-promoting behaviours in this study, the relationship between ambivalence and health behaviour

can be explored, with any differences in these relationships able to be examined. For the purpose of this study, smoking and drinking behaviours were identified as health-risk behaviours. Smoking and alcohol consumption are regarded as health-risk behaviours as it is well documented that engaging in these behaviours may place an individual at risk of various negative health outcomes (Australian Government, 2009; Dietze et al., 2011; U.S. Department of Health and Human Services, 2014). In contrast, exercise and fruit and vegetable intake were identified as health-promoting behaviours because they are typically goal-driven behaviours which may reduce the likelihood of negative health outcomes (Dauchet, Amouyel, & Dallongeville, 2005; Penedo & Dahn, 2005).

One of the few studies that has examined ambivalence in attitudes toward health behaviours found that attitudes toward alcohol consumption, as measured on potential ambivalence measures, were the most ambivalent for the 12 health behaviours assessed (Conner et al., 1998). The current study aims to replicate and expands the results of Conner et al. (1998) by assessing both potential and felt ambivalence toward multiple health behaviours. Authors suggest that felt ambivalence assesses a more conscious aspect of ambivalence, while potential ambivalence measures a more unconscious aspect of ambivalence (Jonas et al., 2000). For the current study, it was predicted that potential ambivalence may be more strongly related to the increased performance of health-risk behaviours (smoking and drinking) than health-promoting behaviours. Additionally, it is argued here that felt ambivalence may be more strongly related to health-promoting behaviours (exercise and fruit and vegetable intake) than health-risk behaviours. The above predictions were made because research suggests that health-promoting behaviours are argued to be more heavily influenced by deliberative and

conscious processes, whereas health-risk behaviours may be more influenced by automatic and unconscious processes (Stacy, 1997; Webb & Sheeran, 2006).

Method

Participants

A total of 257 participants took part in the current study. The sample consisted of 68 males and 189 females. The mean age of participants was 22.38 ($SD = 11$) years, with 182 participants being university students and the remainder of participants being members of the general public. All university students were recruited through the James Cook University Research Participation Pool. Participants completed the experiment for course credit where applicable. Participants from the general public were recruited through snowball and convenience sampling. No incentives were offered for participants from the general public. Ethical approval for this study was obtained from the University's Human Research Ethics Committee.

Materials

Studies 4 and 5 are cross-sectional designs, with the nature of explicit and implicit ambivalence explored using online surveys. All participants completed an online questionnaire hosted by the Inquisit v3.0.4 web program (Millisecond Software, 2010). This questionnaire first assessed demographic information (age, gender, university attendance) before asking participants to complete two measures of attitudinal ambivalence toward five different health-risk or health-promoting behaviours. These behaviours included consuming alcohol on a weekend, consuming alcohol on a weekday, exercising, increasing fruit and vegetable intake and smoking. After completing the measures of ambivalence, self-reported performance of different health behaviours was assessed. The complete questionnaire for Study 4 can be seen in Appendix H.

Felt ambivalence. All participants completed three questions pertaining to felt ambivalence toward each of the five health behaviours. These three questions were adapted from Priester and Petty (1996) for each health behaviour, so overall there were fifteen questions for felt ambivalence. Participants were presented with the following statement "With respect to [*health behaviour*] in the next two weeks I…" followed by three 10-point Likert scale items with the anchors: *feel no conflict-feel maximum conflict, have completely one-sided reactions-have completely mixed reactions* and *feel no indecision-feel maximum indecision.* An overall measure of felt ambivalence for each health behaviour was obtained by summing the participant's responses to the three items. The total score therefore had a possible range of 0-30 with higher scores indicating higher levels of felt ambivalence.

Potential ambivalence. Potential ambivalence was measured with two statements for each health behaviour. These two statements were designed to assess the difference between positive and negative evaluations of the different health behaviours. The first of the statements examined the negative valence of the relevant behaviour: 'Considering only the negative things about [*health behaviour*] and ignoring the positive things, how negative are these things?' Participants could then answer this statement on a 7-point unipolar Likert scale with the anchors: *not at all negative-extremely negative.* The second statement assesses the positive valence of the relevant behaviour: 'Considering only the positive things about [*health behaviour*] and ignoring the negative things, how positive are these things?' Participants could then answer this statement on a 7-point unipolar Likert scale with the anchors: *not at all positive-extremely positive.* Answers on these two items were combined using the Griffin index (see Chapter 8: Attitudinal Ambivalence) in order to create an overall measure of

potential ambivalence with a possible range between -2 and 7. Higher scores on the potential ambivalence measure indicate greater attitudinal ambivalence.

Health behaviour. Participants completed questions asking about their self-reported performance of different health behaviours. For alcohol consumption, participants were asked if they consumed alcohol and if they did, how many standard drinks they would consume on a typical weekend (Sunday-Wednesday) and weekday (Thursday-Saturday) drinking session. Reasons for the weekend/weekday drinking distinction have been made previously (Chapter 5: Study 1). For exercise, participants were asked to indicate how many minutes on a typical day they would engage in moderate exercise (e.g. fast walking, cycling). Participants were also asked to indicate whether they smoked and if they did how many cigarettes they would smoke on a typical day. Finally, participants were asked to report how many pieces of fruit and how many servings of vegetables they would consume on a typical day. A serving was defined as the at least half of a cup of green or orange vegetables (e.g. broccoli, pumpkin), ½ a medium sized potato, or a medium tomato.

Procedure

University participants signed up to complete the study through the James Cook University Psychology Research Participation Pool. Participants from the general public who were recruited through snowball and convenience sampling were given the study link via email or social media programs such as Facebook. All participants were provided with a hyperlink directing them to the study. Participants first read information about the study (see Appendix I) and gave consent to participate by clicking a button. The participants then completed the questionnaire and were given course credit when applicable.

Results

Health Behaviour

Participants consumed, on average, 1.9 ($SD = 2.5$) standard drinks on a typical weekday drinking session and 5.2 ($SD = 4.7$) standard drinks on typical weekend drinking session. Participants reported an average of 45 ($SD = 50$) minutes of moderate exercise a day. The 68 participants who identified themselves as smokers (26.7% of the sample), reported smoking an average of 10 ($SD = 9$) cigarettes a day. Participants consumed, on average, 1.9 ($SD = 1.4$) servings of fruit a day and 3.3 ($SD = 1.6$) servings of vegetables a day. Participants scores for fruit consumption and vegetable consumption were added together to create an overall measure for fruit and vegetable consumption, with a mean of 5.2 ($SD = 2.4$) servings of fruit and vegetables consumed per day.

Ambivalence

Mean scores for felt and potential ambivalence can be seen below in Table 24. As seen in Table 24, participants reported the highest level of felt ambivalence toward smoking, followed by weekday drinking and exercise. In contrast, the evaluation of weekend and weekday drinking behaviour produced the greatest potential ambivalence scores. For a more detailed breakdown of felt and potential ambivalence scores see Table L1 and L2 in Appendix L3.

Table 24

Mean (SD) Scores for Felt and Potential Ambivalence

Behaviour	Felt ambivalence	Potential ambivalence
Weekday drinking	9.98 (6.26)	.83 (2.24)
Weekend drinking	9.02 (6.43)	1.24 (2.30)

Smoking	10.53 (7.16)	-.18 (2.60)
Fruit & vegetable intake	8.89 (5.84)	.41 (2.15)
Exercise	9.89 (6.57)	.32 (2.46)

Multiple regression analyses (MRA) were performed in order to examine the ability of felt and potential ambivalence to predict the extent to which different health behaviours were performed. A separate regression analysis was conducted for each health behaviour. As age and gender were found to have a significant influence on the performance of some of the health behaviours (see Table L3 and Table L4 in Appendix L3), they were entered into Block 1 for each of the MRAs. This was done to control for the effect of these demographic variables on the dependent variable. Additionally, the relevant felt and potential ambivalence measures for each health behaviour were entered into Block 2 for each MRA. Inspection of the tolerances and variable inflation factors indicated that multicollinearity did not affect the results of any of the MRAs performed below.

Health-risk behaviour. The relevant regression statistics for the prediction of health-risk behaviours (weekend drinking, weekday drinking and smoking) can be seen below in Table 25. The results of these regressions indicated that the demographic variables combined with the felt and potential ambivalence scores explained a significant 4.5% of variance in weekday drinking, $F(4,256) = 4.03$, $p = .003$, a significant 7.4% of variance in weekend drinking, $F(4,256) = 6.12$, $p = .000$, and a significant 8.3% of variance in smoking behaviour, $F(4,256) = 6.78$, $p = .000$. As seen in Table 25, potential ambivalence was a significant predictor for each of the health-risk behaviours, while felt ambivalence was a significant predictor for smoking behaviour only. The positive beta weights for potential ambivalence suggest that higher levels of

potential ambivalence are related to increased performance of health-risk behaviour.

Furthermore, for smoking the positive beta weight for felt ambivalence suggests that

higher levels of felt ambivalence are related to higher rates of smoking behaviour (see

Appendix L3 for the output of these analyses).

Table 25

Predicting Health-risk Behaviour Using Ambivalence Measures

	R^2	R^2 Change	B (SE)	β
Weekday Drinking				
Block 1 Constant	.034	.034*	2.51 (.50)	
Block 2 Constant	.060	.026*	2.22 (.57)	
PA			.18 (.07)	.16**
FA			.01 (.03)	.01
Weekend Drinking				
Block 1 Constant	.040	.040**	8.07 (.94)	
Block 2 Constant	.089	.049**	7.26 (1.01)	
PA			.46 (.13)	.22**
FA			.003 (.04)	.01
Smoking				
Block 1 Constant	.020	.020	1.82 (1.48)	
Block 2 Constant	.097	.077**	-.03 (1.60)	
PA			.64 (.17)	.23**
FA			.17 (.06)	.17**

Note. **p sig at .01. *p sig at .05. Block 1 variables included Age and Gender.

Health-promoting behaviour. The relevant regression statistics for the prediction of health-promoting behaviours (exercise and fruit and vegetable intake) can be seen below in Table 26. The results of these regressions suggest that demographic information combined with felt and potential ambivalence scores explained a significant 5.2% of variance in exercise, $F(4,255) = 4.50$, $p = .002$ and a significant 3.7% of variance in fruit and vegetable intake, $F(4,255) = 3.44$, $p = .009$. As seen in Table 26, felt ambivalence was found to be a significant predictor of health-promoting behaviour, while potential ambivalence had no significant predictive power. The negative values for the felt ambivalence beta weights suggest that lower levels of felt ambivalence are related to increased performance of health-promoting behaviours (see Appendix L3 for the output of these analyses).

Table 26

Predicting Health-promoting Behaviour Using Ambivalence Measures

	R^2	R^2 Change	B (SE)	β
Exercise				
Block 1 Constant	.046	.046**	75.75 (10.02)	
Block 2 Constant	.067	.021	85.58 (10.91)	
PA			.01 (1.33)	.00
FA			-1.11 (.50)	-.14*
F & V Intake				
Block 1 Constant	.008	.008	4.57 (.48)	
Block 2 Constant	.052	.044**	5.58 (.56)	
PA			.05 (.07)	.04
FA			-.09 (.03)	-.22**

Note. **p sig at .01. *p sig at .05. Block 1 variables included Age and Gender.

Discussion

Study 4 examined the ambivalent nature of attitudes toward several health related behaviours. More specifically, it examined the interrelationships between felt and potential ambivalence and health-risk and health-promoting behaviours. As predicted and supporting the research by Conner et al. (1998), alcohol consumption was the behaviour found to produce the highest reports of potential ambivalence. Breaking this down further, consuming alcohol on the weekend produced the highest feelings of potential ambivalence, followed by consuming alcohol on a weekday. These findings provide direct support for the argument that attitudes toward alcohol are explicitly ambivalent.

Ambivalence and Health-risk Behaviour

The results of this study found differing relationships between potential and felt ambivalence and the performance of health related behaviours. While alcohol consumption was associated with the highest levels of potential ambivalence, smoking was associated with the greatest feelings of felt ambivalence. This is particularly surprising considering that smoking was the behaviour associated with the lowest levels of potential ambivalence. The above finding supports the argument that felt and potential ambivalence may be assessing different aspects of ambivalence (Jonas et al., 2000). A possible explanation for the above finding may be related to an individual's awareness of their own ambivalent attitudes, with authors arguing that potential ambivalence measures a more unconscious aspect of ambivalence while felt ambivalence assesses a more conscious aspect of ambivalence (Jonas et al., 2000).

In regards to smoking attitudes, research suggests that smokers are explicitly aware of both the positives and negatives of their smoking behaviour (Cotter, Perez, Dessaix et al., 2008; Urbis, 2010). Over the past couple of decades, the negative effects

of smoking have been highlighted based on scientific research directly linking smoking to negative health outcomes (see U.S. Department of Health and Human Services, 2014 for an overview of these outcomes). This research has served as the basis for various mass media anti-smoking campaigns and government legislations in Australia that have attempted to directly restrict smoking behaviour. As a result of mass exposure to these negative health messages, it is practically impossible in this day and age to be unaware of the significant negative health outcomes that are associated with smoking. Additionally, as more information has been released highlighting the negatives of smoking and more government legislation passed limiting this behaviour, smoking has become less and less socially acceptable. This has led to feelings of social stigmatisation and ostracism among smokers (Urbis, 2010). Therefore, as well as having negative health outcomes associated with smoking, there are also negative social connotations associated with this behaviour.

Research suggests that although being consciously aware of the negative social and health aspects of their behaviour, smokers continue to smoke due to the addictive nature of this behaviour as well as the positive (e.g. social interaction with other smokers) and negative (e.g. stress relief) reinforcers associated with this behaviour (Urbis, 2010). In regards to ambivalence, it is perhaps more likely that attitudinal ambivalence toward smoking will be expressed explicitly as smokers may be aware of both the negatives and positives of engaging in this behaviour. As felt ambivalence measures are predicted to be measuring feelings of ambivalence of which individuals are consciously aware and directly able to report (Jonas et al., 2000), ambivalence in attitudes toward smoking is perhaps easier to identify using these measures. This may explain why smoking was found to be the behaviour producing the highest feelings of

felt ambivalence in this study. Additionally, this may explain why higher levels of felt ambivalence were found to be predictive of higher levels of smoking behaviour.

In contrast, the perceived negative outcomes associated with drinking are not as severe as those associated with smoking. For a start, drinking remains a much more socially acceptable behaviour than smoking. Unlike smoking, the consumption of alcohol is unlikely to be perceived by others as a negative behaviour and may even be encouraged by peers. Therefore, the negative social stigmatisation associated with smoking behaviour may not be as strong or even non-existent for alcohol consumption. This may mean that negative evaluations associated with alcohol consumption may only be developed through personal experience with this behaviour, and not through the negative evaluation of drinking from others. It is argued then that, due to the lack of social stigmatisation, individuals may not be as aware of their feelings of ambivalence toward alcohol as they would be toward smoking.

This argument is supported by research from de Visser and Smith (2007). In this study, the authors conducted in-depth interviews exploring ambivalence toward alcohol consumption in sample of 31 young male heavy drinkers. These interviews revealed that participants, when explicitly asked to report them, were able to easily highlight both the positives and negatives of their drinking behaviour, indicating ambivalence toward consuming alcohol. However, this feeling of ambivalence was not one which participants thought about consciously and it seemed to come as a surprise to participants that they held ambivalent attitudes toward alcohol (de Visser & Smith, 2007). Therefore, there is evidence that individuals may be unaware of their feelings of ambivalence toward alcohol. With potential ambivalence measures predicted to be tapping in to cognitive aspects of ambivalence of which an individual is unaware (Jonas et al., 2000), it may be that these measures are better suited to assessing attitudinal

ambivalence toward alcohol than felt ambivalence measures. This may be why the evaluation of attitudes toward alcohol consumption produced the highest scores for potential ambivalence in this study.

Differing Predictive Power for Potential and Felt Ambivalence

Before continuing this discussion, it is acknowledged here that the ambivalence measures predicted only a minimal amount of variance in the performance of each of the health behaviours assessed in this study. However, an identification of various variables that could aid in the prediction of behaviour was not the main purpose of this study. This study simply sought to examine whether scores on felt and potential ambivalence measures could predict the performance of different health behaviours.

Potential ambivalence was found to be a significant predictor for health-risk behaviours, with the results suggesting that higher levels of potential ambivalence are related to increased performance of health-risk behaviour. In contrast, felt ambivalence was found to be a significant predictor of the performance of health-promoting behaviours. The finding that potential ambivalence predicted health-risk behaviour can perhaps be explained by the way in which potential ambivalence is conceptualised. More specifically, potential ambivalence measures focus directly on both the positives and negatives of performing a particular behaviour. In other words, this measure essentially focuses on the underlying cognitive aspect of an attitude itself by asking respondents to consider a cost-benefit analysis of performing certain behaviour. In regards to health-risk behaviour such as smoking and drinking alcohol, this cost-benefit analysis focuses on the conflict between the positives such as enhanced social interaction or stress relief and the various negative health outcomes associated with such behaviour. As Lipkus et al. (2005) state "The decision to engage in health-compromising behaviours entails the expectation of experiencing positive outcomes at

the cost of potential harm" (p. 373). Therefore, the opposing negative and positive outcomes that can arise as a result of engaging in health-risk behaviours may result in the development of ambivalent attitudes toward them. This ambivalence may best be captured by potential rather than felt ambivalence measures, as the former clearly focuses on the positive and negative attitudinal aspects directly related to the behaviour.

Despite holding higher levels of potential ambivalence in attitudes toward health-risk behaviour, the hedonic positives associated with health-risk behaviours such as smoking and drinking alcohol (e.g. enhancement of social interactions, reduction of stress) may still, for the individual, outweigh the various negatives of engaging in this behaviour. Therefore, individuals may continue to engage in these health-risk behaviours despite having mixed feelings toward them. This argument may also help to explain why higher levels of potential ambivalence were predictive of greater performance of health-risk behaviours.

In relation to alcohol consumption, due to a focus on positive and negative evaluations in potential ambivalence measures, this assessment may take into account the various negative and positive consequences experienced by individuals when they engage in drinking behaviour. By directly asking participants to report their positive and negative evaluations of alcohol, respondents may draw upon their positive and negative experiences with alcohol to answer the potential ambivalence measure. As previous research has indicated that heavier drinkers are more likely to experience both the positive and negative outcomes of drinking (Park, 2004), these heavier drinkers may be reporting greater positive *and* negative evaluations of alcohol consumption. On a potential ambivalence measure, this would be reported as higher levels of potential ambivalence. Therefore, it makes sense that higher levels of potential ambivalence may predict greater levels of self-reported alcohol consumption, as was found in this study.

Although the current study found that greater potential ambivalence predicted increased drinking behaviour, it is worth noting that nature of this relationship is not fully understood. More specifically, it is unknown if increased ambivalence in attitudes toward alcohol consumption arises as a result of increased exposure with alcohol, or if increased exposure to alcohol leads to more ambivalent attitudes. Future research should attempt to explore the relationship between potential ambivalence and drinking behaviour in an attempt to understand how the two processes influence one another.

The way in which felt ambivalence is conceptualised may also explain why this form of ambivalence was a significant predictor of health-promoting behaviour in this study. As mentioned previously, potential ambivalence measures, by assessing both the positives and negatives associated with a behaviour, may tap in to the underlying cognitive aspects of attitudinal ambivalence. In contrast, felt ambivalence measures ask participants to directly report the extent to which they experience mixed thoughts or feelings toward different behaviours (Conner & Sparks, 2002). Instead of examining the cognitive aspect of ambivalence, felt ambivalence measures are assumed to be assessing the level of affective ambivalence experienced by an individual.

The inverse relationship found for felt ambivalence scores and the reported performance of health-promoting behaviours in this study may be the result of individuals needing to have a clear positive evaluation of these behaviours, as opposed to mixed feelings, in order to engage in these behaviours. Based on previous research, it is argued that the performance of health-promoting behaviours may be more influenced by deliberative as opposed to automatic cognitive processes (Webb & Sheeran, 2006). Therefore, factors such as high levels of motivation and intention to engage in these behaviours may be important cognitive processes supporting the performance of health-promoting behaviours. This argument is supported by research

which suggests that relationship between attitudes and food consummatory behaviour was weaker when individuals held ambivalent as opposed to univalent attitudes (Arimtage & Conner, 2000; Conner et al., 2002).

Study 4 examined the relationship between felt and potential ambivalence and self-reported performance of health-risk and health-promoting behaviours. This study found a differing relationship between the measures of ambivalence and the health behaviours, with lower levels of felt ambivalence predictive of higher levels of health-promoting behaviours. In contrast, greater feelings of potential ambivalence were predictive of increased performance of health-risk behaviour. Perhaps most importantly, and supporting the results from the previous three studies of this research project, Study 4 found that attitudes toward alcohol consumption were the most ambivalent using an assessment of potential ambivalence. As the focus of this research project is on alcohol-related attitudes, this finding raises the question as to what causes this ambivalence toward drinking behaviour. It has been argued throughout this research project that ambivalence toward alcohol may be a result of the various positive and negative consequences that individuals experience when they drink. This relationship will be directly explored in Study 5. Furthermore, Study 5 hopes to examine the nature of implicit ambivalence toward alcohol. By examining implicit ambivalence toward alcohol-related attitudes, the findings from the current study will be expanded in an attempt to find whether alcohol-related attitudes are not just explicitly ambivalent, but implicitly ambivalent as well.

Chapter 10: Study 5

Study 4 assessed explicit attitudinal ambivalence toward different health behaviours. Importantly for the purpose of this project, the results from Study 4 indicated that compared to three other health behaviours, attitudes toward alcohol consumption were the most potentially ambivalent. This supports the argument that explicit attitudes toward alcohol consumption may be ambivalent in nature (Conner et al., 1998), particularly when focusing on the simultaneous positive and negative evaluations an individual holds toward alcohol consumption.

Implicit Ambivalence

Based on the findings from Study 4, the current study aims to further explore the ambivalent nature of implicit attitudes toward alcohol consumption. Implicit attitudes will be the focus here as the findings from Studies 1-3 indicate that implicit attitudes toward alcohol may be ambivalent. One reason for this argument stems from the previous results of this research project which suggest that implicit attitudes toward alcohol can be significantly positively (Studies 1 & 2) or negatively (Study 3) shifted as a result of brief exposure to valenced stimuli. The results from these studies were interpreted as participants having both positive and negative automatic associations with alcohol consumption, both of which can be easily accessed when exposed to valenced stimuli. It is argued here that as a result of having both positive and negative automatic associations with alcohol, implicit attitudes toward alcohol consumption may be ambivalent in nature. Furthermore, other authors argue that persuasive communications may be more effective in producing attitude change in those individuals who report having ambivalent as opposed to univalent attitudes (Conner & Armitage, 2008). This assumption is supported by the findings of Studies 1-3 of this research project. Therefore, the current study focuses on the ambivalent nature of

alcohol-related implicit attitudes and examines possible factors which may contribute to the development of these attitudes.

Implicit ambivalence has been introduced and discussed earlier (see Chapter 8: Attitudinal Ambivalence). Therefore only a brief overview of this topic will be presented here. To date, the limited research dealing with implicit ambivalence defines this construct as a discrepancy between an individual's implicit and explicit attitudes toward the same target object/behaviour (Petty et al., 2012). This suggests that although individuals may explicitly state that their attitudes toward alcohol consumption are positive, performance on an implicit measure may suggest that their implicit attitudes toward alcohol are actually negative or vice versa. The assumptions made about implicit ambivalence by Petty and colleagues (2009; 2012) are largely theoretical, with limited research directly testing the predictions made by these authors.

As outlined in *Chapter 8: Attitudinal Ambivalence* there has been limited research to suggest that explicit and implicit alcohol-related attitudes are discrepant (Wiers et al., 2002, Houben et al., 2010a). Therefore, the current study aimed to empirically test the assumptions of Petty et al. (2012) in relation to implicit ambivalence in alcohol-related implicit attitudes. Due to the previous findings of the current research project, it is predicted that alcohol-related implicit attitudes will be implicitly ambivalent. More specifically, based on the operationalisation of implicit ambivalence by Petty and colleagues (2009; 2012), it is predicted that a discrepancy will be found in participants' implicit and explicit alcohol-related attitudes.

Relationship with Explicit Ambivalence

There has also been limited research examining the relationship between implicit and explicit attitudinal ambivalence. In their discussion of implicit

ambivalence, Petty et al. (2012) highlight their assumptions concerning the relationship between implicit and explicit ambivalence. These assumptions are based on the Meta-Cognitive Model (MCM) of attitudes (Fazio, 1990). The MCM was introduced in *Chapter 8: Attitudinal Ambivalence*, so only the relevant aspects of this model to the current study will be mentioned here. Most importantly for the current study, the MCM hypothesises that individuals are able to tag their evaluative associations of target objects as true or false. In relation to ambivalent attitudes, the MCM predicts that individuals can have both positive *and* negative explicit attitudes toward a target object. However, the MCM suggests that either the explicit positive or negative evaluation will be tagged as false and will not be explicitly endorsed by the individual. This means that, on explicit attitude measures, individuals will report a univalent attitude. For example, individuals who tag their negative explicit attitude as being false will report positive explicit attitudes toward that target object.

Another key assumption of the MCM is that "the impact of validity tags…are revealed primarily on deliberative measures" (Petty & Briñol, 2009, p. 132). This means that implicit attitude measures are predicted to assess attitudes that are free of any true or false tags. This assumption is made because the evaluative tags associated with different target objects take time and effort to retrieve from memory. Therefore, it is predicted that, due to the demands of implicit attitude measures, these measures are predicted to still be able to assess the attitude which was explicitly tagged as false (Petty et al., 2012). That is, due to the relatively automatic and unconscious nature of responses made on implicit attitude measures, participants do not have the time or cannot exert the cognitive effort to retrieve tags which are associated with a target object. This suggests that an individual's explicit attitudes may be expressed as positive because they have tagged their negative explicit evaluation as false. However, the same

individuals' implicit attitudes may still be negative as implicit measures do not provide enough time for the retrieval of the tag associated with the explicit negative evaluation. Petty and colleagues (2009; 2012) argue that the above process is how a discrepancy arises between an individual's explicit and implicit attitudes, producing implicit ambivalence toward an attitude object.

Based on the definition of implicit ambivalence by Petty & colleagues (2009; 2012), it is hypothesised that attitudes toward an object may never be *both* implicitly and explicitly ambivalent. This is because, at a cognitive level, individuals who are assumed to hold implicitly ambivalent attitudes "…are either unaware of the evaluative conflict…or are aware of having both positive and negative reactions, but deny that one reaction is valid…" (Petty et al., 2012, p. 179). Therefore, a relationship may not exist between implicit and explicit ambivalence because individuals who have *implicitly ambivalent* attitudes are assumed to hold *univalent explicit* attitudes. The above argument is merely an assumption of implicit ambivalence as defined by Petty et al. (2012) and has not yet been empirically tested. Therefore, Study 5 aims to fill this gap in the literature by assessing both explicit and implicit ambivalence in the same study, providing a direct examination of the relationship between the two constructs.

Alcohol-related Consequences

The results from Study 4 suggest that individuals hold explicitly ambivalent attitudes toward alcohol consumption, particularly when measured using scales of potential ambivalence. It was argued that a possible reason for this ambivalence in alcohol-related attitudes is the experience of positive and negative consequences such as social facilitation and feelings of nausea experienced as a result of consuming alcohol. A study by Lee et al. (2011) found that greater experience with both positive and negative alcohol-related consequences was significantly related to greater quantity

and frequency of alcohol consumed It was argued here then that drinkers' attitudes may be ambivalent because they experience both positive and negative alcohol-related consequences frequently. This argument will be directly tested in the current study, with the inclusion of measures for the evaluation of various alcohol-related consequences and the frequency with which these consequences are experienced. It is predicted that individuals who report experiencing alcohol-related consequences more frequently will also report greater levels of potential ambivalence toward alcohol.

The experience of various positive and negative consequences associated with drinking may be particularly relevant for the development of implicit ambivalence. This is because implicit attitudes are predicted to be developed as a result of experience with a target object (Greenwald & Banaji, 1995). If heavier drinkers experience both positive and negative consequences of drinking more frequently (Lee et al., 2011), then this experience may shape implicit attitudes to be ambivalent in nature. Therefore, it is also predicted that the frequency with which alcohol-related consequences are experienced will contribute to greater levels of implicit ambivalence toward alcohol.

Method

Participants

Three hundred and forty participants completed this study. Participants had a mean age of 23.71 ($SD = 9.92$) years. There were 98 males and 218 females in this study (24 participants did not report their gender), with 284 university students and 56 participants from the general public. Recruitment for this study was conducted alongside another study about health behaviours with some participants completing the measures for this study along with those for another research project. All university students were recruited through the James Cook University Research Participation Pool. University participants completed the experiment for course credit. Participants from

the general public were recruited through snowball and convenience sampling. No

incentives were given for participants from the general public. Ethical approval for this

study was obtained from the University's Human Research Ethics Committee.

Materials

The following measures were all computer based and integrated into a script

designed using Inquisit 3.0.4 (Millisecond Software, 2010). This script included all of

the measures described below and was placed on the internet for participants to

complete online. Participants who signed up to complete this study were given a web

link where they could access the online questionnaire. The complete questionnaire for

Study 5 can be seen in Appendix J.

Implicit attitudes. An overview of the basic design and methodological

considerations of the Implicit Association Test (IAT) is provided in earlier chapters (see

Chapter 4: Methodology and Chapter 5: Study 1). However because a different variant

of the IAT is used in this study, a brief overview of the single target-IAT (ST-IAT;

Wigboldus et al., 2006) will be provided here. The ST-IAT is a single-target measure

of implicit attitudes, with the target being the attitude object of interest (Wigboldus et

al., 2006). As this study was focused on alcohol-related implicit attitudes, the single

target used in the ST-IAT was alcohol. The stimuli used in the ST-IAT are shown

below in Table 27. All stimuli used were words, with alcohol-related words as the

target category and positively and negatively valenced words as the attribute categories.

The same attribute category stimuli as used in Studies 1-3 were also used here.

Participants were again required to press either the 'q' or 'p' keys in order to make a

response. An overview of the blocks used for the ST-IAT can be seen below in Table

28. The presentation of stimuli in the ST-IAT was counterbalanced such that some

participants received the positive-alcohol pairings in B2 and B3 first and some received the negative-alcohol pairings in B2 and B3 first (see Table 28).

Table 27

ST-IAT Stimuli for Study 5

	Stimuli
Alcohol-related words	*Beer, Wine, Vodka, Rum*
Positive words	*Cheerful, Happy, Funny, Sociable*
Negative words	*Nausea, Awful, Miserable, Annoying*

Table 28

Overview of the ST-IAT Design for Study 5

Block	Number of trials	Left-key response ('q')	Right key response ('p')
B1	20	Positive	Negative
B2	20	Positive + Alcohol	Negative
B3	40	Positive + Alcohol	Negative
B4	20	Positive	Negative + Alcohol
B5	40	Positive	Negative + Alcohol

For each block in the ST-IAT, the appropriate category labels appeared in the top left and right of the computer screen to remind participants of the response key allocation (Nosek et al., 2007). When stimulus items were incorrectly categorised with the wrong response key, an error indication in the form of a red 'X' appeared on the middle of the computer screen. Participants were then required to press the appropriate response key before the next trial was shown. The intertrial interval between stimuli presentations was set to 250ms, which allowed the measure to be completed rapidly

with little delay (Nosek et al., 2007). As research has suggested that the order of completion for implicit and explicit measures does not influence responding (Hofmann et al., 2005b; Nosek et al., 2005), the ST-IAT was always completed prior to all other attitude measures in this study.

Reaction times were recorded for the critical alcohol-positive and alcohol-negative pairings in the ST-IAT. Based on the improved algorithm for IAT scoring outlined in Table 4 of Greenwald et al. (2003), these critical pairings were the blocks of the ST-IAT where alcohol was paired with the valenced stimuli. So for the current study, the reaction times of interest always came from B2, B3, B4 and B5 (see Table 28 above). The reaction times for participants associating alcohol with positive words and alcohol with negative words were recorded for each of the 60 trials in these blocks. All reaction time data of interest was also cleaned in line with the instructions for the D-score method of IAT scoring outlined in Greenwald et al. (2003). As outlined in this scoring algorithm, all response latencies greater than 10000ms were deleted, while participants who had greater than 10% of trials with a response latency of less than 300ms were removed from further analysis (see Table 4 of Greenwald et al., 2003). The reaction times were then averaged and a mean reaction time score for alcohol-positive and alcohol-negative pairings was generated.

Drinking behaviour. For quantity of alcohol consumption, participants were asked to indicate how many standard drinks they consumed in a typical weekend drinking session. For frequency of alcohol consumption, participants were asked to estimate how many weekend days they consumed alcohol in the past month. Weekend drinking was defined as a drinking session on any day from Thursday to Saturday. Reasons for the apparent importance of assessing weekend drinking have been given previously (see Chapter 5: Study 1).

Potential ambivalence. The same measure for potential ambivalence as used in Study 4 was used again here (see Chapter 9: Study 4 for greater description). However, only potential ambivalence toward weekend drinking behaviour was assessed in this study. Scores were once again calculated with the Griffin Index, with higher scores indicating greater potential ambivalence toward alcohol consumption.

Explicit alcohol-related cognitions. Explicit alcohol-related cognitions were measured using 3 questions related to feelings generated as a result of consuming alcohol. Participants were presented with the following three statements: 'Alcohol makes me feel good,' 'Alcohol makes me more sociable' and 'Drinking alcohol gives me confidence.' Participants could then respond on a 5-point Likert scale from 1= strongly disagree to 5= strongly agree. A Cronbach's alpha of .71 for these 3 items was reported, indicating acceptable reliability. An average explicit attitude score was created by adding together the scores from the three questions then dividing by three. Higher scores on this average measure indicated more positive explicit attitudes toward alcohol consumption.

Alcohol-related consequences. All alcohol-related consequences used in this study were adapted from previous research (Patrick & Maggs, 2011). Participants were presented with twenty-two different consequences related to alcohol consumption. Themes for the consequences were identified as being either fun, relaxing, image, sex or physical/behavioural evaluations of alcohol (see Table 29 in Results section for themes; see Appendix L4 for a full listing of all consequence items used in this study).

Participants were asked to identify how often they experienced each of the alcohol-related consequences, if at all, as a result of their drinking behaviour. Responses were given on a 4-point Likert scale where '0= Never happens,' '1=

Happens a little,' '2= Happens sometimes' and '3= Happens all the time.' A consequence frequency score for each of the evaluation themes was created by adding together all of the scores for each item within an evaluation theme then dividing by the number of items in that theme. For example, an average for the sex frequency theme was calculated by adding responses to 'Having a good sexual experience' and 'Enjoying a sexual experience more' then dividing by two. Higher scores on the consequence frequency variable indicate more frequent experience with the relevant alcohol-related consequences.

Participants were also asked to provide an evaluation of each consequence on a 5-point Likert scale where '0= Very negative,' '1= Slightly negative,' '2= Neutral,' '3= Slightly positive' and '4= Very positive.' An average consequence evaluation score for each theme was calculated using the same method as described above for the calculation of an average consequence frequency score, with higher scores indicating a more positive evaluation of that theme (see Appendix L4 for detailed breakdowns of average consequence evaluation and frequency scores).

Procedure

University participants signed up to complete the study through the James Cook University Psychology Research Participation Pool. Participants from the general public who were recruited through snowball and convenience sampling were given the study link via email or social media programs such as Facebook. All participants were provided with a hyperlink directing them to the study. Participants first read information about the study (see Appendix K) and gave consent to participate by clicking a button. Demographic information, including age, gender and university student status was assessed first, followed by the ST-IAT for alcohol. Participants then completed an assessment of their drinking behaviour, followed by measures of potential

ambivalence and alcohol-related consequences. University students were given course credit for their participation, while members of the general public received no incentive for participation.

Results

Participants reported consuming an average of 4.26 (SD = 4.48) standard drinks in a typical weekend drinking session. Participants reported an average of 2.74 (SD = 3.11) weekend drinking sessions in the past month. Participants reported an average potential ambivalence score for weekend drinking behaviour of 1.64 (SD = 2.19). The average score for the explicit attitude measure was 3.87 (SD = .81), which was found to deviate significantly from the midpoint of the explicit attitude scale, $t(262)$ = 17.43, p = .000. This suggests that, on average, participants held positive explicit attitudes toward alcohol consumption.

Table 29 presents the relevant descriptive statistics for the alcohol-related consequence measures. As seen in Table 29, 'fun' consequences were rated the most positively and occurred most frequently for participants in this sample. In contrast, 'physical/behavioural' consequences were rated most negatively and occurred least frequently for participants. See Appendix L4 for a further breakdown of consequence scores.

Table 29

Mean (SD) Scores for Frequency and Evaluation of Alcohol Consequences

Consequence Theme	Frequency	Evaluation
Fun	1.56 (.85)	2.75 (.96)
Relax	1.17 (.89)	2.30 (1.11)
Sex	.73 (.92)	1.58 (1.32)
Image	.68 (.76)	1.37 (1.06)
Physical/behavioural	.58 (.63)	.45 (.66)

Implicit Attitudes

Participants produced an average score of -.14 (SD = .27) on the ST-IAT, which was found to be significantly different from zero, $t(339) = -9.37$, $p = .000$. This suggests that participants held negative implicit attitudes toward alcohol consumption. In regards to reaction times, participants had a mean reaction time for positive-alcohol pairings of 748.27 (SD = 143.51) milliseconds and a mean reaction time for negative-alcohol pairings of 715.53 (SD = 125.26). A paired samples t-test found significant differences in the mean reaction times for alcohol-positive and alcohol-negative associations, $t(339) = 6.16$, $p = .000$. This suggests that participants were significantly faster at associating alcohol with negatively valenced words than they were at associating alcohol with positively valenced words.

To examine the difference between the reaction times for alcohol-positive and alcohol-negative associations, a mean difference (MD) score was created. The MD score was calculated by subtracting the reaction times for alcohol-negative pairings from the reaction times for alcohol-positive pairings. So the formula for the MD score calculation is as follows:

MD Score = RTs for alcohol-positive pairings – RTs for alcohol-negative pairings

Based on the above calculation, MD scores closer to zero would indicate that reaction times to positive pairings were roughly equal to reaction times for negative pairings. MD scores closer to zero are therefore suggested to indicate greater similarity of implicit positive and negative evaluations of alcohol consumption (i.e. attitudinal ambivalence). As MD scores move further away from zero in either direction, be it positive or negative, it is assumed that participant's implicit attitudes become more univalent. For example, negative MD scores indicate that participants are faster at associating alcohol with positively valenced stimuli than they are at associating alcohol with negatively valenced stimuli. A negative MD score suggests that participants held stronger alcohol-positive than alcohol-negative associations in memory.

In contrast, if MD scores are positive, this suggests that participants were faster at associating alcohol with negatively valenced stimuli than they were at associating alcohol with positively valenced stimuli. A positive MD score suggests that participants held stronger alcohol-negative than alcohol-positive associations in memory. The average MD score for the current sample was 32.74 milliseconds ($SD =$ 97.96), which was found to be significantly different from zero, $t(339) = 6.16$, $p = .000$. This suggests that, on average, participants were significantly faster at associating alcohol with negatively valenced stimuli than they were at associating alcohol with positively valenced stimuli.

Implicit and Explicit Ambivalence

As mentioned earlier, another key assumption of implicit ambivalence as proposed by Petty et al. (2012) is that an individual cannot hold both explicitly and implicitly ambivalent attitudes toward the same target object. That is, if an individual is

assumed to hold implicitly ambivalent attitudes, then their explicit attitudes will be univalent. This is predicted to occur because, at an explicit level, either the positive or negative evaluation of the target object will be denied (Petty et al., 2012). To date, this assumption has had little empirical support. Therefore, based on the measures taken in this study, the relationship between implicit and explicit ambivalence was explored. For the purpose of this analysis, explicit ambivalence was operationalised as participant's potential ambivalence scores. Additionally, implicit ambivalence was measured by using participant's MD scores between the reaction times for alcohol-positive and alcohol-negative associations. This measure is described in detail above.

To examine the relationship between explicit and implicit ambivalence toward alcohol consumption, the previously mentioned MD scores were categorised. This categorisation was performed because, due to the way implicit attitudes were measured, there were both positive and negative MD scores, with both extremes of this score meaning the same thing. That is, both positive *and* negative MD scores indicate that participants have univalent attitudes toward alcohol consumption. In contrast, scores closer to 0 indicate a greater similarity in reaction times for implicit alcohol-positive and alcohol-negative evaluations. For the purpose of this analysis, MD scores closer to 0 were used as the measure of implicit ambivalence. This is because a greater similarity in alcohol-positive and alcohol-negative evaluations suggests that participant's held both alcohol-positive and alcohol-negative associations in memory simultaneously.

Based on their performance on the ST-IAT, participant's responses were divided into 2 categories. This division was performed by initially splitting the implicit attitude MD scores into quartiles. The advantages of splitting data into quartiles are that they can be determined from the current data set alone and do not rely other research, and that the data set does not need to be symmetrical around zero (Hanley, Bourassa,

O'Brien, Smith, & Spade, 2003). Both of these advantages fit nicely with the current data set. First, an extensive literature search found no research which states the expected difference in reaction times for alcohol-positive and alcohol-negative pairings in order for implicit attitudes to be classified as ambivalent. Therefore, there were no set cut-off points in the literature that could be used in order to classify participants' implicit attitudes as ambivalent for this current research project. This means that, by splitting the current data set by quartiles, cut-off points for implicit ambivalence toward alcohol could be created for participants in this sample.

Another advantage of using quartiles was that the implicit attitude MD scores calculated in the current research did not fall symmetrically around zero. That is, because participants in this sample more frequently recorded negative implicit attitudes toward alcohol, with 63.2% of participants in this sample reporting a positive MD score (indicating negative implicit attitudes toward alcohol) while the remainder of participants recorded a negative MD score (indicating positive implicit attitudes toward alcohol). This suggests that the implicit attitude MD scores for this sample were not falling symmetrically around zero, which further justifies using a quartile split to create groups for the implicit ambivalence categories (Hanley et al., 2003).

Based on the initial quartile split, two categories were created with the middle 50% of scores and the top 25% and bottom 25% of scores examined. The middle 50% of scores for the current data ranged between -30.24 and 88.22. Because it is argued here that scores closer to zero suggest implicit ambivalence, and that these middle 50% of scores fall around zero, this group was labelled as the 'Implicitly ambivalent' group. The top 25% and bottom 25% of scores were combined to create the 'Implicitly univalent' group. The MD scores for this group ranged from 88.85 to 482.12

(indicating negative alcohol-related implicit attitudes) for the top 25% and -30.97 to -246.21 (indicating positive alcohol-related implicit attitudes) for the bottom 25%.

The categories as described above were used to examine differences in explicit ambivalence. An independent samples t-test revealed a significant difference in explicit ambivalence scores based on implicit ambivalence category, $t(300) = -2.07$, $p = .039$. This suggests that participants from the 'Implicitly ambivalent' group ($N = 170$, $M = 1.30$, $SD = 2.10$) reported significantly lower levels of explicit ambivalence than participants from the 'Implicitly univalent' group ($N = 170$, $M = 1.81$, $SD = 2.21$).

Alcohol-related Consequences and Explicit Ambivalence

Correlations were run to examine the relationship between frequency of alcohol-related consequences and potential ambivalence. For these correlations, potential ambivalence scores were correlated with frequency of fun, relax, image, sex and physical/behavioural consequences (see Table 30 below). No significant relationships between potential ambivalence scores and the frequency with which alcohol-related consequences were experienced were found (all p's >.05). As it was predicted that the experience of *both* positive and negative alcohol-related consequences may contribute to ambivalent attitudes, a total consequence frequency variable was created by adding together the frequency with which the fun, relax, image, sex and behavioural consequences were experienced. Higher scores on this variable indicated a greater experience with alcohol-related consequences. Again, no significant relationship was found between potential ambivalence and the total consequence frequency variable ($p = .576$) (see Table 30).

Table 30

Correlations between Explicit Ambivalence and Alcohol-related Consequence Frequency

	1	2	3	4	5	6
1. Explicit Ambivalence						
2. Fun Frequency	.05					
3. Relax Frequency	-.09	.71**				
4. Image Frequency	-.06	.60**	.62**			
5. Sex Frequency	-.05	.47**	.50**	.56**		
6. Behaviour Frequency	.10	.53**	.34**	.41**	.36**	
7. Total Frequency	-.02	.85**	.83**	.82**	.76**	.64**

Alcohol-related Consequences and Implicit Ambivalence

Independent samples t-tests were run to detect differences in alcohol-related consequence frequency scores based on implicit ambivalence. For this analysis, the implicit ambivalence categories explained earlier were used. These analyses revealed that there was a significant difference for sex frequency only, $t(285) = 2.24$, $p = .026$, with implicitly ambivalent participants experiencing sex-related consequences ($M = .85$, $SD = .98$) significantly more frequently than those participants who held univalent implicit attitudes ($M = .61$, $SD = .83$). All other t-tests revealed no significant differences in consequence frequency based on implicit ambivalence category (all p's > .05). Another independent samples t-test revealed no significant difference in the total consequence frequency variable based on implicit ambivalence category, $t(257) = 1.14$, $p = .257$ (see Appendix L4, Table L7 for the output of these analyses).

Discussion

Study 5 examined implicit ambivalence toward alcohol consumption and the relationship between ambivalence and alcohol-related consequences. Results from this study indicate that, based on ST-IAT scores and reaction times for alcohol-positive and alcohol-negative associations, participants typically held *negative implicit* attitudes toward alcohol. That suggests that participants found it significantly easier to associate alcohol with negative as opposed to positive stimuli. This indicates a univalent implicit attitude toward alcohol consumption, with negative implicit attitudes being the dominant evaluation. In contrast, participants in the current sample reported, on average, *positive explicit* attitudes toward alcohol consumption.

By reporting, on average, *negative implicit* but *positive explicit* alcohol-related attitudes, it appears as though participants in the current sample held a discrepancy in their attitudes toward alcohol consumption. Therefore, the results from the current study provide empirical support for the suggestion that alcohol-related attitudes are implicitly ambivalent as defined by Petty et al. (2012). Another key assumption about implicit ambivalence made by Petty et al. (2012) is that individuals cannot have ambivalent attitudes toward a target object at both an explicit and implicit level. Empirical support for this argument was found in the results of the current study, with participants categorised as implicitly ambivalent reporting significantly lower levels of potential ambivalence than participants who were categorised as being implicitly univalent. This suggests that individuals with higher levels of similarity in their reaction-times for alcohol-positive and alcohol-negative implicit evaluations actually reported significantly lower levels of explicit ambivalence. This finding adds empirical support for the predictions of Petty et al. (2012) in that participants who may be

considered implicitly ambivalent may reject either a positive or negative evaluation in order to hold univalent explicit attitudes.

The explicit-implicit discrepancy in attitudes toward alcohol consumption found in this research project provides support for some of the assumptions made by the Meta-Cognitive Model (MCM) of attitudes (Petty et al., 2007). According to this model, attitude objects typically have a dominant evaluation representing an individual's knowledge and/or experience toward that particular object. However, some attitude objects, particularly those which produce ambivalent attitudes, can be linked in memory to evaluative associations that are opposite in valence to the dominant evaluation.

According to the MCM it is assumed that at an *explicit* level an individual will reject an evaluation of a target object, be it positive or negative, and will report the dominant univalent explicit attitude on an explicit attitude measure. Based on this assumption, it appears as though participants in this sample are denying the *explicit* negative evaluation of alcohol in favour of a reporting a positive attitude toward alcohol consumption. In contrast, as participants are hypothesised to be unable to retrieve any tags when their attitudes are assessed on an implicit measure (Petty et al., 2012), implicit attitude assessments are still able to measure the 'false' explicit evaluation. This also may have occurred in this study, with the negative evaluation of alcohol that was tagged as false at the *explicit* level still able to be assessed at the implicit level, leading to, on average, negative *implicit* attitudes toward alcohol as was found in this sample.

The discrepancy in alcohol-related explicit and implicit attitudes as found in the study is perhaps not surprising considering the targeted sample of this study. The majority of participants in this study were young adults, who typically consume alcohol

in order to facilitate their social interactions (Hallet et al., 2012; Kypri, Cronin, & Wright, 2005). For young adults, consuming alcohol may be the norm behaviour and one which has many social benefits that may enhance the positive evaluation of alcohol (Kuntsche et al., 2005). In contrast, the negatives associated with alcohol consumption are often health-related such as being hungover or feeling nauseous the next day. However, these negatives may not be as important to a young adult who wishes to enhance their social position by being seen as a drinker. Furthermore, significant negative long-term health issues such as liver disease as a result of alcohol consumption do not occur until later in life so may not be taken into consideration when *explicitly* evaluating drinking behaviour. Therefore, although perhaps aware of the negatives of engaging in drinking behaviour, individuals may explicitly deny these negative evaluations because the social benefits of consuming alcohol may outweigh the health-related costs.

This explicit denial of the negatives associated with alcohol consumption may have contributed to participants reporting positive explicit attitudes toward alcohol in this study. However, it is worth noting that, although explicitly denying the negatives of alcohol consumption, individuals may still be aware that such negatives exist. Research suggests that individuals often experience the negative outcomes of drinking behaviour (e.g. nausea or hangovers) directly as a result of their behaviour or by observing their friends behaviour (Park, 2004, Lee et al., 2011). Therefore, it can be assumed that individuals may be aware of the negatives of consuming alcohol and have negative attitudes toward alcohol consumption as a result. It appears as though these negative attitudes are reflected on implicit attitude measures which, due to their demands, do not allow individuals time to retrieve the explicit 'false' alcohol-negative

tag. As a result, participants' implicit attitudes toward alcohol were typically found to be negative.

Ambivalence and Consequences

The results from the current study indicate that the frequency with which alcohol-related consequences are experienced showed no significant relationship with potential ambivalence. This suggests that greater experience with alcohol-related consequences may not be related to higher levels of explicit attitudinal ambivalence toward alcohol consumption. This result may be explained by the findings presented in Table 29, with primarily positive experiences with alcohol reported by this sample. A clear difference was found in evaluation between consequences viewed as positive or negative, with fun consequences rated most positively, followed by relaxing and sex consequences (see Table 29). These three consequences were also the ones rated as occurring most frequently for participants in this study. In contrast, physical/behavioural consequences were rated as the most negative of these consequences and were also reported as occurring the least frequently as a result of drinking. This suggests that when participants were drinking, they were having a good time when doing so and the negatives of such behaviour were rarely experienced or perhaps not remembered. Due to the lack of reported experience with both positive and negative consequences of drinking, it makes sense that consequences were not related to explicit ambivalence as participants were primarily experiencing only the positives when consuming alcohol. Furthermore, participants' explicit attitudes were found to be, on average, positive toward alcohol consumption, so the positive experiences with alcohol consumption that were reported here may have contributed to this positive overall evaluation.

In regards to ambivalence in implicit attitudes, there was a lack of support for the prediction that those classified as implicitly ambivalent would also report experiencing alcohol-related consequences more often. That is, participants categorised as holding implicitly ambivalent alcohol-related attitudes only reported experiencing significantly more sex-related consequences of their drinking than those with univalent implicit attitudes. Again, these results may be limited by the finding that participants were primarily reporting the experience of only positive alcohol-related consequences. As ambivalence in implicit attitudes was predicted to arise as a result of both positive *and* negative consequences of alcohol consumption, future research should attempt to highlight more negative consequences associated with alcohol consumption.

The finding that participants were typically experiencing positive consequences of alcohol consumption more frequently but then reporting negative implicit attitudes is surprising. As mentioned previously, authors assume that implicit attitudes may be generated through experience with a target object (Greenwald & Banaji, 1995). Based on this assumption, participants in the current sample would have been predicted to report positive implicit alcohol-related attitudes as a result of experiencing mainly positive consequences related to their drinking behaviour. However, this was not the case, with participants reporting negative implicit alcohol-related attitudes. This suggests that experience with alcohol consumption, particularly consequences experienced as a result of drinking, may not be particularly influential on implicit attitudes toward alcohol consumption.

In summary, Study 5 provided evidence to suggest that alcohol-related attitudes may be implicitly ambivalent as defined by Petty et al. (2012). The results of this study also indicated no significant relationship between implicit and explicit ambivalence, providing further empirical support for the assumptions made by Petty et al. (2012)

about implicit ambivalence. Unfortunately, little to no relationship between alcohol-related consequences and ambivalent attitudes was found, suggesting that the experience of alcohol-related consequences may not contribute to ambivalence in alcohol-related attitudes at either an implicit or explicit level. Further research should examine the contributing factors to ambivalence in alcohol-related attitudes in order to obtain a greater understanding of why conflicting positive and negative evaluations toward alcohol arise. The next chapter will recap the research conducted in this project, as well as tying the results to relevant research findings and theoretical perspectives.

Chapter 11: General Discussion

General Overview

Over five experimental studies, the current research project has examined the underlying nature of implicit attitudes toward alcohol consumption. First, this project was interested in producing implicit attitude change through associative and non-associative processes, with a particular focus on advertisement exposure (Studies 1 & 2) and message frames (Study 3). Based on the results of these first three studies, the argument was raised that attitudes toward alcohol consumption may be ambivalent, in that individuals may endorse both the positive *and* negative aspects of alcohol consumption simultaneously. Therefore, the ambivalent nature of both explicit (Study 4) and implicit (Study 5) alcohol-related attitudes was explored.

It is worth noting that the results of this research project serve as an exploration into the nature of alcohol-related attitudes. The interpretations of the current findings did not aim to provide clear evidence in support of one model of attitudes, but rather are applied to multiple models in order to provide support for some of the basic assumptions of each. Based on the results found here, there will be no arguments for the correct definition or appropriate theoretical outlook of the attitude construct. However this was never the intended purpose of this research project. It is hoped that based on the results found here a greater understanding of the underlying nature of alcohol-related attitudes, particularly implicit attitudes, is generated. The following discussion will focus on how the results of the current project integrate and extend the theories and findings related to the implicit attitude change and attitudinal ambivalence literature identified in previous chapters.

Implicit Attitude Change through Associative Processes

The basis for Studies 1 and 2 of this research project stem from the findings of Goodall and Slater (2010) who found that when exposed to four alcohol advertisements, participants reported positive implicit attitudes toward alcohol consumption. Although the results from Goodall and Slater (2010) were promising, their method was limited by the use of post-test only assessments of implicit attitudes. Therefore, the results did not indicate whether implicit attitudes were actually changing from a baseline assessment. The current research findings indicate that viewing an advertisement for beer can produce a positive shift in beer-related implicit attitudes from pre- to post-test as assessed on an Implicit Association Test (IAT; Greenwald et al., 1998). These findings extend the results of Goodall and Slater (2010) by using a pre- and post-test design with a widely-used measure of implicit attitudes. These findings also provide further support for the argument by Goodall and Slater (2010) that alcohol advertisements may be more effective in activating attitudes which are preconscious. In other words, alcohol advertisements may be particularly influential in producing immediate implicit attitude change as opposed to explicit attitude change.

Interestingly, viewing an advertisement for a chocolate product found no significant shift in chocolate-related implicit attitudes from pre- to post-test. Possible reasons for this non-significant finding are given previously in *Chapter 5: Study 1* and will not be discussed again here. The following discussion focuses on the theoretical and practical implications of the findings related to alcohol-related implicit attitudes, as these were the attitudes of major interest for the current research project.

Evaluative Conditioning. It is argued here that the beer advertisement used in this research project may have influenced implicit attitudes through Evaluative Conditioning (EC) principles. To briefly recap, a typical EC procedure repeatedly pairs

a previously neutral conditional stimulus (CS) with a valenced unconditional stimulus (US) of either positive or negative value in order to produce a like/dislike toward a target object (De Houwer, 2007). It is argued that advertisements may use EC principles by pairing a brand or product (CS) with positive attributes such as humour or celebrities (US) in order to create or maintain a positive attitude toward that brand/product. The use of EC in advertising may produce implicit attitude change because EC uses associative processes in order to produce a change in attitudes. As implicit attitudes are assumed to be associative networks in memory (Greenwald & Banaji, 1995; Pieters et al., 2010), it makes sense that associative processes such as EC may be influential in producing implicit attitude change. Recent research supports this argument by showing that EC procedures are effective in producing implicit alcohol-related attitude change (Houben et al., 2010a, 2010b).

By pairing alcohol (the CS) with humour, popular celebrities or other positively valenced stimuli (USs), alcohol advertisements are hypothesised to create positive attitudes toward the product being endorsed. This argument is supported by the results found here, with exposure to a single beer advertisement producing a positive shift in implicit beer-related attitudes from pre- to post-test. These results suggest that an advertisement can be seen as an EC trial, where alcohol products are paired with positive attributes or elements in order to create alcohol-positive associations in memory. The alcohol advertisement may then act as an EC trial, where exposure to the advertisement activates an alcohol-positive evaluative association in memory. The activation of this alcohol-positive evaluation may then have produced the change in IAT scores that were found in this research project.

Previous advertisement exposure. The results surrounding previous advertisement exposure in this research project provides further support for the

argument that exposure to advertisements may be considered as EC trials. That is, the number of times the beer advertisement had been viewed prior to the study influenced whether or not participants' implicit attitudes were shifting from pre- to post-test. More specifically it was found that implicit attitude change from pre- to post-test was greater in participants who reported having been exposed to the advertisement six or more times prior to the study than participants who had not seen the advertisement before. This finding can also be explained by the general properties of EC, with a typical finding being that the more often one is exposed to a particular CS-US association, the stronger the attitude toward the CS (Hofmann et al., 2010).

Based on the above finding, it can be argued that participants who had seen the beer advertisement more often may have held stronger associations between alcohol and positive evaluations than participants who had not seen it before. This stronger association between alcohol-positive may then have influenced scores on the IAT to produce a positive shift in implicit attitudes from pre- to post-test. This positive shift appears to occur as a result of increased previous exposure to an alcohol advertisement. Therefore, the results found here fit nicely with the assumption that each exposure to an advertisement may serve as an EC trial.

Implicit Attitude Change through Non-associative Processes

The results from the first two studies of this research project provide further evidence that associative procedures, namely EC, may be influential in producing alcohol-related implicit attitude change. Despite this increasing evidence, there has been little research examining what other processes, namely non-associative ones, may also contribute to implicit attitude change (Horcajo et al., 2010; Whitfield & Jordan, 2009). The results from this research project provide further evidence that non-associative processes may influence implicit attitudes, with participants' implicit

attitudes shifting in a negative direction from pre- to post-test when they read socially-based messages highlighting the negatives of alcohol consumption. It is worth noting that the current research found no significant differences in implicit attitude change based on the message frame (gain or loss) being used. However, message content was found to be influential on implicit attitude change and this finding will be discussed in greater detail later. As this was the one of the first studies to examine the influence of message framing on implicit attitudes, further studies need to be conducted to replicate, contradict or extend the findings shown here.

Based on the results from Studies 1-3 of this research project, it appears as though implicit alcohol-related attitudes can be manipulated through both associative and non-associative processes. The aim of Studies 4 and 5 was to then examine why implicit attitudes toward alcohol consumption appeared to be susceptible to change. It was argued that the increased susceptibility to change for alcohol-related implicit attitudes may be a result of ambivalence in attitudes toward alcohol. Therefore, the ambivalent nature of explicit (Study 4) and implicit (Study 5) attitudes toward alcohol was directly assessed.

Explicit Ambivalence

The argument that alcohol-related attitudes may be ambivalent in nature was raised for various reasons. First, it appears as though, based on their performance on the alcohol-related IATs in Studies 1-3 of this research project, participants held strong alcohol-positive *and* alcohol-negative evaluative associations in memory. Depending on the valence of the stimuli to which participants were exposed, it appears as though these associative evaluations of alcohol could be easily retrieved from memory. Furthermore, research suggests that ambivalent attitudes are more pliable than univalent attitudes, indicating that ambivalent attitudes may be more susceptible to change

(Armitage & Conner, 2000). The results from Studies 1-3 indicate that alcohol attitudes are pliable, as they were changing after minimal exposure to valenced stimuli.

Based on these findings, explicit ambivalence toward alcohol consumption and various other health behaviours was directly examined in Study 4 of this research project. Again, as alcohol-related attitudes were the main focus of this research project, only the findings related to alcohol consumption will be discussed here. It was found that attitudes toward alcohol consumption may be explicitly ambivalent, with drinking behaviours producing the highest levels of potential ambivalence. This finding supports the limited research examining ambivalent explicit attitudes toward health-related behaviours by also showing that attitudes toward alcohol consumption are ambivalent in nature (Conner et al., 1998; Waterman & Conner, 1999, as cited in Conner & Sparks, 2002). Furthermore, it was found that higher scores for potential ambivalence were predictive of greater drinking behaviour. These results provide evidence to suggest that explicit alcohol-related attitudes, as measured in the current sample, are ambivalent in nature as well as highlighting ambivalence as a possible predictor for increased drinking behaviour.

Implicit Ambivalence

With evidence from the current research suggesting that explicit attitudes toward alcohol consumption were ambivalent in nature, the ambivalent nature of implicit alcohol-related attitudes was also explored. Petty and colleagues (2009; 2012) argue that implicit ambivalence occurs when individuals hold explicit and implicit attitudes that are discrepant with one another. Based on this definition, the findings from the current research project also provide preliminary evidence supporting the assumption that alcohol-related implicit attitudes are implicitly ambivalent. More particularly, participants from Study 5 were found to hold, on average, a univalent negative implicit

attitude toward alcohol consumption. Although participants had negative *implicit* attitudes, they also reported holding positive *explicit* attitudes. This finding suggests that there was an implicit-explicit discrepancy in this sample's attitudes toward alcohol consumption. Therefore, according to Petty and colleague's (2009; 2012) definition, alcohol-related implicit attitudes may be implicitly ambivalent.

Further support for the assumptions of Petty and colleagues (2009; 2012) comes from the finding that explicit and implicit ambivalence were not related to one another. That is, participants who were categorised as having implicitly ambivalent alcohol-related attitudes also reported significantly less ambivalence in their explicit alcohol-related attitudes than those participants categorised as holding implicitly univalent attitudes. This finding was discussed in greater detail earlier in *Chapter 10: Study 5*. As this is one of the first studies to provide empirical support for this assumption, it would be of interest to see whether this finding holds across different attitude objects. Therefore, further research examining the relationship between explicit and implicit ambivalence is encouraged.

The results from this research project provide evidence to suggest that both explicit and implicit alcohol-related attitudes are ambivalent in nature. The earlier findings of this research project suggested that alcohol-related implicit attitudes were susceptible to change as a result of associative and non-associative processes. A possible explanation for these findings was that attitudes toward alcohol may be ambivalent in nature. Support for this assumption was then found in the final two studies of this research project. Therefore, the ambivalent nature of alcohol-related attitudes may be provided as a possible explanation for the findings of Studies 1-3 of this research project.

Alcohol-related Consequences

The current study also attempted to understand why attitudes toward alcohol consumption may be ambivalent by examining the experience of various positive and negative consequences of consuming alcohol. Consequences were examined because authors have suggested that ambivalent attitudes are more likely to be held toward certain target objects/behaviours which can produce different emotional outcomes when focusing on the immediate compared to the distant future (Ortony et al., 1988; Deutsch & Strack, 2006). These differing outcomes can certainly be applied to alcohol consumption, with research suggesting that the most commonly reported consequences of drinking behaviour are immediate fun/social positive (e.g. social enhancement, relaxation) and delayed negative health/behavioural (e.g. nausea, hangovers) consequences (Park, 2004; Lee et al., 2011).

Based on the apparent experience of both positive and negative consequences of alcohol consumption, it was argued here that increased experience with alcohol-related consequences may be related to greater levels of ambivalence in alcohol-related attitudes. This may be particularly relevant for implicit attitudes, as experience with the target object (alcohol) is said to contribute to the development of implicit attitudes toward that object (Greenwald & Banaji, 1995). However, experience with alcohol-related consequences was not found to be significantly related to explicitly ambivalent alcohol-related attitudes. Furthermore, little support was found for the argument that participants who reported experiencing alcohol-related consequences more frequently would also report implicitly ambivalent alcohol-related attitudes. Therefore, it appears as though the experience of alcohol-related consequences may not be as important to the development of ambivalent alcohol-related attitudes as was initially predicted, at least not in the current sample. Due to the null findings of the current research, future

research should attempt to examine the underlying causes of ambivalent attitudes toward alcohol consumption.

Attitudinal Ambivalence and Implicit Attitude Change

Based on the results of this research project, it is argued that valenced stimuli may be particularly effective in manipulating an individual's attitudes when those attitudes are ambivalent. That is, when attitudes toward a target object are ambivalent, as the results from the current research project indicate attitudes toward alcohol are, exposure to positively or negatively valenced stimuli such as alcohol advertisements (Studies 1 & 2) or anti-drinking messages (Study 3) may be effective in producing attitude change. As suggested in research focused on ambivalent attitudes, holding such attitudes may lead to a feeling of psychological discomfort that may motivate individuals to change their attitude in a positive or negative direction (van Delft, 2004). In order to change their attitudes and thus alleviate psychological discomfort, it is argued that individuals may view valenced stimuli as being consistent with their dominant evaluation of the target object (Conner & Armitage, 2008). By viewing an alcohol advertisement (Studies 1 & 2) or a negatively framed message (Study 3) as participants did in the current research, the associations in memory held for alcohol-positive or alcohol-negative may be activated and perceived as the dominant evaluation, thus reducing psychological discomfort as a result of holding ambivalent attitudes. Subsequently, the activation of such associations in memory may have produced a change in performance on an IAT as was found in this research.

Unfortunately, attitudinal ambivalence was not assessed in Studies 1-3 of this research project, so the link between ambivalence in alcohol-related attitudes and effectiveness of message exposure in producing attitude change could not be observed. Furthermore, psychological discomfort relating to ambivalence in alcohol-related

attitudes was not measured. Future research should assess attitudinal ambivalence and psychological discomfort before exposing participants to valenced stimuli. This would help to determine whether individuals with highly ambivalent attitudes are more susceptible to attitude change as a result of exposure to valenced stimuli.

Practical Implications of Results

  Socially targeted messages. The results of this research project found that socially-focused messages were significantly more effective in activating negative implicit attitudes than health-focused messages. This result highlights the importance of targeting the social aspects relating to alcohol-related attitudes, in particular implicit attitudes. The appeal to the social nature of alcohol consumption may be particularly important for young adults, who were the sample targeted in this study. Targeting the alcohol-related attitudes of this particular sample may be beneficial, as Australian young adults (19-24 year olds) typically consume alcohol at riskier levels than other age groups, often making them the population most prone to alcohol-related harms (Roche & Watt, 1999; AIHW, 2014).

  For young adults, negative health-related outcomes may not be important as they are either too far in to the future or individuals are of the belief that these negative health outcomes will not occur to them (Read, Wood, Kahler, Maddock, & Palfai, 2003). The results from the current research project support this argument by showing that health-focused messages had no significant influence on implicit alcohol-related attitudes. The lack of influence for health-focused messages is particularly concerning considering the large focus on health-related negative consequences of alcohol use that are shown in the majority of anti-drinking Public Service Announcements (PSA). As mentioned earlier, alcohol-related PSAs are generally ineffective in producing attitude and behaviour change, and some may even produce a positive shift in attitudes toward

alcohol (Goodall, 2009). Therefore, it is argued that the focus of these PSAs may need to shift from health-related consequences to social-related consequences in order for these messages to be effective in producing attitude change, at least on an implicit level.

As mentioned previously, some of the most common reasons for consuming alcohol among young adults were socially-based, so it is clear that social aspects of consuming alcohol are important to this particular sample (Kuntsche et al., 2005). Furthermore, recently published results from the Global Drug Survey (2015) indicate that participants most commonly cited the experience of social embarrassment or humiliation as the factors which would contribute most to a reduction of their drinking. These are socially-based drinking outcomes, which further highlights the effect that targeting the social aspects of drinking behaviour in anti-drinking messages may have on this behaviour. By targeting the social aspects of alcohol consumption, anti-drinking messages may be more effective in making attitudes toward alcohol more negative, perhaps leading to safer drinking behaviour. Such messages could perhaps focus on the damaging of important relationships with friends, partners or families as a result of drunken behaviour, or the social shame one can experience as a result of behaviour while intoxicated. Therefore, if it is deemed 'uncool' as opposed to 'unhealthy' to consume alcohol, than perhaps PSAs may be more effective in reducing attitudes toward alcohol consumption and subsequent drinking behavior in young adults.

Advertising restrictions. When considering possible methods for reducing the harmful risk of alcohol consumption, a commonly endorsed legislative action is the further restriction of alcohol advertising in the mainstream media (AIHW, 2014; FARE, 2012). The findings from the current research project may provide support for this legislation. More specifically, the results from this project found that previous advertisement exposure was a) an indicator of whether or not positive implicit attitudes

were activated in post-test (Study 1 & 2) and b) a moderator of the relationship between implicit attitude change and actual alcohol consumption behaviour in a laboratory (Study 2). If alcohol advertising is further restricted on television then individuals will see alcohol advertisements less often. Based on the results of the current research, it is argued that this reduced exposure may limit the effectiveness of alcohol advertising to influence implicit attitudes and subsequent behaviour. Therefore, the results found in the current research project may support a further restriction of alcohol advertising as an effective tool for reducing positive alcohol-related attitudes and possible drinking behaviour.

Motivational interviewing. The findings of this research project suggest that alcohol-related attitudes are ambivalent. This finding may provide an explanation for the effectiveness of motivational interviewing techniques for alcohol-related behaviours (Miller & Rollnick, 1991). According to Miller and Rollnick (1991), motivational interviewing is a client-centred counselling approach for producing changes in behaviour based on helping clients explore and resolve ambivalence. In order to highlight ambivalence, participants are generally told to brainstorm, reflect upon, and discuss the positives and negatives associated with their relevant behaviour (see Rubak, Sanbæk, Lauritzen, & Christensen, 2005 for a review). Research using motivational interviewing has been found to be a useful way of helping clients understand their ambivalence toward alcohol consumption, which has led to a reduction in drinking behaviour in both clinical and college samples (Borsari & Carey, 2000; Michael, Curtin, Kirkley, Jones, & Harris Jr., 2006; Vasilaki, Hosier, & Cox, 2006).

Motivational interviewing may be a successful method for brief interventions targeting the reduction of drinking behaviour in young adults because, as shown in this study, drinkers may already be ambivalent toward this behaviour but are perhaps

unaware of it. This argument is supported by results from de Visser and Smith (2007) who found that young drinkers were not aware they held contrasting positive and negative attitudes about alcohol consumption until they were asked to explicitly report their alcohol-related attitudes. With potential ambivalence assumed to be a measure of ambivalence which individuals may not be aware of (Jonas et al., 2000), these mixed cognitions may not contribute to reduced drinking behaviour because people are not aware they hold them. In fact, it was found here that higher levels of potential ambivalence were related to greater self-reported drinking behaviour. By making it clear that individuals do hold ambivalent attitudes toward alcohol consumption, individuals may understand that they are already aware of some clear reasons against their drinking behaviour. By highlighting these negatives, motivational interviewing may lead to the resolution of ambivalence and the subsequent reduction of drinking behaviour.

Limitations

It is worth noting the various limitations of the current research project. First, the use of a bipolar IAT design (Greenwald et al., 1998) in Studies 1-3 limited the level of understanding of the implicit attitude change that was found in these studies. As a result of using a bipolar IAT design, it cannot be ruled out that implicit attitudes toward soft drink were getting more negative/positive as opposed to implicit attitudes toward alcohol consumption getting more positive/negative. Future research may consider using a single target Implicit Association Test (Wigboldus et al., 2006), as used in Study 5, to provide a better understanding of how implicit attitudes are actually changing after exposure to valenced stimuli.

By focusing directly on the influence of advertisement exposure on implicit attitudes in this research project, important information regarding whether explicit

attitudes are manipulated by advertising was not addressed. Explicit attitudes may have been important to examine in this study because these attitudes have been found to be important predictors of drinking behaviour (Houben & Wiers, 2006, 2008a). Therefore, if explicit attitudes can be manipulated through advertisement exposure, drinking behaviour may also be influenced. However, due to the pre- and post-test nature of Studies 1 and 2, it was argued that explicit attitude assessments may have been influenced by practice effects. That is, participants may have simply remembered their responses from the pre-test and reported them again in the post-test. Furthermore, if participants had become aware of the hypotheses for Studies 1 and 2, they could have altered their post-test explicit attitude response to reflect this. By using implicit attitude measures in this research project, the influence of practice effects and demand characteristics is reduced, as authors suggests that implicit attitude assessments are less susceptible to these confounding variables than are explicit attitude measurements (de Houwer, 2006; Gawronski, 2009).

Another limitation of the current study was the sample used, with the majority of participants in this research project being young adults. This means that generalising the results of the current research to other populations of interest may be limited. For example, it has been noted that socially-based messages were influential on the alcohol-related implicit attitudes of participants in this research project, the majority of who were young adults. However, these social-based anti-drinking messages may not be as important to older individuals who may place a larger emphasis on how drinking influences their health and not their social standing. Despite this delimitation, it is worth noting that research has identified that young adults may consume alcohol at high rates, often placing themselves at an increased risk of alcohol-related harms (Kypri et al., 2005; Hallet et al., 2012; AIHW, 2014; FARE, 2012). Therefore, research

examining the alcohol-related attitudes of this particular population may provide important information regarding why these individuals consume alcohol. This information can then be used to help develop anti-drinking messages in an attempt to reduce the high levels of alcohol consumption in young adults.

Future Research

The results of this research project suggest that previous advertisement exposure was an important factor for beer-related implicit attitude change and drinking behaviour. Therefore, it would be worth future research examining if exposure to the same advertisement multiple times over a single viewing session can produce greater implicit attitude change than that found here. This may be of particular interest due to the current loophole in advertising on Australian television, which allows alcohol advertisements to be shown at any time during live sporting events (Fielder, Donovan, & Ouschan, 2009). With televised events like live cricket matches, an advertisement break is usually taken after the end of each over. As alcohol companies are among some of the major sponsors of sporting teams and events in Australia, these advertisement breaks provide the perfect opportunity for alcohol companies to advertise their products. This may mean that a large-scale television audience could be exposed to dozens of alcohol advertisements in a single viewing session. Therefore, it would be interesting for future research to examine what effect these multiple exposures to alcohol advertisements in a short time period may have on implicit attitudes toward alcohol.

Future research may also aim to explore the influence of social media advertising on implicit attitudes. The current trend in advertising is a push for more digital marketing on popular social media outlets such as Facebook and Twitter (Nicholls, 2012). With this rise in social media advertising, it may be particularly

useful to examine the effects of alcohol-related social media advertising on implicit alcohol-related attitudes. This is because social media advertising is non-invasive and subtle, meaning that individuals viewing their Facebook page or Twitter feed may not even be explicitly aware that they are being exposed to alcohol-related advertisements. Based on the results of this research project, previous advertisement exposure was found to have an influence on implicit attitude change. Therefore, if individuals are exposed to these alcohol-related advertisements on social media more often, then this may be having an influence on their alcohol-related implicit attitudes. Future research should therefore examine the influence of alcohol-related social media advertising on implicit attitudes.

Finally, it is also worth noting that the results from this research produce some interesting questions surrounding the measurement of attitudes toward health behaviours. The majority of research examining attitudes toward health behaviours, and attitudes in general, typically measure positive and negative evaluations toward target objects/behaviours as a continuum on the same question (Conner & Sparks, 2002). Based on the results found in this research project it is argued that attitudes toward alcohol consumption may be ambivalent in nature. This may mean that a single scale using positive and negative evaluations as anchors may be missing important information regarding the nature of attitudes toward alcohol consumption. Due to the apparent ambivalent nature of alcohol-related attitudes, it is perhaps time to start taking into consideration this ambivalence when assessing attitudes toward drinking. This may help to gain a greater understanding of the underlying nature of attitudes toward alcohol consumption.

Conclusions

The current research project examined the nature of alcohol-related attitudes, with a particular focus on implicit attitudes. It was found that implicit attitudes may be changed through both associative and non-associative processes. Furthermore, explicit attitudes toward alcohol were found to be ambivalent in nature. Additionally, participants were found to have a discrepancy in their explicit and implicit attitudes toward alcohol consumption, suggesting implicit ambivalence in alcohol-related attitudes as defined by Petty and colleagues (2009, 2012). The results found here provide a greater understanding of the processes which may be used to produce implicit attitude change, as well as highlighting the ambivalent nature of both implicit and explicit alcohol-related attitudes. It is hoped that with these findings, a greater understanding of the structure of alcohol-related implicit attitudes has been achieved.

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Appendices

Appendix A

Table A1

Original and D-score Implicit Association Test scoring algorithms compared

Step	Original scoring method	D-score method
1	Use data from B4 & B7	Use data from B3, B4, B6, & B7
2	Nonsystematic elimination of subjects for excessively slow responding and/or high error rates	Eliminate trials with latencies 10,000 ms; eliminate subjects for whom more than 10% of trials have latency less than 300 ms
3	Drop first two trials of each block	Use all trials
4	Recode latencies outside 300/3,000 boundaries to the nearer boundary value	No extreme-value treatment (beyond Step 2)
5		Compute mean of correct latencies for each block
6		Compute one pooled SD for all trials in B3 & B6; another for B4 & B7
7		Replace each error latency with block mean (computed in Step 5) + 600 ms
8	Log-transform the resulting values	No transformation
9	Average the resulting values for each of the two blocks	Average the resulting values for each of the four blocks
10	Compute the difference: B7 - B4	Compute two differences: B6 - B3 and B7 - B4
11		Divide each difference by its associated pooled trials SD from Step 6
12		Average the two quotients from Step 11

Table adapted from Table 4 of Greenwald, Nosek, and Banaji (2003).

Appendix B1: Study 1 Measure

Gender (please circle):   Male   Female

Age: _____

Please indicate your preference for the alcoholic beverages listed below by placing numbers **(1= most preferred to 4= least preferred)** in the boxes beside the type of alcohol:

Beer (of any strength)

Spirit nip/shot with or without mixer

Wine

Premix Spirits (e.g. vodka cruiser)

Please indicate your preference for the following foods listed below by placing numbers **(1= most preferred to 5= least preferred)** in the boxes beside the type of food:

Piece of fruit

A chocolate bar

A small tub of yoghurt

A bowl of ice-cream

A block of chocolate

Please indicate in the space provided below **what type** and **how much** alcohol you would consume in a typical drinking session on a **weekday (Monday to Thursday).** For example, if you drink 3 glasses of red wine, please write this as it is shown below. If you typically do not drink on a weekday, leave the space blank.

Type of alcohol	Number of drinks
Glasses of red wine	**3**

Please indicate on the line below **your best estimate of how many weekdays (Monday to Thursday) you have consumed alcohol in the past month**.

_____

Please indicate in the space provided below **what type** and **how much** alcohol you would consume in a typical drinking session on a **weekend (Friday to Sunday).** For example, if you drink 4 cans of mid-strength beer and 2 nips of spirits, please write this as it is shown below. If you typically do not drink on a weekend, leave the space blank.

Type of alcohol	Number of drinks
Can of mid-strength beer	**4**

Please indicate on the line below **your best estimate of how many weekend days (Friday to Sunday) you have consumed alcohol in the past month**.

_____

The following questions concern your attitudes toward alcohol. Please circle the number that is most correct for you.

1) After drinking alcohol, I feel:

Active

```
|—————|—————|—————|—————|—————|—————|
1       2     3     4     5     6     7
Not at all                      Extremely
```

Funny

```
|—————|—————|—————|—————|—————|—————|
1       2     3     4     5     6     7
Not at all                      Extremely
```

Miserable

```
|—————|—————|—————|—————|—————|—————|
1       2     3     4     5     6     7
Not at all                      Extremely
```

Uncomfortable

```
|—————|—————|—————|—————|—————|—————|
1       2     3     4     5     6     7
Not at all                      Extremely
```

Energetic

```
|—————|—————|—————|—————|—————|—————|
1       2     3     4     5     6     7
Not at all                      Extremely
```

Awful

1	2	3	4	5	6	7

Not at all   Extremely

Sociable

1	2	3	4	5	6	7

Not at all   Extremely

Nauseous

1	2	3	4	5	6	7

Not at all   Extremely

Sad

1	2	3	4	5	6	7

Not at all   Extremely

Cheerful

1	2	3	4	5	6	7

Not at all   Extremely

Excited

1	2	3	4	5	6	7

Not at all   Extremely

Unpleasant

| | | | | | | |
|1|2|3|4|5|6|7|

Not at all   Extremely

2) I consider consuming alcohol to be:

| | | | | | | |
|1|2|3|4|5|6|7|

Unpleasant   Pleasant

| | | | | | | |
|1|2|3|4|5|6|7|

Boring   Fun

| | | | | | | |
|1|2|3|4|5|6|7|

Bad   Good

| | | | | | | |
|1|2|3|4|5|6|7|

Wise   Foolish

3) Do you intend to drink alcohol in the next month?

Definitely not   Probably not   Probably yes   Definitely yes

4) In my circle of friends, it is expected that I consume alcohol during an evening of socialising.

Strongly	Disagree	Neutral	Agree	Strongly
Disagree				Agree

5) How likely is it that you will drink alcohol in the next month?

Very Unlikely	Unlikely	Likely	Very Likely

6) When my friends are drinking, I feel like I should drink too.

Strongly	Disagree	Neutral	Agree	Strongly
Disagree				Agree

The following questions relate to the advertisement you were just shown. Please circle the response that is most correct for you.

1) Have you seen that advertisement before?   Yes   No

2) Did you know what was being advertised before the end of the ad?   Yes   No

3) If you have seen the ad before, approximately how many times would you say you have seen it? **(Please circle)**

  1-5 times   6-10 times   11-15 times

4) I found that advertisement:

Enjoyable

1	2	3	4	5	6	7

Not at all   Extremely

Appealing

1	2	3	4	5	6	7

Not at all   Extremely

Funny

1	2	3	4	5	6	7

Not at all   Extremely

Likeable

1	2	3	4	5	6	7

Not at all   Extremely

Please place a tick in the boxes provided below to indicate which of the following advertising mediums you are exposed to on a regular basis.

☐	Television
☐	Radio
☐	Internet
☐	Magazines
☐	Billboards
☐	Other (Please specify) _____

Appendix B2: Advertisements

Beer advertisement

Chocolate advertisement

Appendix C: Study 1 Information Sheet and Consent Form

JAMES COOK UNIVERSITY
AUSTRALIA

INFORMATION SHEET

The Impact of Subtlety and Humour on liking of Advertisements

You are invited to take part in a research project which investigates the impact of subtlety and humour on liking of advertisements. The study forms part of Daniel Lindsay's PhD project under the supervision of Dr Anne Swinbourne.

If you agree to be involved in the study, you be invited to take part in a computer-based task which will ask you to classify words into different categories, as well as a short questionnaire which will assess your attitudes toward a particular advertisement. You will also be asked to answer some questions about the types of health related behaviours you do as part of your daily life. You will then be asked to watch some advertisements, and then asked to complete the same computer-based task and another questionnaire about the advertisement. The whole study should only take approximately 30 minutes of your time. The study will be conducted at the School of Psychology at James Cook University.

Taking part in this study is completely voluntary and you can stop taking part in the study at any time without explanation or prejudice. You may also withdraw any unprocessed data from the study.

If you know of others that might be interested in this study, can you please pass on this information sheet to them so they may contact me to volunteer for the study.

Your name will never be connected with any responses you make and all of your responses will be strictly confidential. The data from the study will be used in Daniel's PhD thesis and may be used in research publications. However, you will not be identified in any way in these publications.

If you have any questions about the study, please contact Daniel Lindsay or Anne Swinbourne on the numbers or email shown below.

Principal Investigator:
Daniel Lindsay, BPsyc (Hons.)
School of Psychology
James Cook University
4781 5071
Daniel.Lindsay@my.jcu.edu.au

Supervisor Details:
Dr Anne Swinbourne
School of Psychology
James Cook University
4781 6039
Anne.Swinbourne@jcu.edu.au

JAMES COOK UNIVERSITY
AUSTRALIA

INFORMED CONSENT FORM

PRINCIPAL INVESTIGATOR	**Daniel Lindsay**
PROJECT TITLE:	**The Impact of Subtlety and Humour on liking of Advertisements**
SCHOOL	**Psychology**

I understand the aim of this research study is to investigate the impact of subtlety and humour on liking for advertisements. I consent to participate in this project, the details of which have been explained to me, and I have been provided with a written information sheet to keep.

I understand that my participation will involve a viewing an electronic advertisement, a computer-based task and a short questionnaire and I agree that the researcher may use the results as described in the information sheet.

I acknowledge that:

- taking part in this study is voluntary and I am aware that I can stop taking part in it at any time without explanation or prejudice and to withdraw any unprocessed data I have provided;

- that any information I give will be kept strictly confidential and that no names will be used to identify me with this study without my approval;

(Please tick to indicate consent)

I consent to viewing an electronic advertisement	☐	Yes	☐	No
I consent to participate in the computer-based task	☐	Yes	☐	No
I consent to completing a questionnaire	☐	Yes	☐	No

Name: *(printed)*	
Signature:	**Date:**

Appendix D: Study 2 Measure

Gender (please circle):   Male   Female

 Age: _____

Please indicate your preference for the alcoholic beverages listed below by placing numbers **(1= most preferred to 4= least preferred)** in the boxes beside the type of alcohol:

Beer (of any strength)

Spirit nip/shot with or without mixer

Wine

Premix Spirits (e.g. vodka cruiser)

Please indicate your preference for the following foods listed below by placing numbers **(1= most preferred to 5= least preferred)** in the boxes beside the type of food:

Piece of fruit

A chocolate bar

A small tub of yoghurt

A bowl of ice-cream

A block of chocolate

Please indicate in the space provided below **what type** and **how much** alcohol you would consume in a typical drinking session on a **weekday (Monday to Thursday).** For example, if you drink 3 glasses of red wine, please write this as it is shown below. If you typically do not drink on a weekday, leave the space blank.

Type of alcohol	Number of drinks
Glasses of red wine	**3**

Please indicate on the line below **your best estimate of how many weekdays (Monday to Thursday) you have consumed alcohol in the past month**.

_____

Please indicate in the space provided below **what type** and **how much** alcohol you would consume in a typical drinking session on a **weekend (Friday to Sunday).** For example, if you drink 4 cans of mid-strength beer and 2 nips of spirits, please write this as it is shown below. If you typically do not drink on a weekend, leave the space blank.

Type of alcohol	Number of drinks
Can of mid-strength beer	**4**

Please indicate on the line below **your best estimate of how many weekend days (Friday to Sunday) you have consumed alcohol in the past month**.

_____

The following questions relate to the advertisement you were just shown. Please circle the response that is most correct for you.

1) Have you seen that advertisement before?   Yes   No

2) Did you know what was being advertised before the end of the ad?   Yes   No

3) If you have seen the ad before, approximately how many times would you say you have seen it? **(Please circle)**
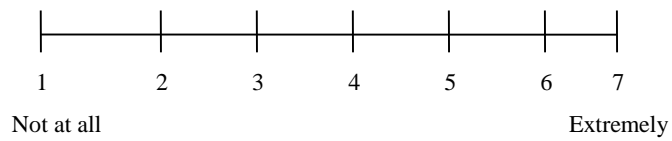
  1-5 times   6-10 times   11-15 times

4) I found that advertisement:

Enjoyable

```
    |----|----|----|----|----|----|
    1    2    3    4    5    6    7
  Not at all                    Extremely
```

Appealing

```
    |----|----|----|----|----|----|
    1    2    3    4    5    6    7
  Not at all                    Extremely
```

Funny

```
    |----|----|----|----|----|----|
    1    2    3    4    5    6    7
  Not at all                    Extremely
```

Likeable

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all   Extremely

Please place a tick in the boxes provided below to indicate which of the following advertising mediums you are exposed to on a regular basis.

☐ Television

☐ Radio

☐ Internet

☐ Magazines

☐ Billboards

☐ Other (Please specify) _____

Taste Test - Beer

On the lines below please indicate a response that best describes the **beer** product you just consumed.

That beer product was:

Bitter

1	2	3	4	5	6	7
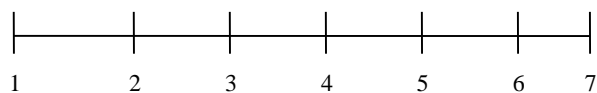
Not at all   Extremely

Fizzy

1	2	3	4	5	6	7
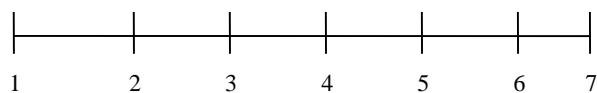
Not at all   Extremely

Sweet
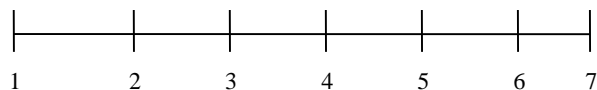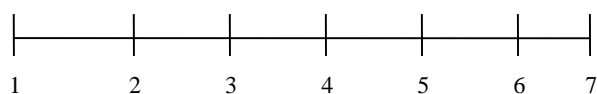
1	2	3	4	5	6	7

Not at all   Extremely

Strong-tasting

1	2	3	4	5	6	7

Not at all   Extremely

Light

1	2	3	4	5	6	7

Not at all   Extremely

Overall, how much did you like the taste of that product?

```
|----|----|----|----|----|----|
1    2    3    4    5    6    7
```

Not at all   Extremely
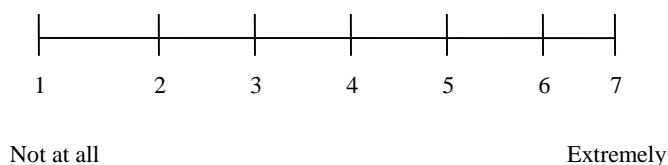
Taste Test – Chocolate

On the lines below please indicate a response that best describes the **chocolate** product you just consumed.

That chocolate product was:

Sweet
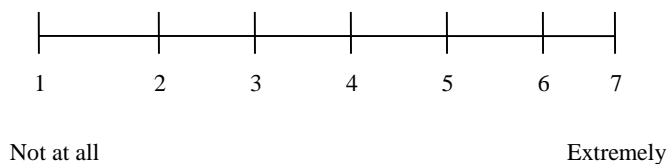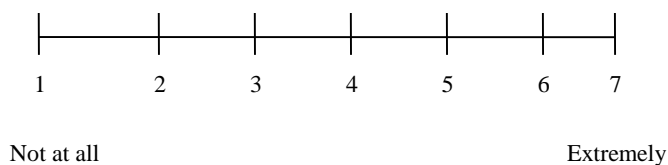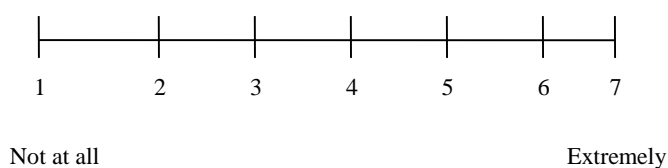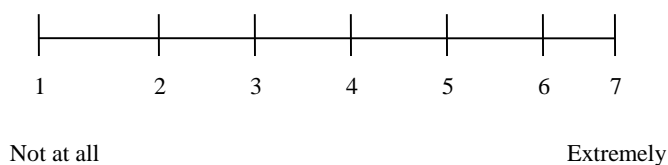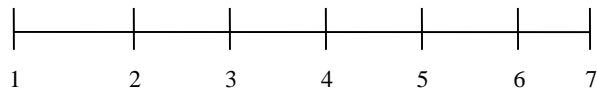
```
|----|----|----|----|----|----|
1    2    3    4    5    6    7
```

Not at all   Extremely

Strong-tasting

```
|----|----|----|----|----|----|
1    2    3    4    5    6    7
```

Not at all   Extremely

Smooth

```
|----|----|----|----|----|----|
1    2    3    4    5    6    7
```

Not at all   Extremely

Rich

```
|----|----|----|----|----|----|
1    2    3    4    5    6    7
```

Not at all   Extremely

Creamy

1	2	3	4	5	6	7

Not at all   Extremely

Overall, how much did you like the taste of that product?

1	2	3	4	5	6	7
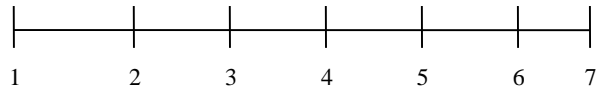
Not at all   Extremely

At this current moment, how hungry do you feel?

1	2	3	4	5	6	7
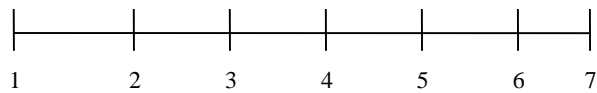
Not at all   Extremely

At this current moment, how thirsty do you feel?

1	2	3	4	5	6	7
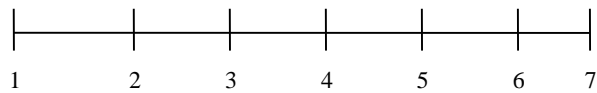
Not at all   Extremely

Appendix E: Study 2 Information Sheet and Informed Consent Form

JAMES COOK UNIVERSITY
AUSTRALIA

INFORMATION SHEET

(TSV) Investigating the relationship between reaction time and taste preferences

You are invited to take part in a research project investigating the relationship between reaction time and taste preferences. The study forms part of Daniel Lindsay's PhD project under the supervision of Dr Anne Swinbourne.

If you agree to be involved in the study, you be invited to take part in a couple of computer-based reaction time tasks assessing your attitudes toward products and perception of taste. You will also be asked to complete a short questionnaire which will assess your attitudes toward advertising of products and about the types of health related behaviours you do as part of your daily life. You will then be asked to consume a small amount of alcohol (approximately 200mLs) and/or some chocolate. The whole study should only take approximately 30 minutes of your time and is worth 4 credit points. The study will be conducted at the School of Psychology at James Cook University.

Taking part in this study is completely voluntary and you can stop taking part in the study at any time without explanation or prejudice. You may also withdraw any unprocessed data from the study.

If you know of others that might be interested in this study, can you please pass on this information sheet to them so they may contact me to volunteer for the study.

Your name will never be connected with any responses you make and all of your responses will be strictly confidential. The data from the study will be used in Daniel's PhD thesis and may be used in research publications. However, you will not be identified in any way in these publications.

If you have any questions about the study, please contact Daniel Lindsay or Anne Swinbourne on the numbers or email shown below.

Principal Investigator:	**Supervisor Details:**
Daniel Lindsay, BPsyc (Hons.)	Dr Anne Swinbourne
School of Psychology	School of Psychology
James Cook University	James Cook University
4781 5071	4781 6039
Daniel.Lindsay@my.jcu.edu.au	Anne.Swinbourne@jcu.edu.au

If you have any concerns regarding the ethical conduct of the study, please contact:
Human Ethics, Research Office
James Cook University, Townsville, Qld, 4811
Phone: (07) 4781 5011 (ethics@jcu.edu.au)

James Cook University — AUSTRALIA

INFORMED CONSENT FORM

PRINCIPAL INVESTIGATOR	Daniel Lindsay
PROJECT TITLE:	Investigating the relationship between reaction time and taste preferences
SCHOOL	Psychology

I understand the aim of this research study is to investigate the relationship between reaction time and taste preferences. I consent to participate in this project, the details of which have been explained to me, and I have been provided with a written information sheet to keep.

I understand that my participation will involve viewing electronic advertisements, completing a brief questionnaire and computer-based reaction time task as well as consuming a small amount of alcohol (approximately 250ml) and/or chocolate. I agree that the researcher may use the results as described in the information sheet.

I acknowledge that:

- taking part in this study is voluntary and I am aware that I can stop taking part in it at any time without explanation or prejudice and to withdraw any unprocessed data I have provided by contacting the principal investigator and requesting to be removed from the study;

- that any information I give will be kept strictly confidential and that no names will be used to identify me with this study without my approval;

(Please tick to indicate consent)

I consent to viewing an electronic advertisement	☐ Yes	☐ No
I consent to participate in the computer-based reaction time task	☐ Yes	☐ No
I consent to completing a short questionnaire	☐ Yes	☐ No
I consent to consuming a small amount of alcohol/chocolate	☐ Yes	☐ No

Name: *(printed)*	
Signature:	Date:

Appendix F: Study 3 Message Frames

If you decide to drink or are drinking already, it is important for you to know about some of the negative consequences of alcohol use. Please read the below statements that help to highlight some of these consequences. Take care when reading these statements as you will be asked about them later in the study.

Gain-Framed Health Consequence (adapted from Gerend & Cullen, 2008)

If you are going to drink, responsible alcohol use can help you avoid various negative health consequences. Responsible drinking can increase the likelihood of driving safely and avoiding car accidents where you can be seriously injured or killed. Drinking responsibly can also help to keep your blood pressure and weight at healthy levels, reducing your chances of developing a range of chronic health issues including diabetes and/or cardiovascular diseases. If you drink responsibly you are less likely to engage in risky sexual behaviour reducing your risk for catching sexually transmitted diseases. Drinking responsibly also significantly decreases your chances of avoiding liver failure or developing liver cancer.

Loss-Framed Health Consequence

If you are going to drink, irresponsible alcohol use can lead you to experience various negative health consequences. Irresponsible drinking can increase the likelihood of reckless driving and being involved in car accidents where you can be seriously injured or killed. Drinking irresponsibly can also contribute to an increase in your blood pressure and body weight, increasing your chances of developing a range of chronic health issues including diabetes and/or cardiovascular diseases. If you drink irresponsibly you are more likely to engage in risky sexual behaviour placing yourself

at a greater risk for catching sexually transmitted diseases. Drinking irresponsibly also significantly increases your chances of having liver failure or developing liver cancer.

Gain-Framed Social Consequence

If you are going to drink, responsible alcohol use can help you to avoid various negative social consequences. Responsible drinking will decrease the likelihood of becoming aggressive and being involved in violent acts, possibly damaging or ending your relationship with family members, friends or romantic partners. Responsible drinking can also reduce the likelihood that you miss important social events or work the next day as a result of a hangover. As well as this, drinking responsibly places you at a reduced risk of committing alcohol-fueled crimes that can impact negatively on your position in society and sever important social relationships.

Loss-Framed Social Consequence

If you are going to drink, irresponsible alcohol use can lead you to experience various negative social consequences. Irresponsible drinking will increase the likelihood of becoming aggressive and being involved in violent acts, possibly damaging or ending your relationship with family members, friends or romantic partners. Irresponsible drinking can also increase the likelihood that you miss important social events or work the next day as a result of a hangover. As well as this, drinking irresponsibly places you at an increased risk of committing alcohol-fueled crimes that can impact negatively upon your position in society and sever important social relationships.

Appendix G: Study 3 Information Sheet

JAMES COOK
UNIVERSITY
AUSTRALIA

INFORMATION SHEET

(CNS, TSV, SNG) The Influence of Message Framing on Attitudes toward Health-Risk Behaviour

You are invited to take part in a research project about examining the influence of message framing on attitudes toward health risk behaviour. The study is being run by Mr Daniel Lindsay and forms part of his PhD project under the supervision of Dr Anne Swinbourne at James Cook University.

If you agree to be involved in the study, you will be invited to complete an online study. The online study will assess your attitudes toward alcohol consumption, as well as getting you to read a short health message containing consequences of performing health risk behaviours. This online study should only take 20 minutes of your time.

This survey is anonymous. Taking part in this study is completely voluntary and you can stop taking part in the study at any time without explanation or prejudice by simply closing your internet browser.

If you know of others that might be interested in this study, can you please pass on this information sheet to them so they may contact me to volunteer for the study.

The data from the study will be used in Daniel's PhD thesis and may be used in research publications. However, you will not be identified in any way in these publications.

If you have any questions about the study, please contact Mr Daniel Lindsay or Dr Anne Swinbourne using the details below:

Principal Investigator:	**Supervisor Details:**
Daniel Lindsay, BPsyc (Hons.)	Dr Anne Swinbourne
School of Psychology	School of Psychology
James Cook University	James Cook University
4781 5071	4781 6039
Daniel.Lindsay@my.jcu.edu.au	Anne.Swinbourne@jcu.edu.au

If you have any concerns regarding the ethical conduct of the study, please contact:
Human Ethics, Research Office
James Cook University, Townsville, Qld, 4811
Phone: (07) 4781 5011 (ethics@jcu.edu.au)

Appendix H: Study 4 Measure

Gender (please circle):   Male   Female

Age: _____

Are you a University student?   Yes   No

The following statements assess your attitudes toward different health behaviours. You will read a statement about a particular health behaviour before being asked to indicate a response which best matches your attitude.

Pay attention to the words used at the ends of the scales as they will change throughout. To indicate your response, type the number that corresponds to your rating using the appropriate number key. You may change your answer by pressing a different number. Press the ENTER key to record your responses and continue to the next page.

With respect to consuming **alcohol on a WEEKDAY** in the next 2 weeks I…

```
|---+---+---+---+---+---+---+---+---+---|
 1   2   3   4   5   6   7|  8   9   10
Feel no                        Feel maximum
conflict                          conflict
```

```
|---+---+---+---+---+---+---+---+---+---|
 1   2   3   4   5   6   7|  8   9   10
Have one-sided                 Have mixed
reactions                       reactions
```

|---|---|---|---|---|---|---|---|---|---|
1   2   3   4   5   6   7   8   9   10

Feel no   Feel maximum
indecision   indecision

With respect to **exercising** in the next 2 weeks I…

|---|---|---|---|---|---|---|---|---|---|
1   2   3   4   5   6   7   8   9   10

Feel no   Feel maximum
conflict   conflict

|---|---|---|---|---|---|---|---|---|---|
1   2   3   4   5   6   7   8   9   10

Have one-sided   Have mixed
reactions   reactions

|---|---|---|---|---|---|---|---|---|---|
1   2   3   4   5   6   7   8   9   10

Feel no   Feel maximum
indecision   indecision
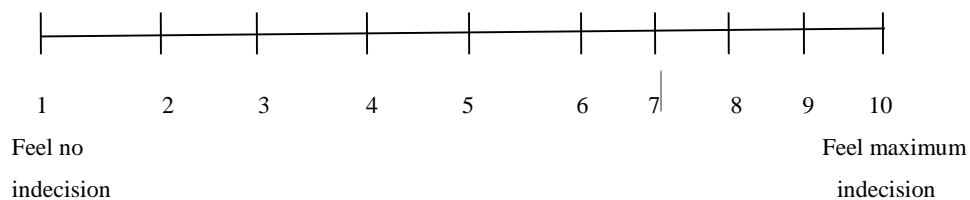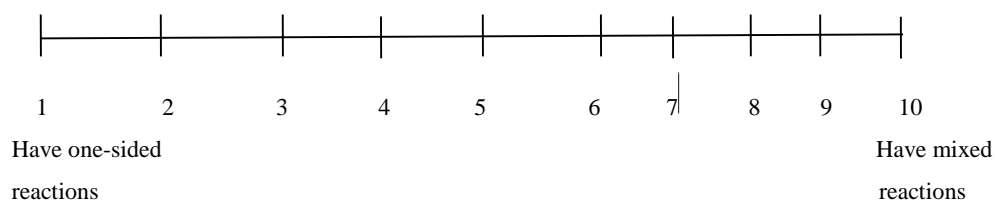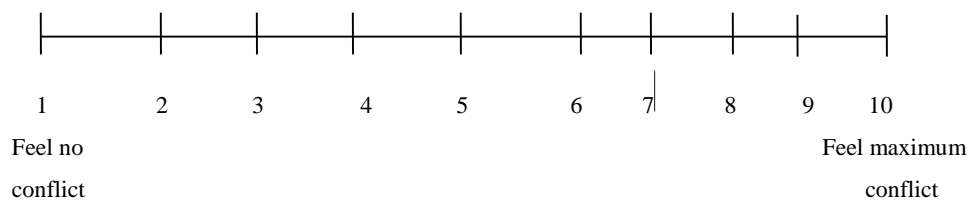
With respect to **smoking** in the next 2 weeks I…

|---|---|---|---|---|---|---|---|---|---|
1   2   3   4   5   6   7   8   9   10

Feel no   Feel maximum
conflict   conflict

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Have one-sided   Have mixed
reactions   reactions

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Feel no   Feel maximum
indecision   indecision
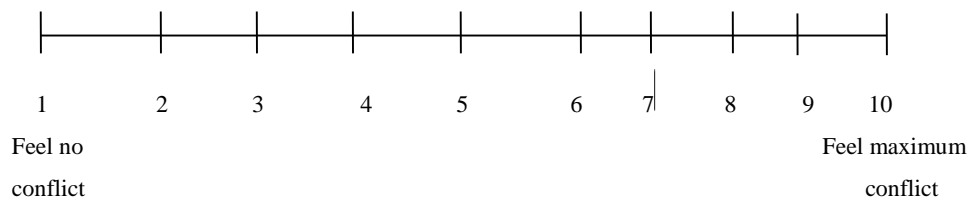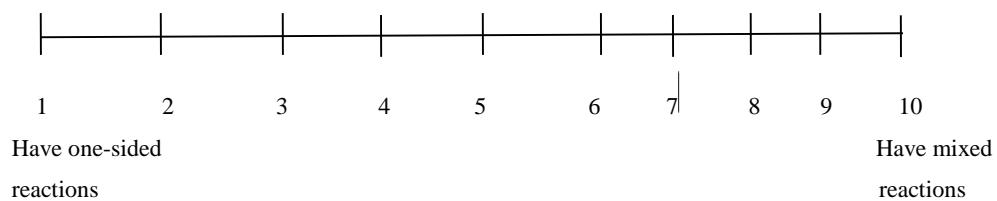
With respect to **increasing my fruit and vegetable intake** in the next 2 weeks I…

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Feel no   Feel maximum
conflict   conflict

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Have one-sided   Have mixed
reactions   reactions

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Feel no   Feel maximum
indecision   indecision

With respect to **consuming alcohol on a WEEKEND** in the next 2 weeks I…

```
├──────┼──────┼──────┼──────┼──────┼──────┼──────┼──────┼──────┤
1       2      3      4      5      6     7|      8      9      10
```

Feel no   Feel maximum

conflict   conflict

```
├──────┼──────┼──────┼──────┼──────┼──────┼──────┼──────┼──────┤
1       2      3      4      5      6     7|      8      9      10
```

Have one-sided   Have mixed

reactions   reactions

```
├──────┼──────┼──────┼──────┼──────┼──────┼──────┼──────┼──────┤
1       2      3      4      5      6     7|      8      9      10
```

Feel no   Feel maximum

indecision   indecision

Please read the following statements carefully. The following statements assess the

positive and negative aspects of your attitudes toward different health behaviours. You

will read a statement about a particular health behaviour before being asked to indicate

a response which best matches your attitude.

Pay attention to the words used at the ends of the scales as they will change throughout.

To indicate your response, type the number that corresponds to your rating using the

appropriate number key. You may change your answer by pressing a different number.

Press the ENTER key to record your responses and continue to the next page.

Considering only the NEGATIVE things about **drinking on a WEEKDAY** in the next 2 weeks and ignoring the positive things, how NEGATIVE are these things?

```
├────────┼────────┼────────┼────────┼────────┤
1        2        3        4        5        6        7
Not at all                                   Extremely
Negative                                     Negative
```

Considering only the NEGATIVE things about **exercising** in the next 2 weeks and ignoring the positive things, how NEGATIVE are these things?

```
├────────┼────────┼────────┼────────┼────────┤
1        2        3        4        5        6        7
Not at all                                   Extremely
Negative                                     Negative
```

Considering only the NEGATIVE things about **smoking** in the next 2 weeks and ignoring the positive things, how NEGATIVE are these things?

```
├────────┼────────┼────────┼────────┼────────┤
1        2        3        4        5        6        7
Not at all                                   Extremely
Negative                                     Negative
```

Considering only the NEGATIVE things about **increasing your fruit and vegetable intake** in the next 2 weeks and ignoring the positive things, how NEGATIVE are these things?

```
├────────┼────────┼────────┼────────┼────────┤
1        2        3        4        5        6        7
Not at all                                   Extremely
Negative                                     Negative
```

Considering only the NEGATIVE things about **drinking on a WEEKEND** in the next 2 weeks and ignoring the positive things, how NEGATIVE are these things?

```
├──────┼──────┼──────┼──────┼──────┼──────┤
1      2      3      4      5      6      7
Not at all                          Extremely
Negative                            Negative
```

Considering only the POSITIVE things about **drinking on a WEEKDAY** in the next 2 weeks and ignoring the negative things, how POSITIVE are these things?

```
├──────┼──────┼──────┼──────┼──────┼──────┤
1      2      3      4      5      6      7
Not at all                          Extremely
Positive                            Positive
```

Considering only the POSITIVE things about **exercising** in the next 2 weeks and ignoring the negative things, how POSITIVE are these things?

```
├──────┼──────┼──────┼──────┼──────┼──────┤
1      2      3      4      5      6      7
Not at all                          Extremely
Positive                            Positive
```

Considering only the POSITIVE things about **smoking** in the next 2 weeks and ignoring the negative things, how POSITIVE are these things?

```
├──────┼──────┼──────┼──────┼──────┼──────┤
1      2      3      4      5      6      7
Not at all                          Extremely
Positive                            Positive
```

Considering only the POSITIVE things about i**ncreasing your fruit and vegetable intake** in the next 2 weeks and ignoring the negative things, how POSITIVE are these things?

```
|-----|-----|-----|-----|-----|-----|
1     2     3     4     5     6     7
Not at all                  Extremely
Positive                    Positive
```

Considering only the POSITIVE things about **drinking on a WEEKEND** in the next 2 weeks and ignoring the negative things, how POSITIVE are these things?

```
|-----|-----|-----|-----|-----|-----|
1     2     3     4     5     6     7
Not at all                  Extremely
Positive                    Positive
```

The following questions regard your performance of certain health behaviours. Please indicate in the space provided your best estimate for each health behaviour. If you do not engage in any of the behaviours, please place a '0' in the space provided.

Approximately how many standard drinks would you consume in a typical drinking session on a WEEKDAY? (Monday-Thursday)?   _____

Approximately how many standard drinks do you consume in a typical drinking session on a WEEKEND day? (Friday-Sunday)?   _____

Approximately how many minutes do you engage in moderate exercise (e.g. fast walking, cycling) on a typical day? _____

Approximately how many cigarettes do you smoke on a typical day? _____

Approximately how many pieces of fruit do you consume on a typical day? _____

Approximately how many vegetables do you consume on a typical day? _____

Thank you for completing this survey, your participation is greatly appreciated. This study sought to investigate the nature of attitudes underlying alcohol consumption. If you have any further questions or queries about the research, please contact the Principal Investigator, Mr Daniel Lindsay, by email at Daniel.lindsay@my.jcu.edu.au. If you have any concerns regarding your current level of drinking behaviour and wish to obtain more facts and advice about alcohol consumption, please visit www.drinkwise.org.au.

If you have any concerns regarding the ethical conduct of the study, please contact:
Human Ethics, Research Office
James Cook University, Townsville, Qld, 4811
Phone: (07) 4781 5011 (ethics@jcu.edu.au)

Appendix I: Study 4 Information Sheet

JAMES COOK
UNIVERSITY
AUSTRALIA

INFORMATION SHEET

Assessing attitudes toward health behaviours

You are invited to take part in a research project that assesses attitudes toward the performance of certain health behaviours. The study is being run by Mr Daniel Lindsay and forms part of his PhD project under the supervision of Dr Anne Swinbourne at James Cook University.

If you agree to be involved in the study, you will be invited to complete an online study. The online study will assess your attitudes toward different health behaviour, as well as getting you to assess your own performance of these behaviours. This online study should only take 15 minutes of your time.

This survey is anonymous. Taking part in this study is completely voluntary and you can stop taking part in the study at any time without explanation or prejudice by simply closing your internet browser.

If you know of others that might be interested in this study, can you please pass on this information sheet to them so they may contact me to volunteer for the study.

The data from the study will be used in Daniel's PhD thesis and may be used in research publications. However, you will not be identified in any way in these publications.

If you have any questions about the study, please contact Mr Daniel Lindsay or Dr Anne Swinbourne using the details below:

Principal Investigator:
Daniel Lindsay, BPsyc (Hons.)
School of Psychology
James Cook University
4781 5071
Daniel.Lindsay@my.jcu.edu.au

Supervisor Details:
Dr Anne Swinbourne
School of Psychology
James Cook University
4781 6039
Anne.Swinbourne@jcu.edu.au

If you have any concerns regarding the ethical conduct of the study, please contact:
Human Ethics, Research Office
James Cook University, Townsville, Qld, 4811
Phone: (07) 4781 5011 (ethics@jcu.edu.au)

Appendix J: Study 5 Measure

Gender (please circle):   Male   Female

 Age: _____

Are you a University student?   Yes   No

The following questions regard your performance of certain health behaviours. Please

indicate in the space provided your best estimate for each health behaviour. If you do

not engage in any of the behaviours, please place a '0' in the space provided.

Approximately how many standard drinks would you consume in a typical drinking

session on a WEEKDAY? (Monday-Thursday)?   _____

Approximately how many standard drinks do you consume in a typical drinking session

on a WEEKEND day? (Friday-Sunday)?   _____

Please indicate in the box below your best estimate of how many WEEKDAYS

(MONDAY-THURSDAY) IN THE PAST MONTH you have consumed alcohol.

_____

Please indicate in the box below your best estimate of how many WEEKEND DAYS

(FRIDAY-SUNDAY) IN THE PAST MONTH you have consumed alcohol.

_____

Please read the following statements carefully. The following statements assess the positive and negative aspects of your attitudes toward different health behaviours. You will read a statement about a particular health behaviour before being asked to indicate a response which best matches your attitude.

Pay attention to the words used at the ends of the scales as they will change throughout. To indicate your response, type the number that corresponds to your rating using the appropriate number key. You may change your answer by pressing a different number. Press the ENTER key to record your responses and continue to the next page.

Considering only the NEGATIVE things about **drinking on a WEEKDAY** in the next 2 weeks and ignoring the positive things, how NEGATIVE are these things?

```
|----|----|----|----|----|----|
1    2    3    4    5    6    7
Not at all                  Extremely
Negative                    Negative
```

Considering only the NEGATIVE things about **drinking on a WEEKEND** in the next 2 weeks and ignoring the positive things, how NEGATIVE are these things?

```
|----|----|----|----|----|----|
1    2    3    4    5    6    7
Not at all                  Extremely
Negative                    Negative
```

Considering only the POSITIVE things about **drinking on a WEEKDAY** in the next 2 weeks and ignoring the negative things, how POSITIVE are these things?

```
├────────┼────────┼────────┼────────┼────────┼────────┤
1        2        3        4        5        6        7
Not at all                                  Extremely
Positive                                    Positive
```

Considering only the POSITIVE things about **drinking on a WEEKEND** in the next 2 weeks and ignoring the negative things, how POSITIVE are these things?

```
├────────┼────────┼────────┼────────┼────────┼────────┤
1        2        3        4        5        6        7
Not at all                                  Extremely
Positive                                    Positive
```

The following statements relate to different consequences that may occur as a result of drinking alcohol. We want to know if you think a particular consequence is negative or positive, regardless of whether you expect it to happen to you when you drink alcohol. To indicate your response, type the number that corresponds to your rating using the appropriate number key. You may change your answer by pressing a different number. Press the enter key to record your response and continue to the next page.

Having more fun

```
├──────────────┼──────────────┼──────────────┼──────────────┤
1              2              3              4              5
Very           Slightly       Neutral        Slightly       Very
Negative       Negative                      Positive       Positive
```

Feeling closer to your friends

1	2	3	4	5
Very Negative	Slightly Negative	Neutral	Slightly Positive	Very Positive

Having a good time

1	2	3	4	5
Very Negative	Slightly Negative	Neutral	Slightly Positive	Very Positive

Becoming more social

1	2	3	4	5
Very Negative	Slightly Negative	Neutral	Slightly Positive	Very Positive

Relieving boredom

1	2	3	4	5
Very Negative	Slightly Negative	Neutral	Slightly Positive	Very Positive

Relieving tension

1	2	3	4	5
Very Negative	Slightly Negative	Neutral	Slightly Positive	Very Positive

Unwinding

1	2	3	4	5
Very	Slightly	Neutral	Slightly	Very
Negative	Negative		Positive	Positive

Relaxing after a stressful situation

1	2	3	4	5
Very	Slightly	Neutral	Slightly	Very
Negative	Negative		Positive	Positive

Coping with daily life

1	2	3	4	5
Very	Slightly	Neutral	Slightly	Very
Negative	Negative		Positive	Positive

Looking interesting to other people

1	2	3	4	5
Very	Slightly	Neutral	Slightly	Very
Negative	Negative		Positive	Positive

Seeming more exciting to others

1	2	3	4	5
Very	Slightly	Neutral	Slightly	Very
Negative	Negative		Positive	Positive

Maintaining your reputation

1	2	3	4	5
Very	Slightly	Neutral	Slightly	Very
Negative	Negative		Positive	Positive

Showing people you drink

1	2	3	4	5
Very	Slightly	Neutral	Slightly	Very
Negative	Negative		Positive	Positive

Having a good sexual experience

1	2	3	4	5
Very	Slightly	Neutral	Slightly	Very
Negative	Negative		Positive	Positive

Enjoying a sexual experience more

1	2	3	4	5
Very	Slightly	Neutral	Slightly	Very
Negative	Negative		Positive	Positive

Having a hangover

1	2	3	4	5
Very	Slightly	Neutral	Slightly	Very
Negative	Negative		Positive	Positive

Passing out

1	2	3	4	5
Very	Slightly	Neutral	Slightly	Very
Negative	Negative		Positive	Positive

Ending up in bad physical shape the next day

1	2	3	4	5
Very	Slightly	Neutral	Slightly	Very
Negative	Negative		Positive	Positive

Having your co-ordination affected

1	2	3	4	5
Very	Slightly	Neutral	Slightly	Very
Negative	Negative		Positive	Positive

Doing or saying something embarrassing

1	2	3	4	5
Very	Slightly	Neutral	Slightly	Very
Negative	Negative		Positive	Positive

Losing control of yourself

1	2	3	4	5
Very	Slightly	Neutral	Slightly	Very
Negative	Negative		Positive	Positive

Getting in trouble with the police or authorities for drinking

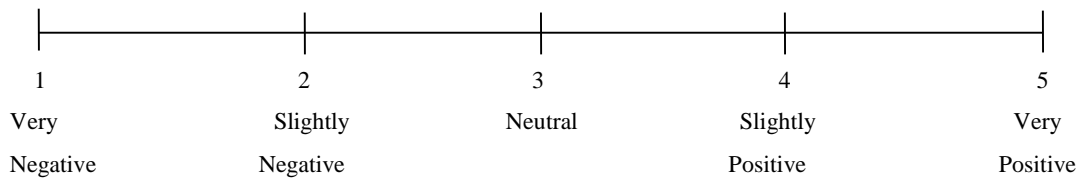|				
1	2	3	4	5
Very Negative	Slightly Negative	Neutral	Slightly Positive	Very Positive

The following statements relate to different consequences that may occur as a result of drinking alcohol. We are interested in how often each of these consequences has occurred to you, if it has at all, in your drinking experiences.

To indicate your response, type the number that corresponds to your rating using the appropriate number key. You may change your answer by pressing a different number. Press the enter key to record your response and continue to the next page.
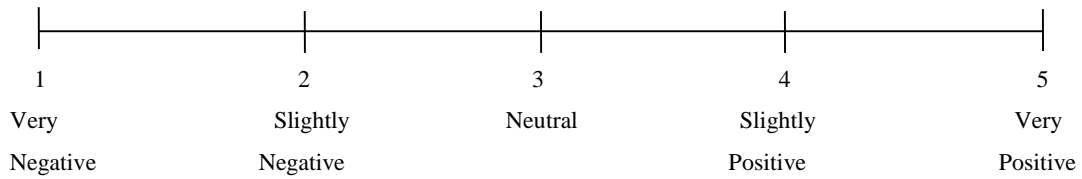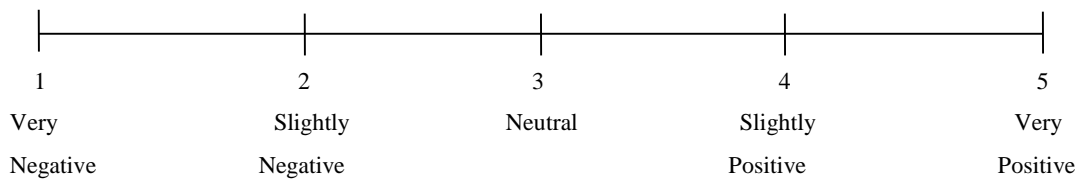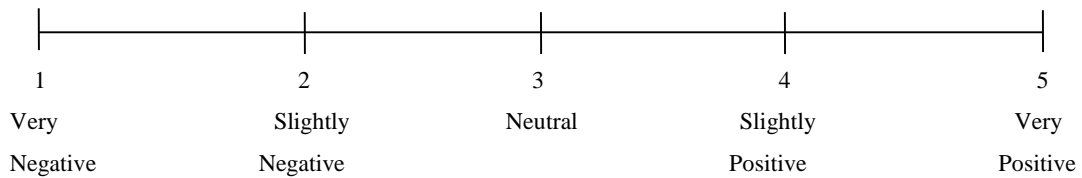
Having more fun

1	2	3	4
Never Happens	Happens a little	Happens sometimes	Happens all the time

Feeling closer to your friends

1	2	3	4
Never Happens	Happens a little	Happens sometimes	Happens all the time

Having a good time

1	2	3	4
Never Happens	Happens a little	Happens sometimes	Happens all the time

Becoming more social

```
├──────────────┼──────────────┼──────────────┤
1              2              3              4
Never          Happens        Happens        Happens all
Happens        a little       sometimes      the time
```

Relieving boredom

```
├──────────────┼──────────────┼──────────────┤
1              2              3              4
Never          Happens        Happens        Happens all
Happens        a little       sometimes      the time
```

Relieving tension

```
├──────────────┼──────────────┼──────────────┤
1              2              3              4
Never          Happens        Happens        Happens all
Happens        a little       sometimes      the time
```

Unwinding

```
├──────────────┼──────────────┼──────────────┤
1              2              3              4
Never          Happens        Happens        Happens all
Happens        a little       sometimes      the time
```

Relaxing after a stressful situation

```
├──────────────┼──────────────┼──────────────┤
1              2              3              4
Never          Happens        Happens        Happens all
Happens        a little       sometimes      the time
```

Coping with daily life

1	2	3	4
Never	Happens	Happens	Happens all
Happens	a little	sometimes	the time

Looking interesting to other people

1	2	3	4
Never	Happens	Happens	Happens all
Happens	a little	sometimes	the time

Seeming more exciting to others

1	2	3	4
Never	Happens	Happens	Happens all
Happens	a little	sometimes	the time

Maintaining your reputation

1	2	3	4
Never	Happens	Happens	Happens all
Happens	a little	sometimes	the time

Showing people you drink

1	2	3	4
Never	Happens	Happens	Happens all
Happens	a little	sometimes	the time

Having a good sexual experience

1	2	3	4
Never	Happens	Happens	Happens all
Happens	a little	sometimes	the time

Enjoying a sexual experience more

1	2	3	4
Never	Happens	Happens	Happens all
Happens	a little	sometimes	the time

Having a hangover

1	2	3	4
Never	Happens	Happens	Happens all
Happens	a little	sometimes	the time

Passing out

1	2	3	4
Never	Happens	Happens	Happens all
Happens	a little	sometimes	the time

Ending up in bad physical shape the next day

1	2	3	4
Never	Happens	Happens	Happens all
Happens	a little	sometimes	the time

Having your co-ordination affected

1	2	3	4
Never	Happens	Happens	Happens all
Happens	a little	sometimes	the time

Doing or saying something embarrassing

1	2	3	4
Never	Happens	Happens	Happens all
Happens	a little	sometimes	the time

Losing control of yourself

1	2	3	4
Never	Happens	Happens	Happens all
Happens	a little	sometimes	the time

Getting in trouble with the police or authorities for drinking

1	2	3	4
Never	Happens	Happens	Happens all
Happens	a little	sometimes	the time

Thank you for completing this survey, your participation is greatly appreciated. This study sought to investigate the nature of attitudes underlying alcohol consumption. If you have any further questions or queries about the research, please contact the Principal Investigator, Mr Daniel Lindsay, by email at Daniel.lindsay@my.jcu.edu.au. If you have any concerns regarding your current level of drinking behaviour and wish to obtain more facts and advice about alcohol consumption, please visit www.drinkwise.org.au.

If you have any concerns regarding the ethical conduct of the study, please contact:
Human Ethics, Research Office
James Cook University, Townsville, Qld, 4811
Phone: (07) 4781 5011 (ethics@jcu.edu.au)

Appendix K: Study 5 Information Sheet

JAMES COOK
UNIVERSITY
AUSTRALIA

INFORMATION SHEET

Attitudes toward alcohol consumption

You are invited to take part in a research project about the nature of attitudes underlying alcohol consumption. The study is being conducted by Mr Daniel Lindsay and will contribute to his PhD project at James Cook University.

If you agree to be involved in the study, you will be asked to complete a brief online questionnaire and computer-based reaction time task. These tasks should take no longer than 15 minutes to complete. As it is an online study, participation can be done at the time and place of your choice.

This survey is anonymous. Taking part in this study is completely voluntary and you can stop taking part in the study at any time without explanation or prejudice by simply closing your internet browser. Your consent to participate in this study will be provided when you press the "proceed" button below

If you know of others that might be interested in this study, can you please direct them to the study link: http://research.millisecond.com/anneswinbourne/alcatti.web so they may participate.

Your responses will be strictly confidential. The data from the study will be used in Daniel's PhD thesis and may be used in research publications. However, as you are not asked for any identification, you cannot be identified in any way in these publications.

If you have any questions about the study, please contact Mr Daniel Lindsay or Dr Anne Swinbourne using the contact information below.

Principal Investigator
Mr Daniel Lindsay
Department of Psychology
James Cook University
p. 07 4781 5071
e. daniel.lindsay@my.jcu.edu.au

Primary Supervisor
Dr Anne Swinbourne
Department of Psychology
James Cook University
p. 07 4781 4809
e. anne.swinbourne@jcu.edu.au

If you have any concerns regarding the ethical conduct of the study, please contact:
Human Ethics, Research Office
James Cook University, Townsville, Qld, 4811
Phone: (07) 4781 5011 (ethics@jcu.edu.au)

Appendix L: Additional Statistical Outputs

Appendix L1: Additional Statistical Output for Study 1

Appendix L1.1. *Chocolate-related Implicit Attitude Change Based on Previous*

Advertisement Exposure

Between-Subjects Factors

		Value Label	N
Have you ever seen the ad before?	1	Yes	19
	2	No	21

Descriptive Statistics

	Have you ever seen the ad before?	Mean	Std. Deviation	N
Pre-test IAT scores chocolate	Yes	.188783	.5144218	19
	No	.192842	.5353294	21
	Total	.190914	.5187522	40
post-test IAT scores chocolate	Yes	.204966	.4660021	19
	No	.155750	.7586013	21
	Total	.179128	.6292552	40

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
time	Pillai's Trace	.000	.012[b]	1.000	38.000	.914
	Wilks' Lambda	1.000	.012[b]	1.000	38.000	.914
	Hotelling's Trace	.000	.012[b]	1.000	38.000	.914
	Roy's Largest Root	.000	.012[b]	1.000	38.000	.914
time * Seen_Ad	Pillai's Trace	.002	.077[b]	1.000	38.000	.783
	Wilks' Lambda	.998	.077[b]	1.000	38.000	.783
	Hotelling's Trace	.002	.077[b]	1.000	38.000	.783
	Roy's Largest Root	.002	.077[b]	1.000	38.000	.783

a. Design: Intercept + Seen_Ad

 Within Subjects Design: time

b. Exact statistic

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
time	Sphericity Assumed	.002	1	.002	.012	.914
	Greenhouse-Geisser	.002	1.000	.002	.012	.914
	Huynh-Feldt	.002	1.000	.002	.012	.914
	Lower-bound	.002	1.000	.002	.012	.914
time * Seen_Ad	Sphericity Assumed	.014	1	.014	.077	.783
	Greenhouse-Geisser	.014	1.000	.014	.077	.783
	Huynh-Feldt	.014	1.000	.014	.077	.783
	Lower-bound	.014	1.000	.014	.077	.783
Error(time)	Sphericity Assumed	6.980	38	.184		
	Greenhouse-Geisser	6.980	38.000	.184		
	Huynh-Feldt	6.980	38.000	.184		
	Lower-bound	6.980	38.000	.184		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	2.748	1	2.748	5.516	.024
Seen_Ad	.010	1	.010	.020	.887
Error	18.933	38	.498		

Estimated Marginal Means of MEASURE_1
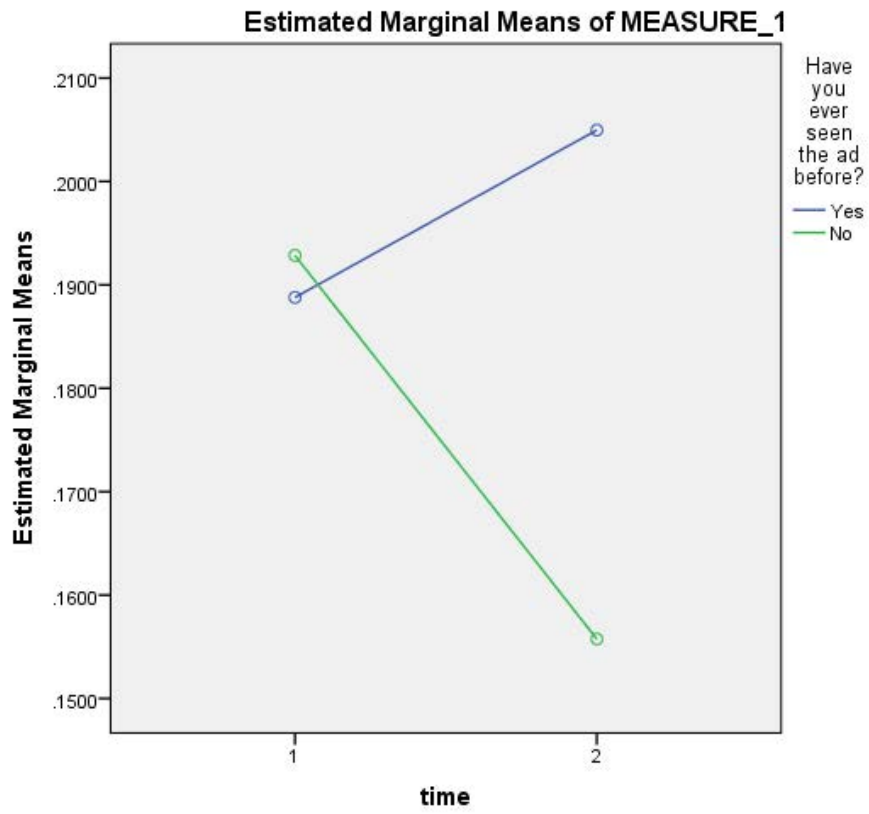
Appendix L1.2. *Chocolate-related Implicit Attitude Change Based on Number of Previous Advertisement Exposures.*

Between-Subjects Factors

		Value Label	N
How many times have you seen the ad before?	0	None	21
	1	1-5	14
	2	6+	5

Descriptive Statistics

	How many times have you seen the ad before?	Mean	Std. Deviation	N
Pre-test IAT scores chocolate	None	.192842	.5353294	21
	1-5	.173870	.5509294	14
	6+	.230541	.4488045	5
	Total	.190914	.5187522	40
post-test IAT scores chocolate	None	.155750	.7586013	21
	1-5	.202622	.5357922	14
	6+	.211531	.2101181	5
	Total	.179128	.6292552	40

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
time	Pillai's Trace	.000	.006[b]	1.000	37.000	.938
	Wilks' Lambda	1.000	.006[b]	1.000	37.000	.938
	Hotelling's Trace	.000	.006[b]	1.000	37.000	.938
	Roy's Largest Root	.000	.006[b]	1.000	37.000	.938
time * Times_Seen	Pillai's Trace	.003	.049[b]	2.000	37.000	.953
	Wilks' Lambda	.997	.049[b]	2.000	37.000	.953
	Hotelling's Trace	.003	.049[b]	2.000	37.000	.953
	Roy's Largest Root	.003	.049[b]	2.000	37.000	.953

a. Design: Intercept + Times_Seen

Within Subjects Design: time

b. Exact statistic

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
time	Sphericity Assumed	.001	1	.001	.006	.938
	Greenhouse-Geisser	.001	1.000	.001	.006	.938
	Huynh-Feldt	.001	1.000	.001	.006	.938
	Lower-bound	.001	1.000	.001	.006	.938
time * Times_Seen	Sphericity Assumed	.018	2	.009	.049	.953
	Greenhouse-Geisser	.018	2.000	.009	.049	.953
	Huynh-Feldt	.018	2.000	.009	.049	.953
	Lower-bound	.018	2.000	.009	.049	.953
Error(time)	Sphericity Assumed	6.976	37	.189		
	Greenhouse-Geisser	6.976	37.000	.189		
	Huynh-Feldt	6.976	37.000	.189		
	Lower-bound	6.976	37.000	.189		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	2.135	1	2.135	4.174	.048
Times_Seen	.018	2	.009	.018	.982
Error	18.925	37	.511		

Estimated Marginal Means of MEASURE_1
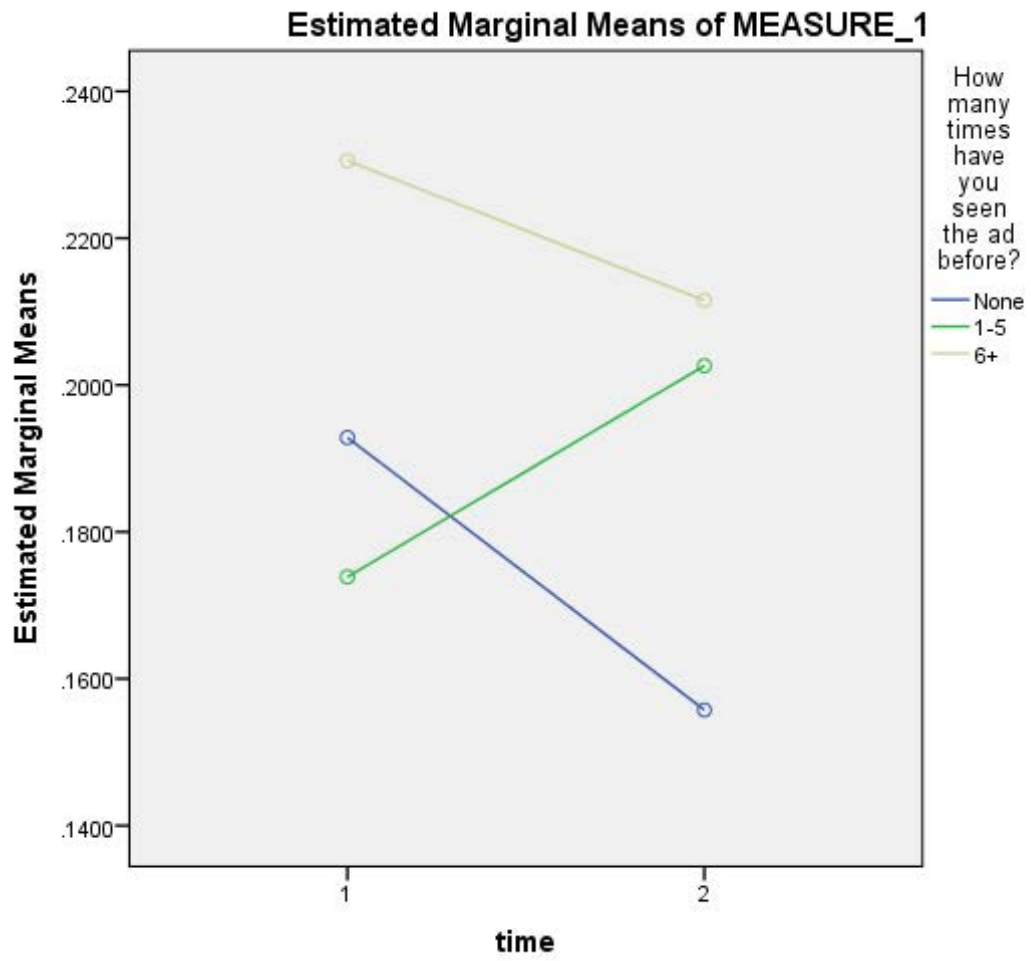
Appendix L2: Additional Statistical Output for Study 2

Appendix L2.1. *Chocolate-related Implicit Attitude Change Based on Previous*

Advertisement Exposure

Between-Subjects Factors

		Value Label	N
Have you seen the ad before?	0	no	17
	1	yes	9

Descriptive Statistics

	Have you seen the ad before?	Mean	Std. Deviation	N
pre-test IAT score for chocolate	no	.025184	.5563368	17
	yes	.055076	.4918540	9
	Total	.035531	.5250825	26
post-test IAT score for chocolate	no	.107444	.3632288	17
	yes	.094321	.5275090	9
	Total	.102901	.4165622	26

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
time	Pillai's Trace	.032	.796[b]	1.000	24.000	.381
	Wilks' Lambda	.968	.796[b]	1.000	24.000	.381
	Hotelling's Trace	.033	.796[b]	1.000	24.000	.381
	Roy's Largest Root	.033	.796[b]	1.000	24.000	.381
time * SeenAd	Pillai's Trace	.004	.100[b]	1.000	24.000	.755
	Wilks' Lambda	.996	.100[b]	1.000	24.000	.755
	Hotelling's Trace	.004	.100[b]	1.000	24.000	.755
	Roy's Largest Root	.004	.100[b]	1.000	24.000	.755

a. Design: Intercept + SeenAd

 Within Subjects Design: time

b. Exact statistic

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
time	Sphericity Assumed	.043	1	.043	.796	.381
	Greenhouse-Geisser	.043	1.000	.043	.796	.381
	Huynh-Feldt	.043	1.000	.043	.796	.381
	Lower-bound	.043	1.000	.043	.796	.381
time * SeenAd	Sphericity Assumed	.005	1	.005	.100	.755
	Greenhouse-Geisser	.005	1.000	.005	.100	.755
	Huynh-Feldt	.005	1.000	.005	.100	.755
	Lower-bound	.005	1.000	.005	.100	.755
Error(time)	Sphericity Assumed	1.310	24	.055		
	Greenhouse-Geisser	1.310	24.000	.055		
	Huynh-Feldt	1.310	24.000	.055		
	Lower-bound	1.310	24.000	.055		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	.234	1	.234	.566	.459
SeenAd	.001	1	.001	.002	.965
Error	9.915	24	.413		

Estimated Marginal Means of MEASURE_1
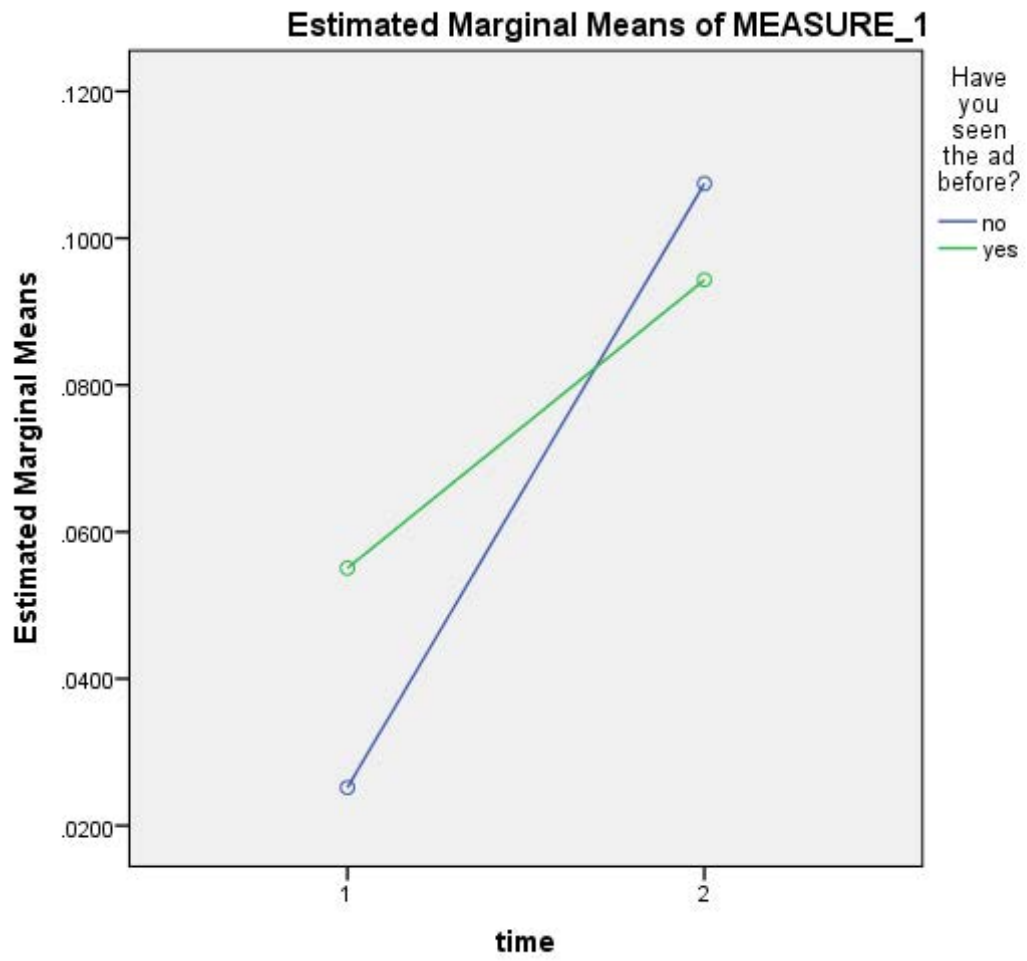
Appendix L2.2. *Chocolate-related Implicit Attitude Change Based on Number of*

Previous Advertisement Exposures.

Between-Subjects Factors

		Value Label	N
How many times have you seen the ad before?	0	None	17
	1	1-5 times	5
	2	6+	4

Descriptive Statistics

	How many times have you seen the ad before?	Mean	Std. Deviation	N
pre-test IAT score for chocolate	None	.025184	.5563368	17
	1-5 times	.106132	.3203706	5
	6+	-.008744	.7060425	4
	Total	.035531	.5250825	26
post-test IAT score for chocolate	None	.107444	.3632288	17
	1-5 times	-.039006	.2705470	5
	6+	.260979	.7601234	4
	Total	.102901	.4165622	26

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
time	Pillai's Trace	.036	.865[b]	1.000	23.000	.362
	Wilks' Lambda	.964	.865[b]	1.000	23.000	.362
	Hotelling's Trace	.038	.865[b]	1.000	23.000	.362
	Roy's Largest Root	.038	.865[b]	1.000	23.000	.362
time * AdTimes	Pillai's Trace	.150	2.022[b]	2.000	23.000	.155
	Wilks' Lambda	.850	2.022[b]	2.000	23.000	.155
	Hotelling's Trace	.176	2.022[b]	2.000	23.000	.155
	Roy's Largest Root	.176	2.022[b]	2.000	23.000	.155

a. Design: Intercept + AdTimes

 Within Subjects Design: time

b. Exact statistic

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
time	Sphericity Assumed	.042	1	.042	.865	.362
	Greenhouse-Geisser	.042	1.000	.042	.865	.362
	Huynh-Feldt	.042	1.000	.042	.865	.362
	Lower-bound	.042	1.000	.042	.865	.362
time * AdTimes	Sphericity Assumed	.197	2	.098	2.022	.155
	Greenhouse-Geisser	.197	2.000	.098	2.022	.155
	Huynh-Feldt	.197	2.000	.098	2.022	.155
	Lower-bound	.197	2.000	.098	2.022	.155
Error(time)	Sphericity Assumed	1.119	23	.049		
	Greenhouse-Geisser	1.119	23.000	.049		
	Huynh-Feldt	1.119	23.000	.049		
	Lower-bound	1.119	23.000	.049		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	.201	1	.201	.467	.501
AdTimes	.039	2	.019	.045	.956
Error	9.877	23	.429		

Estimated Marginal Means of MEASURE_1
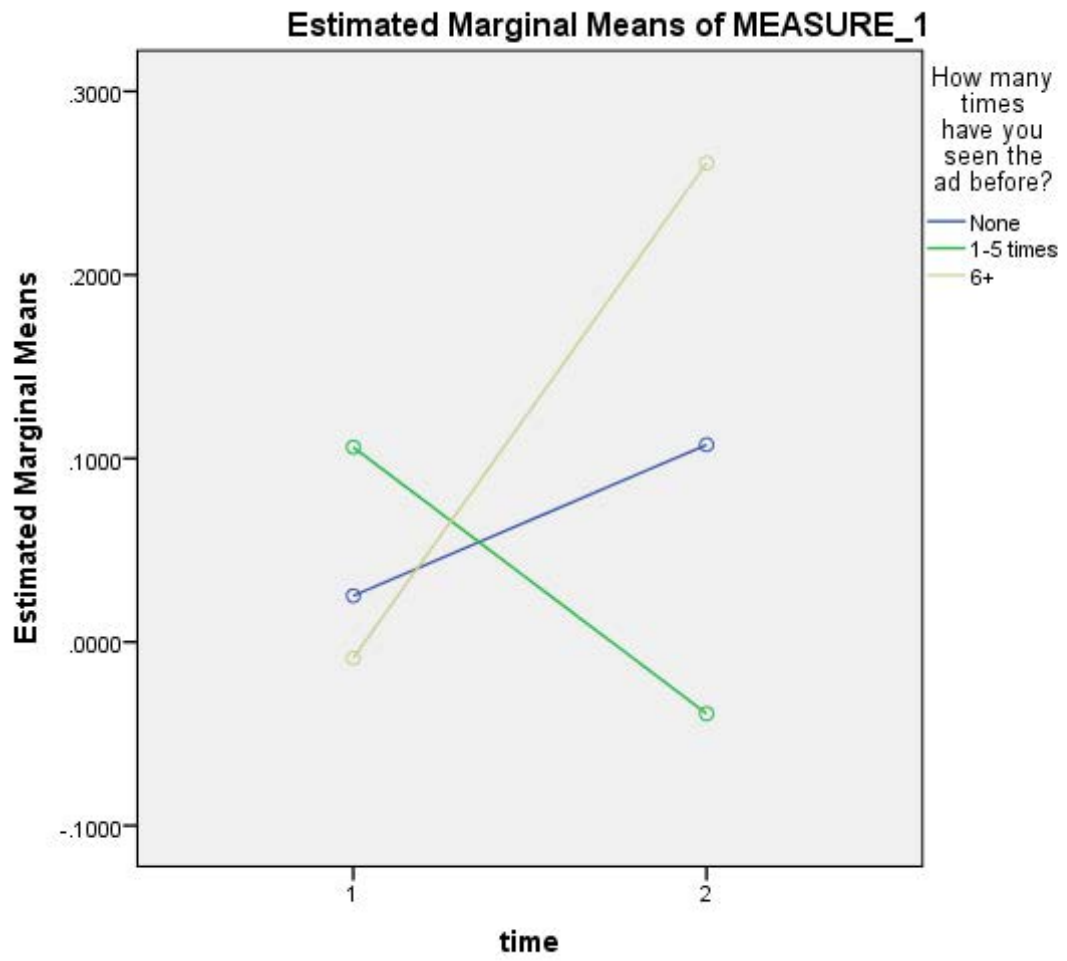
Appendix L2.3. *Moderation Analysis for the Influence of Previous Advertisement*

Exposure on Consumption Behaviour

Variables Entered/Removeda

Model	Variables Entered	Variables Removed	Method
1	Have you seen the ad before?, post-test IAT scores for beer[b]	.	Enter

a. Dependent Variable: How much beer was consumed in Lab?

b. All requested variables entered.

Model Summaryb

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.484a	.234	.173	58.08268	.234	3.820	2	25	.036

a. Predictors: (Constant), Have you seen the ad before?, post-test IAT scores for beer

b. Dependent Variable: How much beer was consumed in Lab?

ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25774.480	2	12887.240	3.820	.036b
	Residual	84339.949	25	3373.598		
	Total	110114.429	27			

a. Dependent Variable: How much beer was consumed in Lab?

b. Predictors: (Constant), Have you seen the ad before?, post-test IAT scores for beer

Coefficientsa

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	68.997	18.128		3.806	.001
	post-test IAT scores for beer	43.621	25.257	.330	1.727	.096
	Have you seen the ad before?	31.541	24.527	.246	1.286	.210

a. Dependent Variable: How much beer was consumed in Lab?

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: How much beer was consumed in Lab?
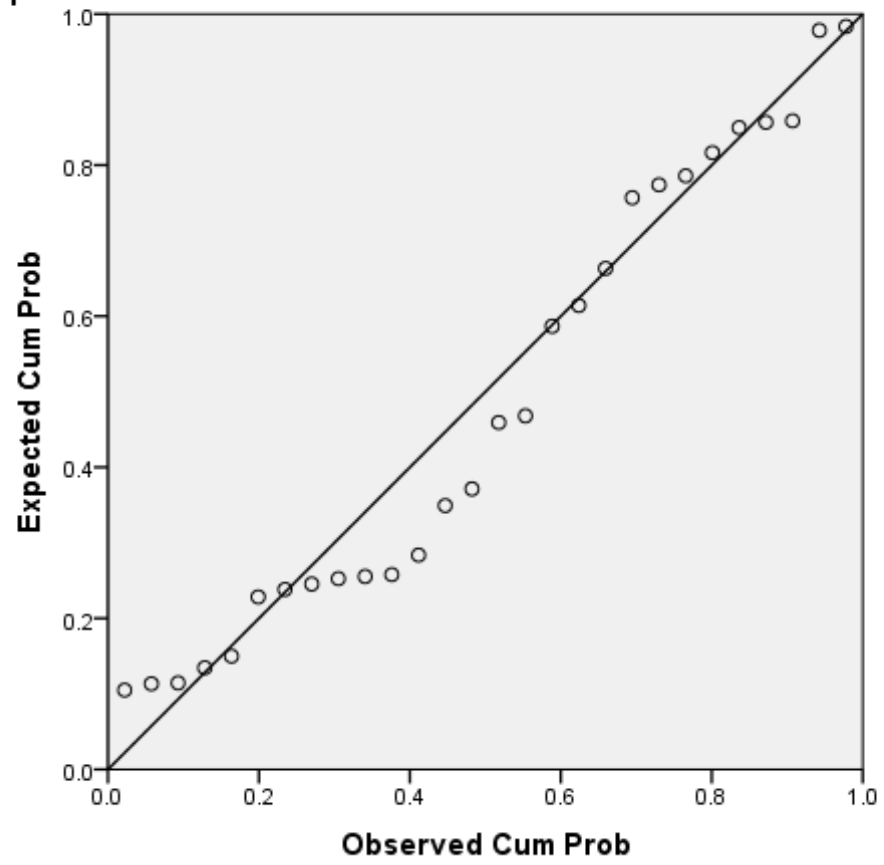
Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Zscore: Have you seen the ad before?, Zscore: post-test IAT scores for beer[b]	.	Enter
2	Interaction_Seen Ad[b]	.	Enter

a. Dependent Variable: How much beer was consumed in Lab?

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1	df2	Sig. F Change
1	.484[a]	.234	.173	58.08268	.234	3.820	2	25	.036
2	.595[b]	.354	.273	54.45208	.120	4.445	1	24	.046

a. Predictors: (Constant), Zscore: Have you seen the ad before?, Zscore: post-test IAT scores for beer

b. Predictors: (Constant), Zscore: Have you seen the ad before?, Zscore: post-test IAT scores for beer, Interaction_SeenAd

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25774.480	2	12887.240	3.820	.036[b]
	Residual	84339.949	25	3373.598		
	Total	110114.429	27			
2	Regression	38953.740	3	12984.580	4.379	.014[c]
	Residual	71160.688	24	2965.029		
	Total	110114.429	27			

a. Dependent Variable: How much beer was consumed in Lab?

b. Predictors: (Constant), Zscore: Have you seen the ad before?, Zscore: post-test IAT scores for beer

c. Predictors: (Constant), Zscore: Have you seen the ad before?, Zscore: post-test IAT scores for beer, Interaction_SeenAd

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	90.357	10.977		8.232	.000
	Zscore: post-test IAT scores for beer	21.068	12.199	.330	1.727	.096
	Zscore: Have you seen the ad before?	15.687	12.199	.246	1.286	.210
2	(Constant)	79.937	11.416		7.002	.000
	Zscore: post-test IAT scores for beer	14.440	11.860	.226	1.217	.235
	Zscore: Have you seen the ad before?	22.997	11.950	.360	1.924	.066
	Interaction_SeenAd	26.988	12.801	.366	2.108	.046

a. Dependent Variable: How much beer was consumed in Lab?

Appendix L3: Additional Statistical Output for Study 4

Table L1

Mean (SD) Scores for Felt Ambivalence Items

Statement	Behaviour				
	WD Drink	WE Drink	Smoking	F&V Intake	Exercise
Feel no conflict – feel maximum conflict	3.81 (3.22)	3.23 (3.03)	5.28 (4.12)	3.00 (2.54)	3.37 (2.80)
One sided reactions – mixed reactions	3.33 (2.57)	3.10 (2.60)	2.50 (2.66)	3.14 (2.38)	3.39 (2.62)
No indecision – maximum indecision	2.85 (2.55)	2.68 (2.36)	2.75 (3.00)	2.75 (2.25)	3.13 (2.54)

Table L2

Mean (SD) Scores for Potential Ambivalence Items

Behaviour	Evaluation	
	Positive	Negative
WD Drink	3.20 (1.92)	4.40 (2.14)
WE Drink	3.88 (2.08)	3.70 (2.08)
Smoking	2.30 (2.00)	5.70 (2.05)
F&V Intake	4.19 (2.52)	2.18 (1.71)
Exercise	5.82 (1.74)	2.41 (1.72)

Table L3

Mean (SD) Scores for Behaviour Based on Gender

	Means (SD)		t-values
	Male	Female	
Weekday drinking	2.68 (3.26)	1.63 (2.14)	2.96**
Weekend drinking	4.82 (4.11)	6.12 (6.10)	1.95*
Smoking	3.00 (6.72)	4.15 (8.89)	1.10
Exercise	39.92 (39.39)	60.51 (70.94)	2.93**
F & V Intake	5.19 (2.14)	5.11 (2.89)	.22

Note. *sig at p < .05. **sig at p <.01.

Table L4

Correlations between Age and Behaviour

	1	2	3	4	5
1. Age					
2. WDay Drinking	.03				
3. WEnd Drinking	.16*	.58**			
4. Smoking	.13*	.16*	.14*		
5. Exercise	.12	-.01	-.07	-.08	
6. F & V Intake	.08	-.07	-.13*	.07	-.01

Note. *sig at p < .05. **sig at p <.01.

Appendix L3.1. *Regression Statistics for Weekday Drinking Predicted by Ambivalence*

Measures

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.184[a]	.034	.026	2.491	.034	4.454	2	254	.013
2	.245[b]	.060	.045	2.466	.026	3.511	2	252	.031

a. Predictors: (Constant), What is your gender?, How old are you?

b. Predictors: (Constant), What is your gender?, How old are you?, Felt ambivalence average - Weekday drinking , Potential ambivalence - Weekday drinking

c. Dependent Variable: Approximately how many standard drinks would you consume in a typical drinking session on a WEEKDAY? (Monday-Thursday)"

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	55.265	2	27.633	4.454	.013[b]
	Residual	1575.677	254	6.203		
	Total	1630.942	256			
2	Regression	97.985	4	24.496	4.027	.003[c]
	Residual	1532.957	252	6.083		
	Total	1630.942	256			

a. Dependent Variable: Approximately how many standard drinks would you consume in a typical drinking session on a WEEKDAY? (Monday-Thursday)"

b. Predictors: (Constant), What is your gender?, How old are you?

c. Predictors: (Constant), What is your gender?, How old are you?, Felt ambivalence average - Weekday drinking , Potential ambivalence - Weekday drinking

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.513	.504		4.988	.000
	How old are you?	.006	.014	.025	.405	.686
	What is your gender?	-1.041	.352	-.182	-2.955	.003
2	(Constant)	2.217	.568		3.900	.000
	How old are you?	.010	.014	.042	.686	.493
	What is your gender?	-1.074	.350	-.188	-3.065	.002
	Felt ambivalence average - Weekday drinking	.006	.025	.014	.231	.817
	Potential ambivalence - Weekday drinking	.182	.070	.161	2.607	.010

a. Dependent Variable: Approximately how many standard drinks would you consume in a typical drinking session on a WEEKDAY? (Monday-Thursday)"

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Approximately how many standard drinks would you consume in a typical drinking session on a WEEKDAY? (Monday-Thursday)"

Appendix L3.2. *Regression Statistics for Weekend Drinking Predicted by Ambivalence Measures*

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
						Change Statistics			
1	.200[a]	.040	.032	4.660	.040	5.283	2	254	.006
2	.298[b]	.089	.074	4.559	.049	6.716	2	252	.001

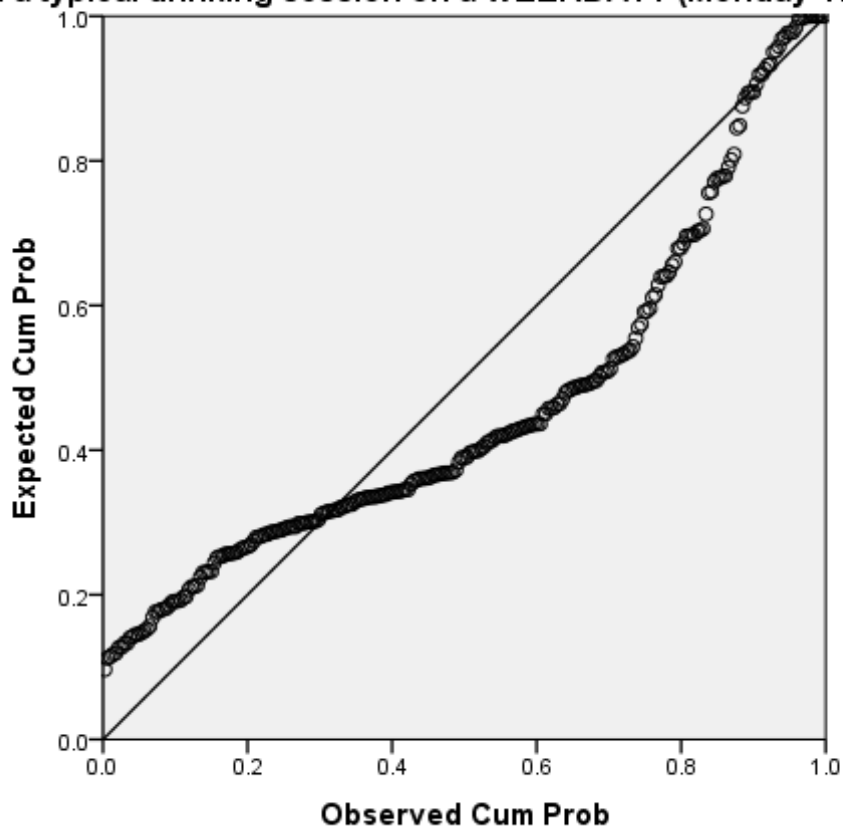a. Predictors: (Constant), What is your gender?, How old are you?

b. Predictors: (Constant), What is your gender?, How old are you?, Felt ambivalence average - Weekend drinking, Potential ambivalence - Weekend drinking

c. Dependent Variable: Approximately how many standard drinks do you consume in a typical drinking session on a WEEKEND day? (Friday-Sunday)"

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	229.456	2	114.728	5.283	.006[b]
	Residual	5515.680	254	21.715		
	Total	5745.136	256			
2	Regression	508.564	4	127.141	6.118	.000[c]
	Residual	5236.572	252	20.780		
	Total	5745.136	256			

a. Dependent Variable: Approximately how many standard drinks do you consume in a typical drinking session on a WEEKEND day? (Friday-Sunday)"

b. Predictors: (Constant), What is your gender?, How old are you?

c. Predictors: (Constant), What is your gender?, How old are you?, Felt ambivalence average - Weekend drinking, Potential ambivalence - Weekend drinking

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.069	.943		8.560	.000
	How old are you?	-.068	.026	-.159	-2.586	.010
	What is your gender?	-1.309	.659	-.122	-1.986	.048
2	(Constant)	7.259	1.010		7.188	.000
	How old are you?	-.058	.026	-.134	-2.220	.027
	What is your gender?	-1.422	.645	-.133	-2.203	.029
	Felt ambivalence average - Weekend drinking	.003	.045	.005	.077	.939
	Potential ambivalence - Weekend drinking	.455	.126	.221	3.608	.000

a. Dependent Variable: Approximately how many standard drinks do you consume in a typical drinking session on a WEEKEND day? (Friday-Sunday)"

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Approximately how many standard drinks do you consume in a typical drinking session on a WEEKEND day? (Friday-Sunday)"
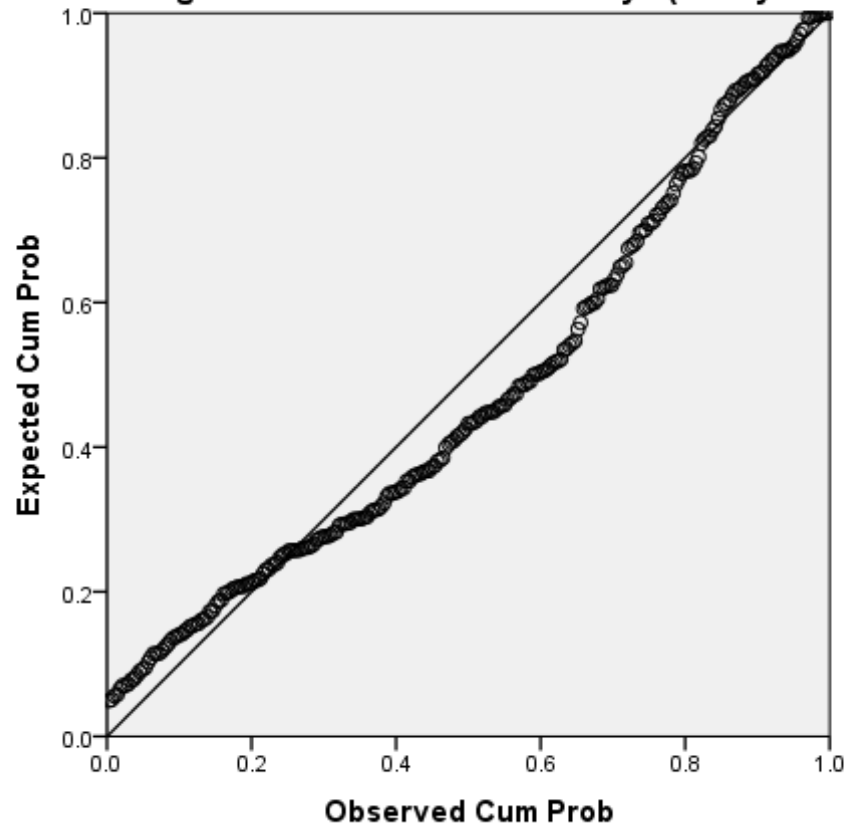
Appendix L3.3. *Regression Statistics for Smoking Predicted by Ambivalence Measures*

Model Summary^c

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
					Change Statistics				
1	.140[a]	.020	.012	7.312	.020	2.549	2	254	.080
2	.312[b]	.097	.083	7.045	.077	10.806	2	252	.000

a. Predictors: (Constant), What is your gender?, How old are you?

b. Predictors: (Constant), What is your gender?, How old are you?, Potential ambivalence - Smoking, Felt ambivalence average - Smoking

c. Dependent Variable: Approximately how many cigarettes do you smoke on a typical day?"

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	272.553	2	136.276	2.549	.080[b]
	Residual	13581.774	254	53.472		
	Total	13854.327	256			
2	Regression	1345.313	4	336.328	6.775	.000[c]
	Residual	12509.014	252	49.639		
	Total	13854.327	256			

a. Dependent Variable: Approximately how many cigarettes do you smoke on a typical day?"

b. Predictors: (Constant), What is your gender?, How old are you?

c. Predictors: (Constant), What is your gender?, How old are you?, Potential ambivalence - Smoking, Felt ambivalence average - Smoking

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.819	1.479		1.230	.220
	How old are you?	.082	.042	.122	1.966	.050
	What is your gender?	-1.134	1.034	-.068	-1.097	.274
2	(Constant)	-.027	1.596		-.017	.987
	How old are you?	.081	.040	.121	2.015	.045
	What is your gender?	-.879	.999	-.053	-.880	.380
	Felt ambivalence average - Smoking	.172	.062	.167	2.780	.006
	Potential ambivalence - Smoking	.639	.170	.226	3.770	.000

a. Dependent Variable: Approximately how many cigarettes do you smoke on a typical day?"

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Approximately how many cigarettes do you smoke on a typical day?"

Appendix L3.4. *Regression Statistics for Exercise Predicted by Ambivalence Measures*

Model Summary[c]

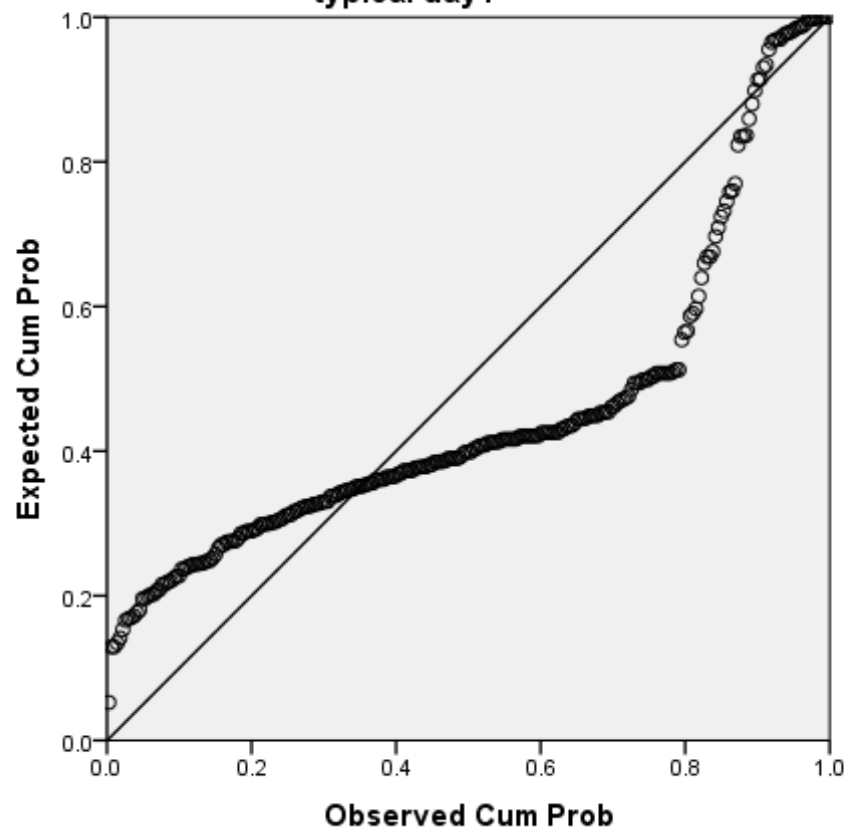| Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	Change Statistics F Change	Change Statistics df1	Change Statistics df2	Change Statistics Sig. F Change
1	.215[a]	.046	.039	49.503	.046	6.138	2	253	.002
2	.259[b]	.067	.052	49.158	.021	2.782	2	251	.064

a. Predictors: (Constant), What is your gender?, How old are you?

b. Predictors: (Constant), What is your gender?, How old are you?, Potential ambivalence - Exercise, Felt ambivalence average - Exercise

c. Dependent Variable: Approximately how many minutes do you engage in moderate exercise (e.g. fast walking, cycling) on a typical day?"

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30082.393	2	15041.196	6.138	.002[b]
	Residual	619997.092	253	2450.581		
	Total	650079.484	255			
2	Regression	43526.314	4	10881.579	4.503	.002[c]
	Residual	606553.170	251	2416.546		
	Total	650079.484	255			

a. Dependent Variable: Approximately how many minutes do you engage in moderate exercise (e.g. fast walking, cycling) on a typical day?"

b. Predictors: (Constant), What is your gender?, How old are you?

c. Predictors: (Constant), What is your gender?, How old are you?, Potential ambivalence - Exercise, Felt ambivalence average - Exercise

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	75.745	10.018		7.561	.000
	How old are you?	-.534	.281	-.117	-1.899	.059
	What is your gender?	-20.695	7.005	-.181	-2.954	.003
2	(Constant)	85.577	10.914		7.841	.000
	How old are you?	-.531	.280	-.116	-1.895	.059
	What is your gender?	-19.265	6.985	-.169	-2.758	.006
	Felt ambivalence average - Exercise	-1.109	.499	-.144	-2.221	.027
	Potential ambivalence - Exercise	.005	1.331	.000	.003	.997

a. Dependent Variable: Approximately how many minutes do you engage in moderate exercise (e.g. fast walking, cycling) on a typical day?"

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Approximately how many minutes do you engage in moderate exercise (e.g. fast walking, cycling) on a typical day?"
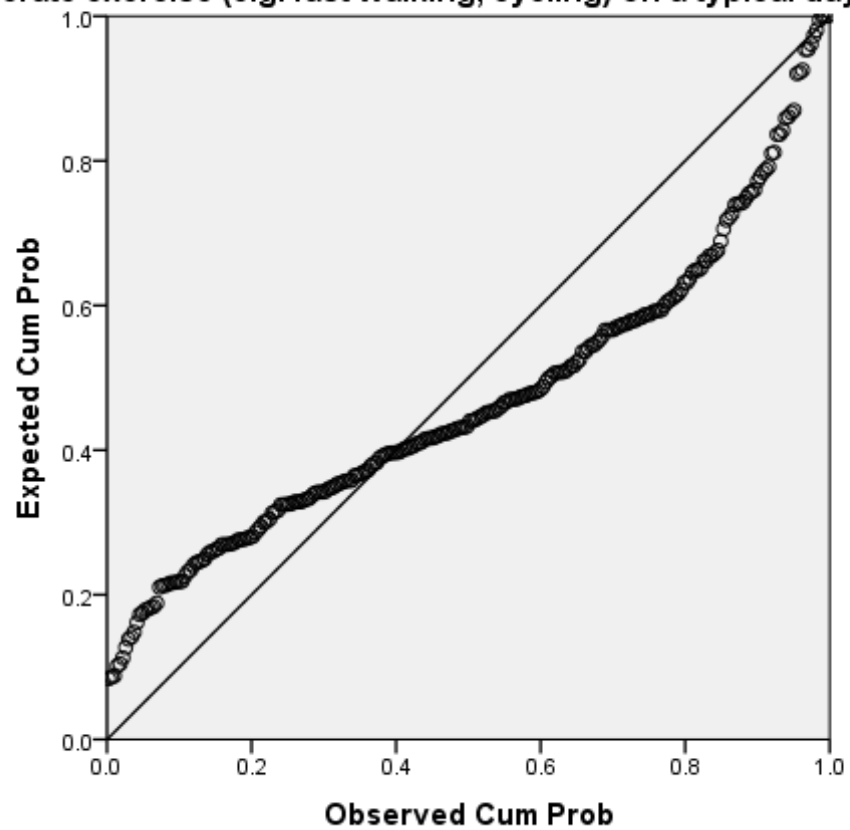
Appendix L3.5. *Regression Statistics for Fruit and Vegetable Intake Predicted by*

Ambivalence Measures

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.089[a]	.008	.000	2.36412	.008	.999	2	253	.370
2	.228[b]	.052	.037	2.32014	.044	5.841	2	251	.003

a. Predictors: (Constant), What is your gender?, How old are you?

b. Predictors: (Constant), What is your gender?, How old are you?, Potential ambivalence - Fruit & Veg intake, Felt ambivalence average - Fruit & Veg intake

c. Dependent Variable: Fruit + Vegetable consumption

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.163	2	5.581	.999	.370[b]
	Residual	1414.031	253	5.589		
	Total	1425.194	255			
2	Regression	74.048	4	18.512	3.439	.009[c]
	Residual	1351.146	251	5.383		
	Total	1425.194	255			

a. Dependent Variable: Fruit + Vegetable consumption

b. Predictors: (Constant), What is your gender?, How old are you?

c. Predictors: (Constant), What is your gender?, How old are you?, Potential ambivalence - Fruit & Veg intake, Felt ambivalence average - Fruit & Veg intake

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.576	.479		9.559	.000
	How old are you?	.019	.013	.087	1.395	.164
	What is your gender?	.078	.335	.015	.233	.816
2	(Constant)	5.584	.556		10.040	.000
	How old are you?	.017	.013	.079	1.277	.203
	What is your gender?	-.162	.337	-.030	-.483	.630
	Felt ambivalence average - Fruit & Veg intake	-.089	.026	-.221	-3.408	.001
	Potential ambivalence - Fruit & Veg intake	.047	.073	.041	.642	.521

a. Dependent Variable: Fruit + Vegetable consumption

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Fruit + Vegetable consumption
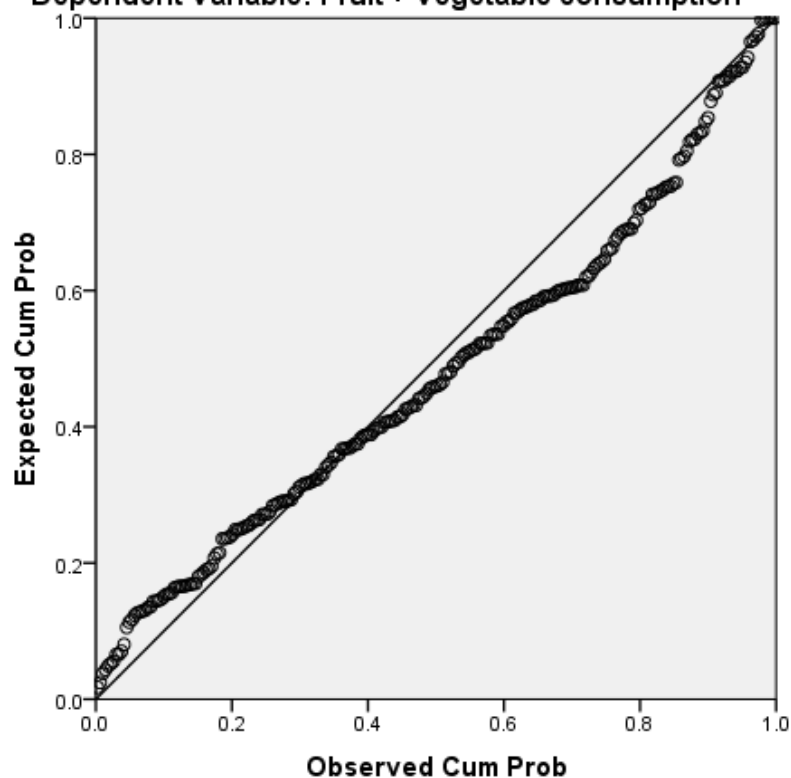
Appendix L4: Additional Statistical Output for Study 5

Table L5

Mean (SD) Scores for Consequence Evaluations

Consequence	Mean (SD)
Having more fun	2.59 (1.27)
Feeling closer to your friends	2.42 (1.34)
Having a good time	2.63 (1.19)
Becoming more social	2.54 (1.21)
Relieving boredom	1.88 (1.39)
Relieving tension	2.15 (1.32)
Unwinding	2.25 (1.24)
Relaxing after a stressful situation	2.20 (1.37)
Coping with daily life	1.35 (1.34)
Looking interesting to other people	1.24 (1.26)
Seeming more exciting to others	1.33 (1.29)
Maintaining your reputation	1.09 (1.18)
Showing people you drink	.81 (1.03)
Having a good sexual experience	1.31 (1.36)
Enjoying a sexual experience more	1.33 (1.34)
Having a hangover	.38 (.84)
Passing out	.22 (.65)
Ending up in a bad physical shape the next day	.29 (.70)
Having your coordination affected	.48 (.81)
Doing or saying something embarrassing	.62 (.92)
Losing control of yourself	.35 (.81)
Getting in trouble with the police or authorities for drinking	.16 (.58)

Table L6

Mean (SD) Scores for Consequence Frequency

Consequence	Mean (SD)
Having more fun	1.44 (1.04)
Feeling closer to your friends	1.31 (1.06)
Having a good time	1.48 (1.06)
Becoming more social	1.46 (1.08)
Relieving boredom	1.07 (1.06)
Relieving tension	1.12 (1.05)
Unwinding	1.16 (1.04)
Relaxing after a stressful situation	1.11 (1.07)
Coping with daily life	.69 (.98)
Looking interesting to other people	.64 (.87)
Seeming more exciting to others	.67 (.88)
Maintaining your reputation	.55 (.88)
Showing people you drink	.51 (.81)
Having a good sexual experience	.59 (.87)
Enjoying a sexual experience more	.62 (.90)
Having a hangover	.84 (.99)
Passing out	.28 (.60)
Ending up in a bad physical shape the next day	.68 (.92)
Having your coordination affected	.81 (.94)
Doing or saying something embarrassing	.87 (.94)
Losing control of yourself	.49 (.76)
Getting in trouble with the police or authorities for drinking	.11 (.39)

Table L7

Mean (SD) Scores for Consequence Frequency based on Implicit Ambivalence

	Ambivalence Category		t-value
	Implicitly ambivalent	Implicitly univalent	
Fun frequency	1.57 (.89)	1.54 (.82)	.29
Relax frequency	1.19 (.96)	1.15 (.81)	.41
Image frequency	.75 (.82)	.59 (.69)	1.83
Sex frequency	.85 (.98)	.61 (.83)	2.24*
Behaviour frequency	.64 (.60)	.70 (.63)	-.82
Total consequence frequency	5.01 (3.42)	4.58 (2.86)	1.14

Note: *p sig at < .05