THE RELATIONSHIP BETWEEN USUAL ALCOHOL CONSUMPTION AND THE CONTENT OF ASSOCIATION MEMORY IN YOUNG AND MATURE SOCIAL DRINKERS.

Thesis submitted for degree of Doctor of Philosophy
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Faculty of Social Sciences

THESIS SUMMARY

Introduction

During the last two decades, key explanations of alcohol consumption variability have derived from social learning frameworks. A main theoretical approach in this area concerns the role of alcohol consumption outcome expectancies in decisions to consume alcohol. Within this domain, research concerning positive alcohol expectancies has consistently shown that there is a positive relationship between alcohol consumption level and positive alcohol expectancies held. Therefore, the role of this memory construct in decisions to consume alcohol is generally viewed as causal. In contrast, the role of negative alcohol expectancies in alcohol use is less clear. In general, research investigating this construct has been minimal. This is largely due to previous inconsistent empirical finding concerning the relationship between alcohol consumption negative alcohol expectancies. With regards to the inconsistent findings it has recently been purported that the explicit testing instruments used in this area may not enable the true relationship between negative alcohol expectancies and alcohol consumption to be measured. A further criticism, which is also related to the methodological procedures used in this area, relates to the fact that the use of stored information regarding alcohol use decisions is likely to be an unconscious process. Consequently, questions concerning the use of an explicit assessment tool, as a means of assessing unconscious memory processes involved in behavioural decisions, have been raised.

In response to these issues an alternative means of assessing the influential role of stored alcohol memories associations has been proposed - The Alcohol-Related Association Memory model of alcohol use. In this approach previously learnt associations with alcohol use are measured using implicit-based assessment tools. Consequently, a more valid means of assessing stored information, which may serve to bias behavioural decisions, is utilised.

Based on the assumptions of this model it is purported that memory associations are formed between alcohol use and related behavioural outcomes of this behaviour. The relationship between the two concepts is strengthened when the

behaviour (alcohol use) and an outcome (e.g. feeling relaxed) are repeatedly experienced in parallel. How alcohol memory associations are purported to influence behavioural decisions is related to the strength of the association between the two concepts. It is assumed that when a strong association exists between alcohol use and related outcomes, thoughts about the outcome can activate thoughts about the behaviour. As the formation between concepts is bi-directional, thoughts about the behaviour can also prompt thoughts about the related outcomes. Previous research in this area has found a positive relationship between alcohol consumption and the alcohol memory associations for positive outcomes of this behaviour. However, the relationship between negative outcomes of alcohol use and alcohol consumption has not yet been established. A primary goal of the present research was to assess the relationship between alcohol use and negative outcomes of this behaviour using the implicit approach advocated by this model. It was proposed that when an appropriate implicit assessment tool is used a relationship between alcohol use and negative alcohol memory associations would be evident.

Studies

The first study in this thesis was concerned with the development of an implicit assessment tool. The construction of a questionnaire was based on a previous association questionnaire (Stacy, Leigh and Weingardt, (1994). The questionnaire contained a list of positive outcomes of alcohol use (e.g. feeling relaxed) to which participants were instructed to write down what behaviour of theirs would cause the particular outcome to occur. As the questionnaire does not contain any explicit references to alcohol use, the questionnaire is viewed as an implicit assessment tool. In Study 1, the procedure used to develop the association questionnaire was adapted to include negative outcomes of alcohol use. This research tool will now be referred to as the Memory Association Questionnaire (MAQ).

In Study 2, the MAQ was administered to a sample of young undergraduate students. When the participant's responses to the behavioural outcomes in the

questionnaire were measured (by coding responses as either alcohol-related or non alcohol-related), in relation to reported alcohol consumption, a significant relationship was found between alcohol use and memory associations for **both** positive and negative outcomes of this behaviour. In addition to providing support for the Alcohol-Related Association model of alcohol use the findings from this study indicated that a relationship between alcohol use and alcohol-related negative memory associations could be measured when an implicit assessment tool is used. In Study 3 the MAQ was administered to a sample of mature alcohol consumers. As alcohol memory associations of mature alcohol consumers were being assessed this enabled an alternative definition of a key assumption of the Alcohol-Related Association Memory model to be tested - the effect of alcohol **experience** on the strength of alcohol memory associations. In Study 2 alcohol experience was viewed as current alcohol consumption level. In addition to this interpretation, in Study 3 the effect of a substantial alcohol consumption history on the formation and strength of alcohol memory associations was tested.

A significant relationship was observed between alcohol use and both positive and negative alcohol memory associations. The effect of a lengthy alcohol consumption history was shown to result in stronger alcohol memory associations being formed. In addition, a substantial alcohol consumption history was found to contribute to the formation of a wider range of negative alcohol associations (Study 4). The findings from Study 3 and 4 provided further support for the Alcohol-Related Association Memory model of alcohol use.

In Study 5 the main objective was to test whether cues related to alcohol use would serve to activate alcohol memory associations. The rationale for this study derived from alcohol-cue reactivity research. To assess the effects of alcohol cues on memory associations three groups of participants completed in the MAQ in three different testing locations, which differed with regards to the level of explicit alcohol cues that were present. An additional aim of this study was to test the effects of alcohol cues on alcohol memory associations in an

ecological manner. Hence, the testing locations (e.g. a pub) used were ones which individuals naturally associated with alcohol use.

The results from this study indicated that the accessibility of negative alcohol memory associations was higher in alcohol contexts as participants generated more alcohol-related responses to the negative alcohol-related behavioural outcomes. As no effect of context was observed for positive alcohol memory associations, it was postulated that this type of memory association might become activated prior to or during decisions to consume alcohol. In addition, the results indicated that activated negative memory associations might not exert an influential role over decisions to consume alcohol. The results from this study provided further support for the Alcohol-Related Association Memory model of alcohol use.

Discussion

The findings from the series of studies provided support for the Alcohol-Related Association Memory model of alcohol use. In addition to replicating previous research findings, concerning the relationship between alcohol use and positive outcomes of this behaviour, the research findings showed that a relationship between alcohol use and negative outcomes of this behaviour is evident when an appropriate assessment tool is used.

In addition to demonstrating that alcohol memory associations are strengthened in relation to current alcohol consumption level the results from Study 3 showed that the length of an alcohol consumption history relates to the strength and subsequent accessibility of positive and negative alcohol memory associations. It was also indicated that activated negative alcohol memory associations might not exert an influential role over behavioural decisions. Alcohol association memory research, conducted thus far, has shown that there is a relationship between alcohol consumption experience and strength of alcohol memory associations. However, the effect that activated memory associations have on

actual alcohol consumption, has not yet been established. Therefore, future research suggestions address this issue.

DECLARATION

I declare that the work in this thesis is my own and was carried out within the normal terms of supervision in the Department of Psychology, University of Glasgow.

Lisa Gadon
October 1, 2002.

ACKNOWLEDGEMENTS

I would like to thank Professor Barry Jones for all his help and supervision throughout my PhD. I would also like to thank Dr. Kerry Kilborn who was responsible for getting the funding for the PhD. Lastly, I would like to say a huge thank you to my friends and family for their constant support and encouragement throughout the PhD.

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Chapter 1 - An introduction to the two key explanations of alcohol consumption variability to be reviewed in this thesis.

Chapter Summary

In this chapter, the value of conducting research using social drinkers will be established. An overview of the two key explanations of alcohol consumption variability (Alcohol Consumption Outcome Expectancy and Alcohol-Related Association Memory research) central to the present thesis will then be presented.

1. *Putting the user in the framework - What is the role of the social drinker in alcohol abuse and addiction research?*

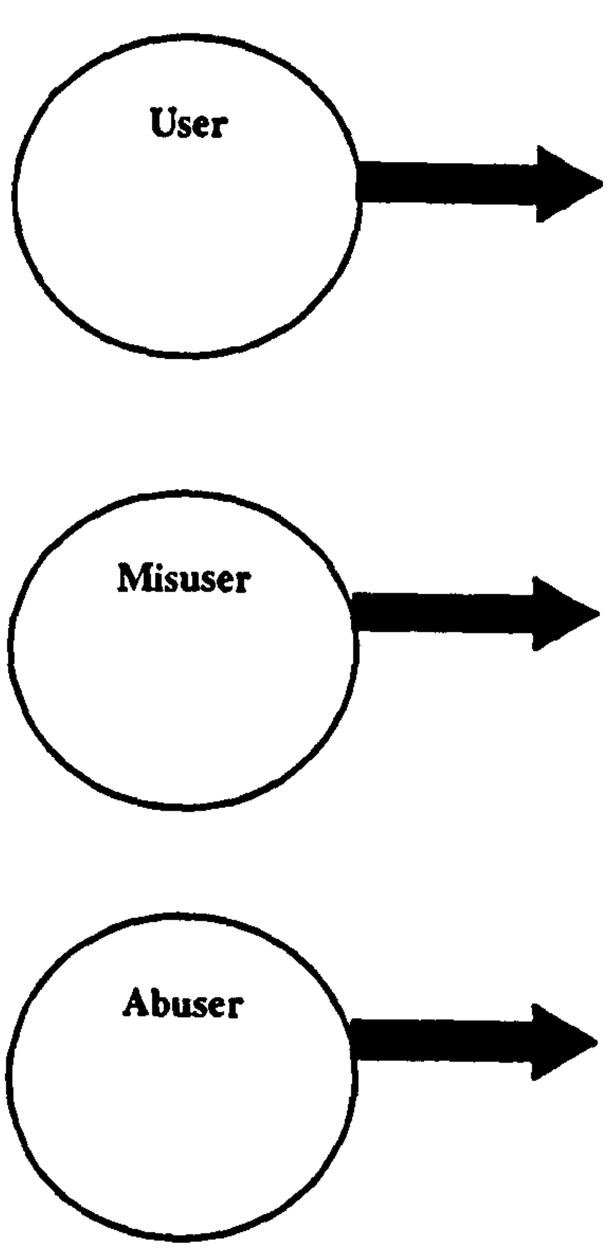
"Alcohol use is more damaging than all the illicit drugs combined (Gordis, 1999).

Alcohol is a substance that when abused can have severe health and social consequences. Although viewed as a harmless recreation by many, there are others who have experienced the negative and obstructive effects that drinking alcohol can bring. The health impact of excessive drinking is not just limited to cirrhosis of the liver but extends to brain damage, stroke, inflammation of the pancreas and chronic damage to the heart muscle. A report conducted by WHO (1996) entitled the *Global Burden of Disease* estimated that the death toll caused directly by alcohol, in the United Kingdom, is approximately 750,000 a year. In terms of the effects on society, excessive alcohol use is also connected with crime. An estimated 30-40% of cases of domestic violence and an estimated 50% of sexual assaults and murders are known to involve alcohol (Thomas, 1999, para.1).

Due to health-related problems, a large proportion of the NHS budget is being spent on alcohol-related problems. A recent report from the Royal College suggested that as much as 12% of the total NHS hospital budget is spent dealing with drink-related problems - a total of £3 billion per annum (BBC Front Page News, 2001, para.4). However, "Many of these damaging effects [with reference to health related issues] can be reversed by cutting down on alcohol consumption" (Wilks, 1999). In light of the detrimental effects that overuse of this legal substance can have and in an effort to gain a better insight into the aetiology of overuse a comprehensive understanding of normal use is sought because overuse inevitably has normal use as its precursor. This thesis addresses 'normal' use.

There are discriminatingly different levels of alcohol use and it is beneficial to consider a terminology that recognises this. Four types of alcohol consumer can be identified - **the user**, the **misuser**, the **abuser** and the **dependent** drinker (see figure 1).

Figure 1. The continuum of alcohol use.



An individual who has the occasional drink.

An individual who continues to use alcohol occasionally. Although at this stage consumption use is not problematic the occasional drink-related accident may occur.

An individual who continues to use alcohol to mask a problem. Due to the masking effects of alcohol the observed positive effects (e.g. reduced anxiety levels) drinking continues to increase on a negative basis and therefore becomes problematic. Alcohol at this stage is acting as a negative reinforcer. The consumer is psychologically and physiologically dependent.

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Those who abuse alcohol or are dependent on it will have had less harmful use and misuse as precursors. This does not mean that use/misuse causes abuse/dependence but it might mean that a better understanding of the principles underpinning use/misuse might help explain why some users/misusers develop into abusers/dependent and some do not. An emerging view is that the same fundamental principles that cause alcohol use can also cause misuse, and dependence. Marlatt and Gordon (1985), for example, support the view that all points along the continuum of consumption (from the user to the dependent

drinker) are influenced by the same principles of learning. More specifically they postulate that the same mechanisms that may be applied to explain alcohol use can be invoked to explain alcohol use disorders. This possibility has gained enormous support during the last two decades (Jones and McMahon, 1998; Goldman, Del Boca and Darkes, 1999; Jones, Corbin and Fromme, 2001) and the important features of this approach to understanding individual difference in alcohol consumption is reviewed below.

1.1 How to explain individual differences in consumption

During the last 25 years conceptualisations of alcoholism have increasingly derived from social learning theory and social cognition (e.g. Wilson, 1987) rather than medical and disease theories (e.g. Jellenick, 1960). Such frameworks can be defined as "*approaches that synthesise principles of learning with those of cognitive psychology" (*Maisto, Carey and Bradizza, 1999, p. 107). Within these frameworks there is an emphasis on the role of behaviour and a view that memory for prior experiences influences subsequent behaviour (Bandura, 1969).

Memory for prior experiences has been mainly represented in two different ways during the last two decades - as alcohol consumption outcome expectancies (e.g. Goldman, et al. 1999) and alcohol-related associations (e.g. Stacy, 1995). The constructs 'expectancies' and 'associations' are briefly explained below. First, expectancies, because this has been the more traditional approach to explaining alcohol consumption variability. Then, associations, as this has been at the centre of a more recent development and one towards which the thesis will turn.

1.2 Alcohol outcome expectancies - Set within a social learning framework.

'Expectancy' refers to information templates that are stored in the nervous system that input to a process that produces behavioural output (Goldman, et al., 1999). As individuals are bombarded with visual and acoustic stimuli on a daily basis these templates enable people to interact with and react to situations in an efficient and consistent manner. Once acquired, these templates have the capacity to influence behaviour because they become activated when input is sufficiently similar to previously stored representations (Goldman et al., 1999).

Memory systems that retain such information can be conceptualised as information-based buffers.

Tolman established the expectancy concept in the 1930s, when he postulated that motivation to perform a given behaviour at a given moment is a function of one's memory of the anticipated consequences of the behaviour. The concept of expectancies is a crucial component of social learning (Mischel, 1973) and social cognitive theories (Bandura, 1986). Mischel defines expectancies as a belief based on past experiences that provides a prediction of future outcomes (Mischel and Shoda, 1995). Subsequent work by Bolles (1972) further defined the role of expectancies in human behaviour. He viewed them as intervening cognitive variables that represent information about the relationship of a response to a stimulus outcome or the relation between stimulus events. Bandura's (1984) definition of outcome expectancies highlights the role of other individuals and what can be learnt through observing others behaviours and actions. He proposed that people adopt other individuals' expectancies concerning future events and therefore exhibit behaviour in line with these expectancies. He called it modelling.

From the above definitions one can identify the probable function of outcome expectancies - they enable one to deal with and to make sense of the world, by having preconceived ideas (represented as templates in memory) about certain aspects of one's world. Alcohol expectancies have long been identified as having a critical influence on individuals' drinking behaviour (e.g. Brown, Goldman, Inn and Anderson, 1980; Darkes and Goldman, 1993).

Alcohol consumption outcome expectancies are defined as the effects individuals anticipate they will experience after drinking alcohol (Brown, et al., 1980). Alcohol expectancies are viewed as structures, which have impact on cognitive processes governing current and future consumption. The pattern of expectancy development is thought to begin at a young age through the normal learning process of observation (Dunn and Goldman, 1998). Research demonstrates that they exert an influence over drinking behaviour and are closely linked with consumption patterns in adults (e.g. Knight and Godfrey, 1994).

Generally, expectancies are measured through the use of explicit approaches such as with the Alcohol Expectancy Questionnaire (AEQ, Brown, Goldman and Christiansen, 1987; Goldman and Rather, 1993). When asked to complete the AEQ (a research exercise designed to establish an individual's expectancy-base), participants need to consciously recollect information as they are instructed to indicate whether or not they hold certain stated alcohol-related expectancies (Schacter, 1987). Therefore methods that use instruments like the AEQ measure cognitive products that can be viewed as the outcome of a series of principally conscious cognitive processes (Kendall and Dobson, 1993). In this sense, the methodology of assessing expectancies is said to be explicit.

Individuals hold negative alcohol expectancies (NAEs) and positive alcohol expectancies (PAEs) concerning alcohol and these appear to be independent constructs (Leigh and Stacy, 1994; McMahon and Jones, 1994; Jones and McMahon, 1998). Overall expectancy research has emphasised the role of positive expectancies rather than negative expectancies in decisions relating to alcohol use (e.g. Palfai and Wood, 2001). Although the research into PAEs generally shows a consistent association with consumption, the role of NAEs is less clear and the results are somewhat inconsistent. Some researchers believe that NAEs make an important contribution to explanations of consumption (e.g. Lee, Greely and Oei, 1999). Whereas, others purport that the role of NAEs in drinking patterns is less clear and less influential than PAEs (e.g. Goldman et al., 1999). This issue will be discussed in a subsequent section.

The establishing of expectancies through experience is probably not a conscious process, but the use of stored expectancies (once established), probably is - at least when individuals are asked to fill in expectancy questionnaires. The fact that the use of expectancies has a conscious component (or possibly many different conscious components) has led some to believe that the way expectancies have been measured in alcohol research (with questionnaires) is of doubtful validity. This issue is particularly relevant when researchers are trying to understand the cognitions that occur at drinking decision time. Because an individual endorses a particular expectancy item in a questionnaire, this does not

mean that the particular expectancy item will feature at drinking decision time. Consequently, the use of alcohol associations rather than expectancies for

explaining alcohol consumption variability has been proposed (e.g. Stacy et al., 1995). It is thought that the process used to measure associations might be a more valid way of measuring stored information of the sort that might have influence at decision time.

1.3 Memory associations - Set within a cognitive- neuroscience framework.

Through understanding how memory associations are formed, one might gain a fuller understanding of their role in decisions concerning whether to consume alcohol. Therefore, the formation of alcohol memory associations will be discussed below. This will be followed by a consideration of how this type of research can aid in understanding individual differences in consumption level.

In comparing addictive behaviour to highly skilled behaviour (Tiffany, 1990) the pathway for the joining of implicit memory research with addiction research was opened. If one adopts Tiffany's view and recognises that addictive behaviour is like skilled behaviour, it is possible that the processes involved in making decisions to consume alcohol may not be open to introspective investigation, which underpins the type of self-report response that is required for completing expectancy questionnaires.

Association research addresses this issue through assessing memory associations between alcohol use and usual outcomes using implicit paradigms. The association approach to alcohol use is derived from theories which suggest that repetitive experience strengthens the association between concepts in memory (e.g. Hopfield and Tank, 1986, Stacy, 1995). Stacy points to theories such as, Bolles' (1972) Expectancy Approach and Hopfield's Network Model (Hopfield and Tank, 1986), to show how repetitive behavioural experience can affect and influence behavioural decisions. Implicit approaches to measuring alcohol-related memories have been utilised as they provide a means of assessing past events that affect present responses and cognitive process without the individual being aware that previous experience is being assessed (Greenwood and Banaji,

1995). This is not the case when alcohol-related memories are measured using explicit paradigms as it is made clear, through the items of the questionnaire, to participants that alcohol memories are being addressed. Measures of implicit cognition assess performance on tasks in order to form judgements about internal, non-conscious processes (Sayette, 1999). Generally these tasks present ambiguous information to participants who are usually unaware that they are relying on past experiences to respond and are unaware of what the core experimental features of the task are.

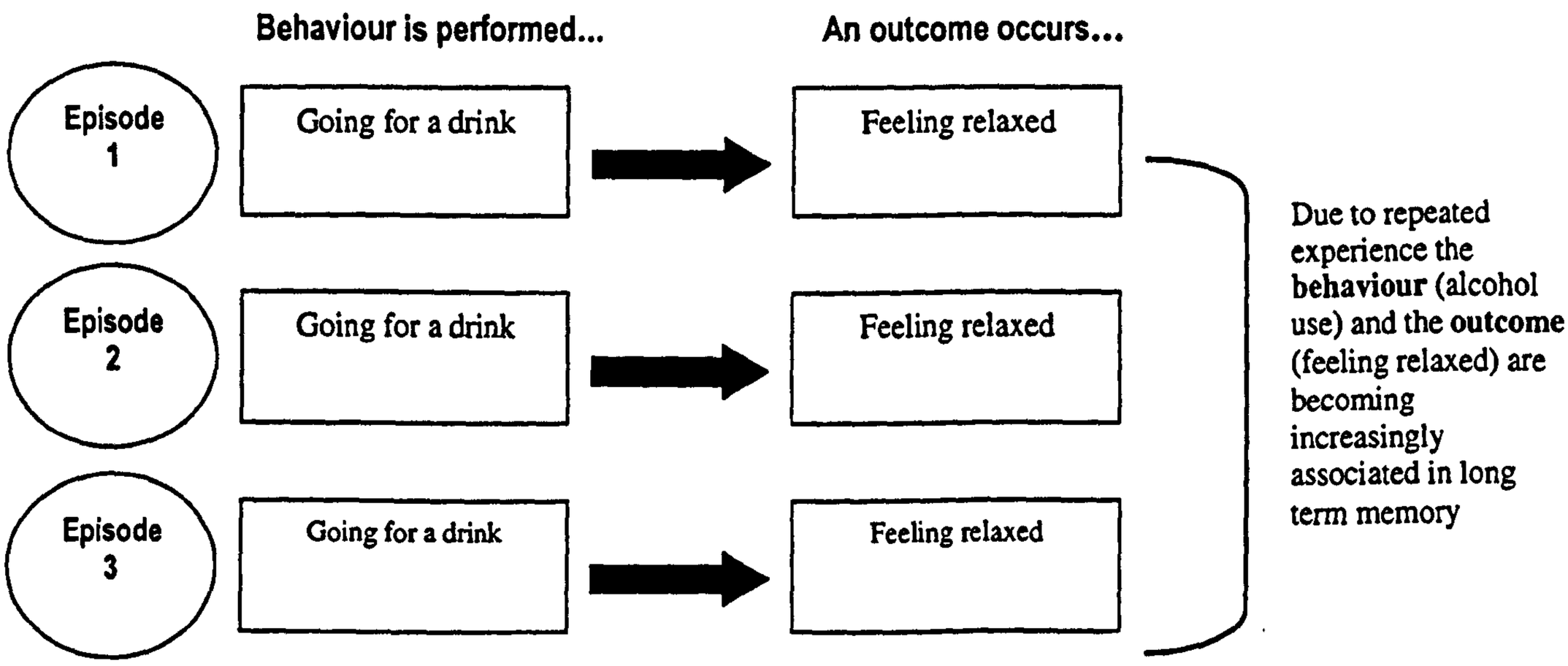
One such task is the word association task. In this task, individuals are presented with a word (for example, 'shot') and asked to write down the first word that it makes them think of (for example, 'whiskey'). Word association tasks and associated implicit memory paradigms share the same underlying function in terms of the information that is provided. It is thought that individuals have greater perceptual sensitivity to stimuli that is relevant to their concerns and interests (Sayette, 1999). Therefore, with reference to word association tasks, a participant who is a heavy drinker may spontaneously think of the word 'whiskey' when shown the word 'shot' whereas a light drinker may think of a word which is unrelated to alcohol, such as 'gun'.

Like expectancies, *memory associations* are also formed through experience. Associations develop between a behaviour and an outcome of the behaviour (see Figure 2.). With increasing behavioural experience concepts become strongly associated in memory with the outcome, to the extent that thoughts about the outcome can activate or prime thoughts about the behaviour (Stacy, Leigh and Weingardt, 1994). Hence, the more associated an outcome is to the behaviour that produces it (due to repeated experience/exposure), the more likely thoughts about the outcome will mediate future behaviours as this is the behavioural choice that is likely to come to mind when associated outcomes are presented or considered.

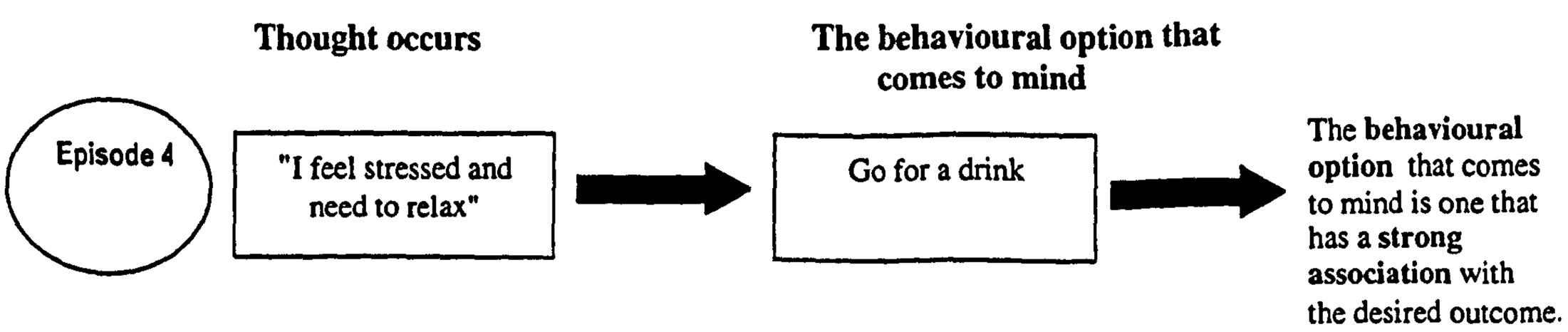
In terms of alcohol use, when consumption behaviour produces a behavioural outcome (for example feeling relaxed) the more often the behaviour and the outcome occur together the stronger the two concepts become in memory.

Therefore with repeated experience of the behaviour (e.g. alcohol use) and the behavioural outcome (e.g. feeling relaxed), these concepts become increasingly associated in association memory. When there is a strong association between the behaviour and the outcome, thoughts about the outcome can prime or activate thoughts about the behaviour. Figure 2. further demonstrates how alcohol memory associations are formed and strengthened.

Figure 2. The formation and strengthening of alcohol memory associations.



If this association is symmetrical then the strength of the association should be reflected in the degree to which a behaviour and a potential outcome of that behaviour act as memory cues or primes for one another (Stacy et al., 1994).



How associations are further strengthened can be understood when an encoding bias view is adopted (Marlatt and Rohsenow, 1980). As with expectancies,

initially weak associations between alcohol use and available outcomes are perpetuated and strengthened through the continued encoding of cogntions (labelled feelings such as relaxation) that are activated or retrieved during drinking episodes. Marlatt and Rohsenow assert that these cognitions are retrieved in situations based on previously acquired associations with that situation.

When assessing how memory associations might contribute to behavioural decisions, it is important to make a clear distinction between *availability* and *accessibility* with reference to information in ones' memory storage. *Availability* can be defined as the presence of information in memory storage, which is necessary but not sufficient for information to be remembered or used at a given moment. *Accessibility* can be defined as the extent to which information can be accessed from memory and is necessary in order for prior experiences to influence present situations.

The concept of accessibility is relevant to alcohol use because of its emphasis on the highly conditional nature of memory retrieval or activation (Stacy et al., 1994). For example, the majority of individuals who consume alcohol, will know that a positive outcome of alcohol use is feeling relaxed. However, what distinguishes heavy drinkers from light drinkers is the strength of the association between these two concepts in memory. In line with the assumptions of the Alcohol-Related Association model of alcohol use (e.g. Stacy, 1995) if a behaviour and an outcome of that behaviour are strongly associated in memory, this means that thoughts about either the outcome or the behaviour are more accessible and therefore more likely to bias behaviour. Hence heavier drinkers would be more likely to consider having an alcoholic beverage in order for them to feel relaxed in comparison to a light drinker even though a light drinker will have the information "available" in memory that alcohol can help them to relax.

Therefore, when assessing the strength of the relationship between alcohol use and related outcomes, of great importance is how accessible the two concepts are in memory. To assess strength of accessibility, established methods from memory research, such as free association or recall, have been utilised. Such

methods ensure that memory for previous experiences is assessed without the participant making explicit assessments of their own behaviour. Additionally, cognitive processes that may be unavailable to introspection may be assessed (Stacy et al. 1994).

Memory associations regarding features of alcohol use should be predictive of alcohol consumption levels because this approach enables one to examine memory processes that are thought to be involved in decisions to consume alcohol. Therefore heavier drinkers should have stronger associations between alcohol use and associated outcomes, which should be measurable, based on the relative accessibility of the associated memories.

Previous research on associative memory responses to alcohol use has demonstrated a direct relationship between alcohol consumption level and accessibility of positive concepts (Stacy et al. 1994) and negative alcohol-related outcomes of alcohol use (Leigh and Stacy, 1998). Both studies concluded that heavier drinkers when presented with potential outcomes of alcohol use (e.g. feeling happy) were more likely to write down an alcohol related association to the given outcome than light or non-drinkers. Studies have also shown that this approach can significantly predict level of alcohol and marijuana use among drug offenders (Ames and Stacy, 1998). In common with expectancy research, research into the role of positive memory associations in decisions to consume alcohol appear to be receiving more attention than negative memory associations. This may be due to the precedent that has been set by expectancy research, however this issue will be examined in more detail in following sections.

To fully assess these two approaches, empirical research and methodological practices will be assessed in the next two chapters - expectancies in Chapter 2 and associations in Chapter 3.

Chapter 2 - Alcohol consumption outcome expectancies.

Chapter Summary

Alcohol memories are thought to influence future consumption. The two major contending representations of alcohol memory research, as described in the preceding chapter, are 'expectancies' and 'associations'. The goal of this chapter is to present and critically evaluate empirical findings relating to alcohol consumption outcome expectancy. Firstly, research that centres on pre-adolescent alcohol expectancies and future drinking behaviour will be reviewed in order to illustrate how expectancies are formed and how they might be viewed as being predictive of future drinking. Next, studies that examine the role of negative alcohol expectancies (NAEs) and positive alcohol expectancies (PAEs) in relation to alcohol use will be reported.

To assess which alcohol expectancies are held and how they relate to consumption, the traditional approach has involved the use of explicit questionnaires. Recently many questions have been raised regarding the suitability of an explicit approach as a means of measuring alcohol expectancies. Therefore, main methodological-related problems will also be discussed. The extent to which alcohol expectancies (even when measured validly) actually influence behavioural decisions has also been questioned, for it is held that expectancy research may not adequately reveal the underlying decision making processes (or the components that are involved) that contribute to decisions to consume alcohol. Consequently, criticisms of this approach as an explanation for alcohol use will also be reviewed in this chapter.

2. *The role of alcohol outcome expectancies in alcohol consumption variability.*

> *Alcohol expectancies function has been viewed as a bridge or a transition intervening variable that serves to link experiences regarding alcohol use obtained at one point in life with a later point when actual decisions to drink are made and when alcohol behaviours are emitted."* (Christiansen and Goldman, 1983, p. 93)

Three areas concerned with alcohol expectancies and alcohol consumption levels will be examined. Firstly, information concerning the origin of alcohol expectancies will be presented. Studies concerned with pre-adolescent and adolescent alcohol outcome expectancies will be reviewed as these studies demonstrate how alcohol expectancies might be formed, prior to direct consumption experience. Relevant longitudinal studies, which examine pre-alcohol use expectancies with actual alcohol consumption level, will also be reviewed. These studies help assess whether or not expectancies change as a result of age or whether expectancies change as a result of alcohol use. By establishing this relationship the issue of whether alcohol expectancies mediate or moderate alcohol use becomes clearer. Research that examines the relationship between alcohol expectancies held by an individual and actual alcohol consumption use will then be reviewed. Finally, a summary of the discussed research will be presented which will include major empirical findings and a general critique of the materials and research methodology which is implemented in this area. However, prior to reviewing these three areas, information regarding the assessment tools used to measure alcohol outcomes consumption expectancies will be presented.

2.1 Scales for measuring alcohol consumption outcome expectancies.

The methodological approaches that are utilised in this research area are well established. Generally, the research techniques used in this area are explicit in nature as alcohol expectancies are mainly assessed using forced-choice questionnaires. This approach relies on self-reported introspection that requires participants to articulate what they have experienced during a study (Sayette 1999). The Alcohol Expectancy Questionnaire (AEQ, Brown et al., 1987) is the

questionnaire that has been used in at least 80% of the expectancy research and on which most subsequent research tools have been modelled. Consequently, the formation and framework of this tool will be reviewed below.

2.1.1 The Alcohol Expectancy Questionnaire (AEQ, Brown et al., 1987).

The adult form of the AEQ (Brown et al., 1987) is the most frequently used alcohol expectancy measure. It is an empirically-derived, self-report questionnaire, which assesses diverse anticipated experiences that are associated with alcohol use. The questionnaire is used to investigate "*the reinforcement expectancies which people hold with respect to alcohol*" (Brown et al., 1987). In constructing this questionnaire a four-phase process was carried out. A summary of each phase will now be provided.

In the first phase, 25 participants (a combination of students and individuals in an alcohol treatment program) were asked to report positive outcomes of alcohol use (subjective changes they experienced when drinking alcohol). From the composite list that this procedure generated, 216 items were structured into statements for use within a subsequent exploratory questionnaire. In the second phase this exploratory questionnaire was administered to 400 subjects. Item analysis was used to further condense the list. Analysis indicated a pool of 90 items. In the third phase information from the previous phase was used to refine the existing exploratory questionnaire to a total of 90 items. A further 450 participants completed this more compact questionnaire. In phase four the results were analysed using factor analysis. From this procedure a 6-factor solution was derived. This statistical process indicated that alcohol expectancies could be grouped into six subtypes, which are listed below:

(i) Global Positive Change- depicts alcohol as a positive transforming agent.

(ii) Physical and Social Pleasure- factor depicts alcohol as a pleasure enhancer and social lubricant.

(iii) Sexual Enhancement- breaks down barriers for meeting others, enhances sexual performance and enjoyment.

(iv) Increased Social Assertiveness- alcohol is viewed as a social facilitator.

(v) Relaxation and Tension Reduction depicts alcohol as an anxiolytic by relieving tension and aiding sleep.

(vi) Arousal and Aggression- alcohol gives the individual power over others.

The final format of the AEQ is a 90-item questionnaire. Items representing each factor are randomised throughout the questionnaire. It has a forced choice 2-point scoring system, where the subjects answer "agree" if they sometimes or always experience the effect described in an item or 'disagree' if they never experience the effect. The AEQ only measures positive alcohol expectancies (PAEs) of alcohol use as it is assumed that people drink alcohol because of expected positive reinforcement (Goldman et al., 1987). This format has been copied and utilised for most other questionnaires, including a version created for adolescents, the Adolescent Form (AEQ-A) and versions that incorporate both positive and negative outcomes (Southwick, Steele, Marlatt and Lindell, 1981; Young and Knight, 1989; Fromme, Stroot and Kaplan, 1993).

2.2 The aetiology of alcohol expectancies.

Although expectancies can be formed through direct experience with alcohol (e.g. Goldman, Brown and Christiansen, 1987), it has also been found that alcohol expectancies exist before actual drinking behaviour has commenced in an individual's life (e.g. Query, Rosenberg and Tisak, 1998; Schafer and Leigh, 1996; Dunn and Goldman, 1998). These studies provide a valuable starting point for establishing the role of expectancies in alcohol use.

Expectancies or expectancy-like information has been detected in pre-school children (e.g. Zuckner, Kincaid, Fitzgerald and Bingham, 1996), elementary-school-aged children (e.g. Dunn and Goldman, 1996) and junior high school students (e.g. Christiansen, Smith, Roehling and Goldman, 1989) even before they begin to experiment with alcohol. Such studies demonstrate that expectancies can be acquired before drinking commences, presumably through observing family, friends, and aspects of the general culture. Although it has been demonstrated that children and pre-alcohol users possess alcohol expectancies, it is likely that expectancies held at this age change to some extent once drinking behaviour begins.

A study conducted by Miller, Smith and Goldman (1990) showed that a shift in expectancies held occurs before actual alcohol use begins. This study was based on the premise that through examining young children's expectancies one would be able to see how these expectancies affect later (first) drinking experience. Their research sample consisted of 89 elementary school children, from grades 1 through to grade 5 (age range 5-10 years). Using an adapted version of the Children's Alcohol Related Expectancy (CARE) procedure, Miller, et al. concluded that elementary school children endorsed more desirable expectancies then younger elementary school children. They highlighted the fact that there was a notable increase in endorsement of desirable expectancies in the third and fourth grade. An increase in desirable expectancies appears to occur within the pre-alcohol use time frame. This finding was replicated by Kraus, Smith and Ratner (1994).

Query, et al. (1998) have offered possible explanations for this result. They postulate that the increase is due to the way that pre-adolescent children begin to understand and process information around them. It is possible that children at this age are becoming more aware of advertising and are become increasingly influenced by models. Indeed, the role of peer groups has been identified along with the role of immediate family members as two major factors that influence alcohol use (Ellickson and Hays, 1991). An alternative explanation is that individuals in this age group are beginning to consume alcohol. However a survey conducted by Johnston, O'Malley and Bachmman (1992) of American students found that only a small percentage of students drink alcohol prior to the 7th, 8th and 9th grade levels (age 12 to 14 years). Therefore it would seem that another variable is contributing to the change in alcohol expectancies prior to alcohol use.

A study conducted by Dunn and Goldman (1998) which examined PAE and NAEs for 3rd, 6th, 9th and 12th grade children lends support to the fact that there is an increase in the range of expectancies held both prior to and after alcohol use has commenced. This indicates that both modelling (vicarious learning) and actual consumption (direct learning) play their part in laying down memories as

expectancies. However, to properly address the relationship between experience and consumption it is necessary to examine results from longitudinal studies.

2.3 Evidence from longitudinal studies

Longitudinal studies provide a much greater base for understanding how alcohol expectancies can affect future alcohol consumption. These studies are viewed as being more persuasive of a causal connection between expectancies and drinking than cross-sectional studies (Jones, Corbin and Fromme, 2001; Goldman et al., 1999). Research has shown that expectancies can longitudinally predict alcohol consumption and associated problems, when the role of expectancies as a theoretically active (causal) variable becomes more substantiated (Christiansen et al., 1989). In general, longitudinal research, in this area has focused on adolescents, as during this age drinking behaviour has not yet begun but is likely to commence within a couple of years time.

A number of longitudinal studies have been conducted to examine the view that expectancies have a causal role in drinking behaviour. Pre-drinking expectancies have been found to predict the likelihood of drinking onset and consumption level, once drinking has begun (e.g. Christiansen et al., 1989). Expectancies were also found to be predictive of drinking problems in adolescents (Brown, Creamer and Stetson, 1987). Moreover, research has shown that expectancies endorsed by adolescents predicted alcohol use patterns better than demographic information, such as social status (Christiansen, et al., 1982; Christiansen and Goldman, 1983).

Christiansen et al. (1989) conducted a study that took place over a two year time period with participants who were judged to be on the threshold of beginning to consume alcohol. In total 687 participants took part in both the first year and second year samples. Participants were from the seventh and eight grades (age range 12-14 years old). To assess alcohol expectancies, each participant completed the Adolescent Form of the AEQ (AEQ-A, Goldman et al., 1987). The participants also completed a demographic style questionnaire (age, sex, religion, etc) and a drinking style questionnaire. The drinking style questionnaire was used to assess whether the participants had already began to use alcohol and

also to assess the amount and frequency of alcohol use, where applicable. The participants were repeatedly ensured that all information provided was confidential, in order to obtain accurate and reliable responses in the aforementioned questionnaires. The results indicated a longitudinal prediction at a level that is sufficient to support the possibility of a true cause. However, only PAEs were assessed.

Most longitudinal studies have examined the role of PAEs in consumption while neglecting NAEs. A study conducted by Schafer and Leigh (1996) indicates that adolescents (aged 12 -17 years) and young adults (18-30 years) hold both positive and negative alcohol expectancies (NAEs). Previous research indicates PAEs can perpetuate alcohol use, whereas negative expectancies represent an important component of motivation to restrain (reviewed by Jones and McMahon, 1998). These studies reinforce the need to assess the relationship between PAEs and NAEs in connection to future or present alcohol consumption.

2.4 Children of alcoholics and alcohol expectancies - An alternative look at vicarious learning and future alcohol consumption.

One area of pre-adolescent expectancy research, which appears to assess both PAEs and NAEs, are studies concerned with the type of alcohol expectancies that children of alcoholics (COAs) hold. Children of alcoholics are known to be at a high risk for problem drinking (Schuckit, Marc and Smith, 2001a; Schuckit, Marc and Smith, 2001b). In line with alcohol expectancy research, a correlation between PAEs and drinking level is generally found (e.g. Palfai and Wood, 2001) with a higher endorsement of PAEs correlating with a greater alcohol consumption level. Based on this framework of alcohol use together with the fact that children of alcoholics are at a greater risk of problem drinking than control groups, one might expect that these individuals would have higher PAEs in direct comparison with a control group.

Research looking at COAs provides pertinent information, primarily for three reasons. Firstly, this group are likely to experience both negative and positive outcomes of alcohol use, more so than average. Secondly, they are more likely

to have had more alcohol-related experience, in terms of situations and instances witnessed. Finally, information obtained from studies using COAs as participants can add to information supporting or rejecting the role of alcohol expectancies as a mediator of alcohol use. As this group is thought to be more at risk for problem and abusive drinking, studies which examine pre-alcohol use expectancies, can help determine whether expectancies are causal in terms of decisions to consume alcohol. As pre-alcohol use expectancies are largely derived from vicarious learning, it is reasonable to ask whether expectancies endorsed by COAs differ from those of a control group.

Some researchers have postulated that COAs hold more PAEs than controls participants (Mann, Chassin and Sher, 1987). This prediction would appear to have some grounding when one examines psychological explanations (e.g. learning explanations) for alcohol use rather than genetic and/or medical explanations. However, as these pre-alcohol use expectancies derive from vicarious learning (Goldman et al., 1987) this prediction does not make sense intuitively as COAs are likely to indirectly experience the negative aspects of alcohol use more often than the positive consequences. Hence one would assume that overall, these children are more familiar with alcohol use. Indeed, research has shown that COAs have more elaborate cognitive schemas concerning alcohol use than control samples (Zuckner et al. 1995). During childhood, primary models are likely to be parents or main carers. Consequently a lot of what is experienced about the world will derive from the home. Hence one would assume that COAs would hold more negative expectancies of alcohol use in comparison to positive expectancies and also in comparison to a control sample.

A study conducted by Wiers, Gunning and Sergeant (1998) investigated whether COAs' vicarious negative experiences with alcohol would result in more negative expectancies due to aversive learning. Two age groups of 7-11 and 12-18 year olds were recruited to investigate this issue. An adolescent expectancy questionnaire was developed which measured both positive and negative expectancies. Alcohol use was measured using a self-report questionnaire. Wiers et al. found that young non-drinking COAs had stronger NAEs compared

with a control group. With reference to the older, drinking COAs, no differences were observed in terms of expectancies held between them and their peers. It was hypothesised that drinking COAs would hold stronger PAEs than the control group due to possible physiological differences that may be observed between the two groups.

In line with these results, an important question to ask is how the existence of strong negative expectancies would relate to the enhanced risk for later alcohol related problems and to strong positive expectancies found with older adults (Reese, Chassin, Molina, 1994). Wiers et al. have developed a model of alcohol use to explain how COAs can go from holding strong pre-drinking NAEs to possessing strong PAEs in adulthood. They postulate that before COAs consume alcohol, they have more negative expectancies than other children, due to aversive modelling of parental alcohol use. They propose that alcohol expectancies of all children are predominately negative before direct experience with alcohol use has commenced. However COAs are thought to be even more negative. Once COAs begin to experiment or use alcohol, differences associated with the physiological response to alcohol come into play. When alcohol consumption commences the positive aspects of alcohol use become apparent (Sher, 1991). Wiers et al. postulate that this favourable response to alcohol use is likely to enhance the development PAEs.

It is possible that this model holds true for all levels of alcohol users, as it is assumed that the alcohol expectancies formed once drinking has commenced contribute to decisions to consume alcohol. Based on the information presented thus far it would appear that there is a shift in alcohol expectancies prior to onset of actual alcohol use (Miller et al.1990; Kraus, Smith and Ratner, 1994). This would indicate that alcohol expectancies stabilise once actual experience with alcohol commences. Various explanations have been offered to explain this shift, with the majority highlighting the fact that it is during this age that children develop a more mature outlook of life. However, it must be recognised, that information from longitudinal studies shows that there is a direct relationship between pre-alcohol use expectancies and early actual consumption level. Although the information presented this far does not entirely support the view

that alcohol expectancies mediate alcohol use, it would appear that alcohol expectancies, which do affect decisions regarding alcohol use, are formed once drinking behaviour has begun.

In the next section research which examines the relationship between PAEs and alcohol use and NAEs and alcohol use will be discussed. As PAEs and NAEs are thought to operate separately and contribute differently to decisions to consume alcohol, information concerning the role of both types of alcohol expectancies will be presented seperately.

2.5 Positive and negative alcohol expectancies and alcohol consumption level - Are both important?

Through vicarious learning and direct experience with alcohol use, individuals come to develop a number of expectancies about specific positive and negative effects of drinking (Palfai and Wood, 2001). It is important that positive and negative expectancies are not viewed as polar opposite effects (as some have, for example, Southwick et al., 1981). Positive effects are more proximal whereas negative effects are more distal in nature as they tend to occur later in a drinking session or the next day. On the whole, PAE research has received the most empirical attention. This may be due to the point that expectancy based approaches generally target the incentive value of drinking (Goldman, 1994).

A vast array of literature indicates that there is a significant relationship between alcohol use and PAEs. PAEs have been closely associated with consumption patterns in adults (for review see Goldman et al., 1999; Jones et al., 2001) and can also be viewed as a reliable predictor of future consumption patterns in adolescents (Christiansen et al. 1989). PAEs have also been closely associated with consumption patterns in adults and college students (Palfai and Wood, 2001). This relationship is visible using several different assessment instruments, across different sample populations (e.g. adolescents, adults, and clinical sample, (Maisto, Carey and Bradizza, 1999).

McCusker (2001) states that positive outcome expectancies for engaging in the behaviour together with minimised negative expectancies and poor self-efficacy

maintain addictive behaviour. As negative outcomes of alcohol use are evident and known by individuals an important question to ask is how could they not contribute to decision/motivation to consume or to abstain from alcohol use. Goldman et al. (1999) assert that negative outcomes may be less predictive than positive as they largely refer to delayed or highly intermittent consequences of drinking (e.g. trouble with the police) rather than regular proximal effects (e.g. having fun). However the fact that negative expectancies occur and are recognised by individuals would ensure that some sort of association between alcohol use and negative outcomes should occur.

Although research into positive expectancies is generally consistent the role of negative expectancies is less clear and results somewhat inconsistent. Some researchers propose that negative expectancies make an important contribution to explanations of consumption (e.g. Adams & McNeil, 1991; Fromme et al. 1993; McMahon and Jones, 1993; Jones and McMahon, 1994; Lee, Greely and Oei, 1999). It is thought by some that positive expectancies might initiate drinking episodes whereas negative expectancies might serve to limit the amount consumed. Indeed, McMahon and Jones (1994) argue that it is the accumulation of negative expectancies that causes problem drinkers to (eventually) stop. However, others write that the role of negative expectancies in drinking patterns is unclear and less influential than positive expectancies (e.g. Goldman et al., 1999).

Although NAEs are significantly associated with drinking in adolescents and young adults, they typically account for less variance than PAEs (Leigh and Stacy, 1993; Rather and Goldman, 1994), although Grube, Ames, Delany (1994) show that negative expectancies are better associated with alcohol consumption level than positive expectancies. For certain types of drinkers, both expectancies differentially associate with quantity and frequency of drinking. Lee et al. (1999) conducted a study in order to examine proportion of variance that could be explained by positive and negative expectancies using a Drinking Expectancy Questionnaire (DEQ) (Young and Knight, 1989) which measured both positive and negative expectancies. The questionnaire consisted of 43-items. Participants responded to each item using a likert scale. The results showed that expectancies

were strongly related to measures of consumption after influence of age, gender and dependence on alcohol were accounted for. Both positive and negative expectancies were related to quantity and frequency of consumption. They showed that negative expectancies accounted for more variance in frequency of consumption whereas positive accounted for more variance in quantity per session. The researchers concluded that it was difficult to establish an overall pattern that related all positive or negative expectancies to consumption. Overall, the data showed that positive and negative expectancies are both important in explaining a number of aspects of drinking behaviour. The authors concluded that it may be more beneficial to examine the role of subtypes of expectancies in relation to drinking behaviour rather than look at positive expectancies collectively in direct comparison to negative expectancies.

Amongst those who recognise the need for the inclusion of negative expectancies in questionnaires are Wiers, Sergeant and Gunning (2000). They highlight three reasons or justifications for the inclusion of negative expectancies in tools, which measure alcohol expectancies. Firstly, they cite the need to adhere to guidelines that are present for the construction of questionnaires, which includes the use of positive and negative (or contradictory) items to minimise a positive response bias (Cronbach, 1990). Secondly they state that previous research has demonstrated that negative expectancies are important with respect to an individual's decision to refrain from drinking (Jones and McMahon, 1994) and are likely to be relevant with respect to the initiation of drinking (Wiers et al. 1998).

As a final reason for the inclusion of negative expectancies in such questionnaires they cite research that has shown that negative views of alcohol exist prior to alcohol use itself. Although few studies have assessed children's expectancies, relevant research has shown that children do possess negative attitudes concerning alcohol use (e.g. Query et al. 1998). In addition, surveys of the general population have found that substantial alcohol use results in more positive and negative consequences being experienced (Midanik and Clark, 1995).

Jones et al. (2001) have identified two pertinent reasons that the majority of research in this area has only examined the role of positive expectancies. Firstly, the view that immediate positive consequences are thought to influence behaviour more strongly than delayed negative effects (Rohsenow, 1983) has directed research goals in this area. This assumption is known as the *Accessibility Hypothesis* with the rationale stemming from the *Immediacy Assumption.* This theory is based on the fact that positive affects of alcohol are more immediate than negative affects and hence more powerful in their influence on behaviour. Support is derived from Tulving's *Encoding Specificity Principle* (1983). As positive effects of alcohol are more immediate and occur earlier in drinking sessions (Marlatt 1992) it is likely that at the start of subsequent drinking sessions thoughts about positive effects of alcohol use will be more accessible than negative. This is because time of retrieval will be similar to time of encoding. The second reason that Jones et al. (2001) highlight is more practical in nature and involves the type of measurement tool which is generally implemented in this area. They state that:

> *"...research emphasis on positive expectancies also stems from an overwhelming reliance on the Alcohol Expectancy Questionnaire* (AEQ, Brown et al., 1987*) which was designed to assess only positive expectancies .*
> (Jones et al., 2001, p. 62).

Recently the methodology that has been developed to assess alcohol expectancies has come under serious criticism (e.g. McCusker, 2001). The different research tools themselves have also been cited as a possible confounding variable for the inconsistent findings that have been found for NAEs and consumption level (Lee et al., 1999). The issues that surround the methodology utilised in this area will now be reviewed.

2.6 Methodology and related problems

Queries have been raised concerning the suitability of the traditional explicit questionnaire approach. Perhaps the most salient issue in this methodological debate centres on the fact that participants are asked to rate and endorse outcomes that are explicitly stated to be of alcohol use. It is unlikely that this approach validly reflects the cognitive processes and propositions which actually

motivate ongoing behaviour (McCusker, 2001). As questions are asked in an explicit manner, it is possible that cognitive dissonance (among other processes) occurs. For example, an individual completing the questionnaire might assume that it is hypocritical to possess negative views of alcohol use if they themselves consume alcohol on a regular basis. Also due to the explicit nature of this approach individuals responding to the questionnaire are able to consider how the response they make reflects on them as an individual. It is possible that individuals will evaluate their own behaviour in relation to their peers as a means of assessing how they behave when they consume alcohol. As they are able to make comparisons between themselves and others, this might result in unsubstantiated and inaccurate responses to the questionnaire items. In addition, the negative outcomes incorporated in expectancy questionnaires are often the type of outcomes that would generally not be encountered by the average drinker and would perhaps be more applicable and relevant to a problem drinker.

Other pertinent issues that McCusker highlights also involve the methodology that is commonly utilised in this research area. As individuals can contemplate their response and are aware that their views of alcohol use can be put under scrutiny, it is possible that responses reflect socially-held norms rather than personal beliefs. Or, and this is not necessarily the same point, responses may not accurately reflect what the individual thinks but rather what they would like others to think that they think.

Another difficulty with the explicit approach is that responses made to earlier test items may prime or falsely bias responses made to later items or questions (Bargh, Bond, Lombardi, and Tota, 1986) as participants try to paint a consistent picture. Again it is possible that this is a common issue with many empirical approaches. However, as the task is explicit, priming and subsequent conscious biasing effects are increased rather than minimised.

An additional issue has been raised concerning the explicit questionnaire measure as a whole. It has been acknowledged that the by providing a set of responses (in the form of a scale) it is possible that respondent's answers are being cued (Crawford, 1984). The expectancy items that are exhibited to

individuals may not be present in an individuals set of thoughts and, even if available, may not be important (Leigh and Stacy, 1994). Yet many unknown alcohol expectancies will be endorsed.

Issues have also been raised which question whether responses to explicit questionnaires actually reflect memory processes at all. Many psychological processes may influence responses to such instruments, including those that produce error variance. Some may mask memory effects, for it is possible to respond to such instruments without assessing long term memory (Rather & Goldman, 1994). This would lower the relationship between the predictor and the criterion, as this would introduce variation not related to the criterion. Goldman et al. (1999) state that based on research findings in the field, the issue of questionnaire reliability should not be an issue of great importance as *"Robustness of the relationship observed between expectancies and drinking suggests otherwise" (p. 230)*. This does, though, confuse validity with reliability.

If memory accessibility is an important aspect of the decision to consume alcohol, then Leigh and Stacy (1994) observe that the standard expectancy questionnaire does not enable this aspect to be measured as alcohol expectancies are explicitly stated nullifying any accessibility differences. McCusker (2001) also supports this view, finally questioning whether personal judgements which are made in response to questionnaire items actually demonstrate the type of propositions which are accessible and retrievable from memory in drinking situations.

A defining feature of addictions is the continuation of the behaviour and or excessive engagement in it, despite consciously expressed intentions to abstain from it (McCusker, 2001). This may be indicative of underlying (unconscious) processes that govern behaviour which are outside conscious awareness and volitional control (McCusker and Getting, 1997). With reference to drink patterns which are not problematic (e.g. social drinking), the same underlying principles may also apply. If one acknowledges this view of alcohol use it would seem that traditional explicit expectancy measures are not appropriate tools to

assess decisions to consume alcohol as this process may not be open to introspection.

To summarise it would appear that there is empirical support for the role that alcohol expectancies play in decisions/motivation to consume alcohol. However it would also seem that there is a substantial amount of theoretical and methodological problem associated with this approach. This could mean that the strong relationship that is found is either an artificial or trivial. The specific aspects of the approach, which are problematic, can be summarised as:

(i) The participants are recruited into an explicit alcohol experiment (for example, the word alcohol appears in the participant recruitment advertisement).
(ii) The participants are welcomed, by the experimenter, into an explicit alcohol experiment.
(iii) The general instructions for the experiment make it clear that it is about alcohol use.
(iv) The questionnaire title contains the word 'alcohol'.
(v) Each questionnaire item is prefaced by the phrase "*If you were to go for a drink...*"

The fact that the deliberate manipulation of expectancies in treatment programs does not reliably affect subsequent consumption (reviewed by Jones et al., 2001) supports the view that the relationship between expectancies may not be causal.

An alternative approach, which also aims to identify what motivates an individual to consume alcohol is the alcohol memory association research (e.g. Stacy et al., 1994). This type of research will herein be referred to as the Alcohol-Related Association Memory model of alcohol use. As this model is implicit in nature, many of the serious, methodological problems detailed above are largely eradicated. By adopting implicit memory measures, one is able to make inferences about cognitive processes and structures based on behavioural responses rather than relying on self report measures and the introspection baggage it can carry with it (McCusker, 2001). By using this alternative approach a theory and model of alcohol use emerges which assesses how prior

experience with alcohol can affect future consumption. Through this model one can gain an understanding of the processes which cumulate and result in individual differences in consumption level. This model is described in the next chapter.

Chapter 3 - Memory Association Model of Alcohol Use.

Chapter Summary

In the previous two chapters information has been presented which indicates that using an explicit approach as a way of understanding individual differences in alcohol use may not provide a valid account of the cognitive processes that contribute to decisions to consume alcohol. In response to this, an alternative theoretical approach and model of alcohol use has been developed - The Alcohol-Related Association Memory approach (e.g. Stacy, Leigh and Weingardt. 1994). This implicit model has 'alcohol motivations' at its centre just as does the explicit model described in chapter 2.

The main objective of this chapter is to provide an overview of this theory of alcohol use. Background information, concerning the memory theories, underlying the principles of this model, will be introduced. The rationale behind the research reported in this thesis is a direct response to the empirical issues yet to be addressed in this area. This chapter concludes with a plan of the four experiments reported in the remainder of this thesis.

3. Alcohol use and memory associations.

The Alcohol-Related Association Memory model of alcohol use (Stacy, Leigh and Weingardt, 1994) is an implicit model. It is theoretically grounded in and supported by established memory theories (Bolles, 1972, Hintzman, 1986; Hopfield and Tank. 1986). First, these grounding and supporting aspects will be discussed. Major aspects of this model (how memory associations are formed between alcohol use and common outcomes and the manner in which established memory associations can contribute to decisions to consume alcohol) will then be discussed. Lastly, empirical work in this area will be reviewed.

3.1 Relevant memory theories – The contribution of memory theories to understanding alcohol consumption variability.

The memory association approach to alcohol consumption (with reference to what motivates an individual to drink) contains processes that link lexical and conceptual aspects of memory (e.g. how alcohol makes you feel) to behavioural experiences and motivation (e.g. consuming alcohol). Within the memory association approach to alcohol use the following memory theories are utilised as a means of explaining the dual relationship that occurs between memory for an event and memory for a cue or an associated outcome - for example, Bolles' (1972) expectancy approach, Hintzman's (1986) episodic view of memory and Hopfield Network model (Hopfield and Tank, 1986). Stacy (1995) writes that these memory models show how repetitive experiences with a behaviour (e.g. alcohol use) may influence associations in memory between cues (for example the smell of beer or how it makes you feel) and the behaviour (alcohol use).

3.1.1 Bolles expectancy approach (1972)

According to Bolles (1972), in order for expectancies to be formed and consolidated in memory, two events or concepts (a behaviour and an outcome or a behaviour and associated cues) have to occur within the same time period or during the same occasion. He established that a relationship could either occur between a cue (S) and a biologically relevant event (S*) or between a response (R) and a biological relevant event (S*). In this approach the strength of expectancies influence the likelihood of influencing subsequent behavioural responses. Situations in which similar cues (such as surroundings) are present

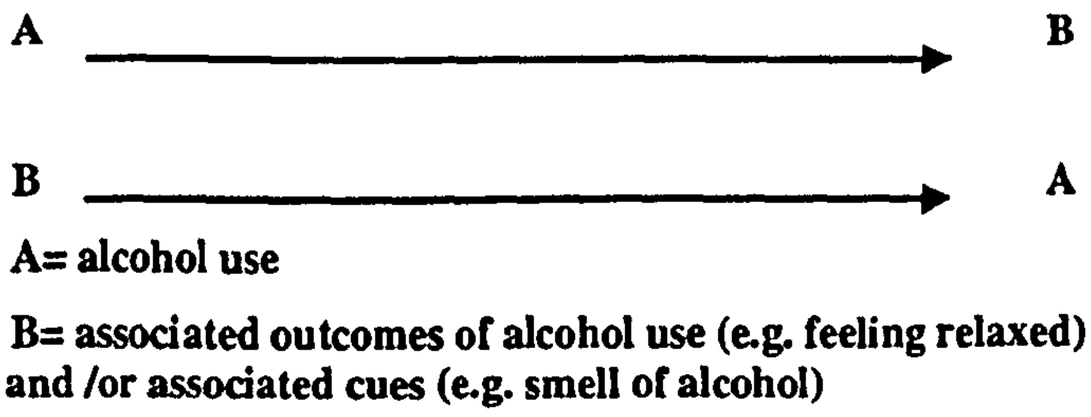
can activate the expectancy that has derived from previous experiences. It would appear that activation is unidirectional as a biologically relevant event can only activate a response. However, the response or outcome itself can not activate memories of the biological event. Although Bolles refers to these links as expectancies, they are principally of the unconscious kind and not like the expectancies referred to by most alcohol expectancy researchers.

3.1.2 Hintzman's episodic view of memory (1986)

In Hintzman's episodic view of memory the positive affect that occurs during a situation is encoded in conjunction with other features of the experience. Therefore, the outcome of the situation and relevant contextual features are encoded simultaneously. When a cue that was previously encoded is presented activation of the memories that were previously encoded alongside the cue are also activated; therefore other pertinent features of the situation are encoded in conjunction with the overall response, result or outcome of the situation.

In the Alcohol-Related Association Memory model a distinction is made between information that is *available* in memory and information that is *accessible* from memory, with reference to how and why certain information is retrieved from memory. In Chapter 3, *availability* was defined as the presence of information in memory storage, which is necessary but not sufficient for information to be remembered or used at a given moment. Whereas *accessibility* was defined as the extent to which information can be accessed from memory and is necessary in order for prior experiences to influence present situations. In accordance with Hintzman's model, each experience produces a separate memory trace and knowledge of abstract concepts is derived from a memory pool of traces at time of retrieval. When an individual is presented with a retrieval cue, all relevant traces are contacted, based on the number of similar features that they share with the present cue or situation. The information that is retrieved from memory reflects the summed context of all activated traces that respond in parallel. Based on the main concepts of this memory model one would expect to see differences between heavy and light drinkers in terms of memory traces concerning alcohol use and associated outcomes and cues.

According to the model of alcohol use developed by Stacy et al. thoughts about alcohol use (the behaviour) can spontaneously activate thoughts about outcomes of alcohol use (e.g. feeling relaxed). Likewise, thoughts about the outcomes of alcohol use (e.g. feeling relaxed) can instantly activate thoughts about alcohol use. This bi-directional relationship can be depicted as the following:



Hintzman's (1986) model can also be used to explain this feature of Stacy's model due to the fact that each experience is thought to produce a memory trace.

3.1.3 Hopfield and Tanks' parallel approach to memory (1986).

Hopfield and Tank's parallel approach to memory also contributes to the underlying theoretical principles of Stacy's model as affective features can be considered elements of a much larger pattern of neural activation and inhibition that accompanies an experience. What dictates the strength of the association between the behaviour and the outcome, based on this approach, is the number of times that the behaviour and the outcome have occurred concurrently. In this parallel approach to memory a dual process occurs; when a concept is activated from long-term it is simultaneously encoded. Therefore with repeated activation, the concept pairs are being repeatedly encoded and activated.

A major feature of both Hintzman's (1986) and Hopfield and Tank 's (1986) theories is that memories are encoded and activated in parallel across multiple types of experiences or features. Therefore the type of activation that can occur between concepts is unilateral. For example, a strong association can occur between a behaviour and features of the environment in which the behaviour is carried out. An alternative pairing may occur between a behaviour (alcohol use) and the way in which this makes an individual feel (relaxed). Also, due to the parallel manner in which concepts are encoded and retrieved simultaneously from memory, thoughts concerning the behaviour can be activated when

associated cues are encountered, as can thoughts about associated cues when the behaviour is contemplated or carried out. This parallel encoding and activation is essentially a type of associative memory process, which can be likened to the expectancy process of Stacy (1995).

3.2 How memory associations between alcohol use and associated outcomes and cues are formed.

Associations develop between a behaviour and an outcome of the behaviour. With increasing behavioural experience they strengthen to the extent that thoughts about the outcome can activate or prime thoughts about the behaviour (Stacy et al. 1994). Hence, the more accessible an outcome is (due to repeated experience and exposure) the more likely it is to mediate future behaviours as this is the behavioural choice that is likely to come to mind when associated outcomes are presented or considered.

How associations are strengthened can be understood through parallel memory theories. Initially weak associations between alcohol use and available outcomes are perpetuated and strengthened through the continued encoding of cognitions (labelled feelings such as relaxation) that are activated or retrieved during drinking episodes. These cognitions are retrieved in situations on the basis of previously acquired associations with that situation (Marlatt and Rohsenow, 1980). Cognitions need not have any physical or physiological basis but are simply retrieved in a situation on the basis of previously acquired associations with that situation (Stacy et al. 1994). In terms of alcohol use, when consumption behaviour produces a behavioural outcome (for example feeling relaxed) the more often the behaviour and the outcome occur together the stronger the two concepts become in memory. This is due to the fact that a parallel memory process occurs, which means that when information is being activated it is simultaneously being encoded. Stacy et al. (1994) cite the *Encoding Bias View* as being from this class of theory. In order for retrieval to occur the only requirement is that these cognitions have previously occurred in or due to the particular situation (Marlatt and Rohsenow, 1980). Therefore, with

reference to memory associations, ongoing retrieval and ongoing encoding result in the strengthening of the association between the behaviour and the outcome.

Therefore with repeated experience the behaviour (alcohol use) and the outcome (feeling relaxed) become increasingly associated in memory. When there is a strong association between these concepts, thoughts about the outcome can prime or activate thoughts about the behaviour. This is one aspect, which deviates from traditional expectancy theories. In the memory association approach to alcohol use a dual process can occur in which either part of the associated pair can activate or prime the other part. However, with the expectancy approach, it is the behaviour, which triggers thoughts of the associated outcomes of that behaviour. With reference to the actual pharmacological effect of alcohol it is likely that these effects will act in parallel with memories for the behavioural outcome (e.g. feeling relaxed) that occur when the drug is used. Therefore memory associations can be viewed as the visible markers or indicators of physiological-based memory associations (Stacy et al., 1994).

It is possible to view the link that is formed between alcohol use and related outcomes as resulting from conditioning. Glautier and Spencer (1999) view the relationship between alcohol use and behaviour as part of Associative Learning Theory (ALT). They assert that the relationship between the two related concepts develops through conditioning process. Therefore, a presentation of a conditioned stimulus (e.g. the smell of beer) evokes a response because it activates a representation of the unconditioned stimulus (the behaviour - drinking alcohol). When considering the possibility that the process that is occurring in the memory association model of alcohol use is due to classical conditioning it is feasible to view the model in terms of a behavioural approach to alcohol use. However, by viewing the model in this manner, important theoretical constructs may be lost, particularly the fact that a distinction must be made between information that is *available* in memory in comparison to information that is *accessible* from memory. It is this distinction between availability and accessibility, which differentiates heavy drinkers from light drinkers, in terms of decision-making processes. For example, both types of drinkers are likely to know that drinking alcohol can make you feel relaxed. However, the heavier

drinker is more likely to spontaneously think of going for a drink when feeling the need to relax in comparison to the light drinker. This is likely to result from the heavier drinker having had more experience with drinking alcohol and feeling relaxed. With repeated experience the behaviour and the outcome will become increasingly associated in memory, to the extent that thoughts about related outcomes (feeling relaxed) will readily trigger cognitions related to drug use (Stacy, Ames, Sussman and Dent, 1996). Hence, it is more appropriate to view this model of alcohol use within a cognitive neuroscience framework, rather than within a strict behavioural framework.

An alcohol research area that does draw on the principles of classical conditioning, is alcohol cue-reactivity research. Cue reactivity has been summarised as, "a dependent variable measured by physiological, behavioural and subjective report following exposure to contextual cues associated with alcohol", (McKay and Schare, 1999, p. 635). A core assumption of cue-reactivity theory is that stimuli previously associated with drug taking will elicit distinctive patterns of responses because of the drug users history or experiences with those stimuli (Glautier and Tiffany, 1995). In line with the assumptions from this theory, it is proposed that through the process of conditioning, the alcohol-related stimuli can elicit conditioned responses which can increase the likelihood for drug self administration (Drummond, Tiffany, Glauiter and Remington, 1995). As a study reporting the effect of alcohol cues on the activation of alcohol memory associations will be reported later on in the thesis, the key components of this theory will introduced and cue-reactivity research relevant to the present thesis will be reviewed (Chapter 7).

3.3 How memory associations can bias/motivate behavioural options.

In line with the memory association model of alcohol use, how memory associations motivate or bias behavioural decisions is due to the representation of alcohol and associated concepts in memory and the process through which these concepts become activated (Leigh and Stacy, 1998). When assessing how memory associations can influence behaviour, in terms of motivating or biasing behavioural decisions, the way in which memory processes interact with an individuals situations is a prominent aspect. It is assumed that individuals are

motivated or biased into behaving a certain way as a result of the current pattern of activation of concepts in memory (Stacy, Ames and Sussman, 1996). The concept of accessibility is relevant to alcohol use because of its emphasis on the highly conditional nature of memory retrieval or activation (Stacy et al., 1994).

Stacy et al. (1996) state that increased activation and accessibility of a concept which represents a particular behaviour, is likely to affect subsequent decisions regarding whether or not to engage in that behaviour. When a drug-consistent pattern of activation is evoked by cues or thoughts of outcomes, it is unlikely that alternative behavioural options will be activated spontaneously (Stacy et al., 1994). As with the continued activation of alcohol-related behavioural options, in response to alcohol-related cues, drug consistent tendencies become manifested in overt behaviour when a particular pattern of activation is triggered (e.g. the need to feel relaxed). This aspect of the Alcohol-Related Association Memory model explains why an individual can continue to engage in problematic behaviour.

3.4 Relevant studies

In response to methodological and theoretical criticisms that have been raised concerning the traditional expectancy approach to alcohol consumption (Chapter 2), Stacy et al. (1994) developed the Association Questionnaire (AQ) as an alternative measurement tool (the construction of the questionnaire is described below). By inquiring explicitly about the outcomes of drinking (as in the traditional expectancy approach) participants are automatically provided with an alcohol prompt or a cue that is likely to make culturally available information more accessible. Therefore an invalid measure of accessibility is obtained. However by adopting an implicit approach and by minimising or eradicating explicit cues, as with the Association Questionnaire, a more valid measure of accessibility and associated outcomes can be obtained. Using this alternative implicit approach, a primary aim of the Stacy et al. (1994) study was to examine whether drinking frequency would predict the number of alcohol-related responses given to word association items. Through the use of the AQ the principles of the Alcohol-Related Memory Association model of alcohol use, can be empirically assessed.

The AQ consisted of behavioural outcome phrases that were a combination of alcohol-related (e.g. you would feel relaxed) and alcohol-unrelated (e.g. you would feel studious) outcomes. To collect suitable alcohol-related phrases, for use in the AQ, two preliminary studies were conducted. In total, 370 undergraduate students were asked to generate a short list of pleasant or good things that could happen if they consumed alcohol. As it was assumed that the first response to this question would be the answer most likely to represent the strongest association with alcohol use (the most accessible), only these responses were included in the subsequent analysis (in which responses were analysed verbatim). From the composite list that this procedure generated 16 high-frequency and 12 low-frequency positive alcohol-related outcomes were produced. In addition to these outcomes the researchers generated eight semantically similar alcohol-related outcomes (i.e. were not verbatim responses).

The final format of the questionnaire consisted of seventy-three phrases, of which thirty-six were related to alcohol use (e.g. feeling relaxed) and 37 were behavioural outcomes that were not related to alcohol use (e.g. being thrifty). To minimise the possibility of response biases or priming effects influencing responses to the questionnaire, the phrases were listed so that alcohol-related outcomes were consistently separated by non alcohol-related behavioural outcomes. Other measures that were taken to minimise priming effects included the fact that the AQ was not entitled as an alcohol questionnaire and no explicit references to alcohol use were made in the written instructions. Lastly, alcohol-related activities were not mentioned at any stage of the recruitment process.

Once the AQ had been constructed as a collection of (i) behavioural outcomes available for most students (the high-frequency outcomes) and (ii) those only idiosyncratically available (the low-frequency outcomes) as well as (iii) non alcohol-related outcomes, it could be used as a tool to measure alcohol association in another sample of students. In order to complete the AQ, the following written instructions were provided "*write down the very first and second behaviours that come to mind when you read each item of the Association Questionnaire*".

After the AQ was completed, the participants were then asked to provide information detailing alcohol consumption use (in addition to other pertinent demographic details, e.g. age and gender). To code the AQ, the two causal behaviours (the responses to each item) were coded for explicit mentions of alcohol-related behaviours. Alcohol-related behavioural responses were coded as 1 and non-alcohol responses were coded as 0. The total number of alcohol-related responses was summed for each of the following categories: high-frequency alcohol-related outcomes, low-frequency alcohol-related outcomes, semantically related outcomes and non alcohol-related outcomes.

The aim of the analysis was to measure the relationship between habitual consumption for each of the four categories of casual behaviour. It was hypothesised that the heavy drinking participants would be more likely to respond to the alcohol-related phrases with an alcohol-related behavioural response, as compared with the moderate or light drinkers (as this type of consumer will have had more opportunities to form associations between alcohol use and culturally available outcomes). With reference to the four categories of behavioural outcomes represented in the questionnaire, it was predicted that there would be a significant relationship between consumption level and responses to items containing alcohol-related outcomes that were classified as being culturally available (i.e. high-frequency items) but not those that were shown to be idiosyncratically available (i.e. low-frequency items) nor the alcohol-unrelated items.

Through stepwise, hierarchical incremental multiple regression analysis, the **associations** were explored between alcohol-related responses to each of the four categories of behavioural outcomes represented in the questionnaire and habitual alcohol consumption. The results showed that alcohol frequency (number of days that alcohol had been consumed in the last month) was found to be a significant and independent predictor of total alcohol responses for combined high and low responses and for high-frequency behavioural outcomes. This suggests that more frequent alcohol users are more likely to associate an ambiguous alcohol-related behavioural outcome as being related to alcohol use

than moderate or light drinkers are. The results also showed that individuals were more likely to respond with an alcohol-related behavioural response to the high-frequency outcomes (alcohol-related behavioural outcomes that were shown to be available for most students, as suggested by the preliminary study)

The memory association approach to alcohol use focuses on motivational aspects in terms of what causes an individual to consume alcohol. The results from this study provide support for the view that there is a dual process occurring, as in drinking situations or prior to drinking situations, information is being retrieved and encoding simultaneously. As responses to the items requires information from long-term memory to be accessed this would indicate that previous experience is influencing the present associations that are made. Based on the results one could assume that memory for prior experiences are having a mediational effect on present behavioural choices due to associations that are formed between alcohol use and associated outcomes. Hence frequent alcohol users who have experienced the sedational effects of alcohol use, for example, are more likely to spontaneously think of alcohol-related activities as behavioural options when feeling the need to relax in comparison to light drinkers. To conclude, the findings from the Stacy et al. (1994) study provide support for the view that memory associations mediate behavioural choice.

As a new research tool was being utilised, it is beneficial, at this stage, to assess the methodology and the experimental procedure that was implemented in this study. The features of the AQ and its use, which can be viewed as representing a methodological advancement over the traditional approach in expectancy research, are as follows. The recruitment of participants in the study was conducted in a manner that insured that the true nature of the study was not revealed before or during the completion of the questionnaire (i.e. that it was related to alcohol). Measures were taken to ensure that the questionnaire did not provide any explicit cues that alcohol associations were under investigation (the word 'alcohol' or any other direct representation of it did not appear in the AQ). With reference to individual alcohol-related outcome phrases, there were an endless number of behaviours that could be associated with each item, therefore any number of responses could be given by each participant (alcohol-related

responses are not prescribed). This feature of the questionnaire in conjunction with the fact that an equal number of alcohol-unrelated related outcome phrases combine to minimise possible effects of priming or cueing whilst the questionnaire was completed. With reference to the verbal and written instructions, no information was provided which explicitly indicated that the task was concerned with alcohol use. Lastly, all demographic and consumption level information was obtained once the AQ was completed and submitted to the tester. Using this more valid way of testing alcohol-related memories, Stacy et al. state that the results are consistent with the class of theory that suggests that drinking behaviour influences the strength of memory association between alcohol use and culturally available outcomes from drinking.

Although the empirical approach adopted in the above study can be viewed as extremely beneficial and suitable for assessing the memory association approach to alcohol use there are some methodological problems. Firstly, with direct reference to how memory associations are formed, it would appear that the actual amount of alcohol consumed can contribute greatly to the type of outcomes that an individual experiences as a result of drinking alcohol. In the above study the number of times alcohol is consumed in the previous month is used as a way of assessing alcohol use. In terms of strength of association between concepts an individual who has one drink a night will hold strong associations between certain outcomes of alcohol use and this behaviour. However the range of outcomes will be limited. An individual who drinks more on a single night will have a great range, yet will be judged the same in terms of alcohol consumption level. In addition, frequency of alcohol use does not adequately distinguish between heavy and light drinkers as the amount of alcohol consumed on each occasion is not taken into consideration when this type of measure is used. In order to represent and differentiate between different levels of habitual consumption a more suitable measure of alcohol use could be represented in terms of units of alcohol consumed rather than number of times alcohol has been consumed in the previous month. Using this measure of alcohol consumption produces a finer grain scale.

Stacy and his colleagues have conducted a series of experiments which utilise the implicit methodological approach. Three of these studies are relevant to the present research. In these studies (Stacy, 1995; Stacy et al., 1996; Leigh and Stacy, 1998) the relationship between alcohol consumption level and memory associations for alcohol-related outcomes and cues is also measured using a variety of implicit methodological approaches. Also under investigation in these studies, is the relationship between marijuana use and associated outcomes and cues. As the findings, concerned with marijuana use are not directly related to the present thesis, they will not be included in the discussion of the studies. Each of the three studies with alcohol will now be described and the methodology and procedures adopted will be critically assessed.

In the next study (Stacy, 1995) the extent to which associations between alcohol use and associated cues (for example, 'shot') are related to alcohol consumption level was examined. A combination of two implicit tasks were used – the cue-behaviour association task and the object-association task. In the cue-behaviour task, participants were presented with a list of 38 words of which five (draft, picture, tap, mug and shot) of the words were viewed as having a meaning which could represent features of alcohol use. Participants were instructed to write down the first word they thought of after reading each word. The second task – object-association task- consisted of a variety of clip-art pictures. In total two of the pictures (a six-pack without a label and three drinks) were related to alcohol use. Again, individuals were instructed to write down the first word that each picture made them think of. Alcohol-related responses, for both the tasks, were coded as 1 and alcohol-unrelated responses were coded as 0. As with the previous study (Stacy et al., 1994) careful controls were implemented to ensure that participants were not made aware of the true nature of the experiment, during both, the recruitment and completion of the experiment. As before self-report alcohol consumption information was obtained once the implicit tasks were completed.

Based on the Alcohol-Related Association Model of alcohol use, certain sets of meanings and behaviours are thought to become more accessible and salient when prompted by potential cues of alcohol use, when the two concepts (e.g.

alcohol use and draft) are strongly related in memory. Therefore, it was predicted that individuals who had more experience with alcohol use would be more likely to write down alcohol-related responses in response to the target items.

Confirmatory factor analysis was used to analyse the predictive effects of memory association and drug use. Within this analysis, predictive effects of the following variables were controlled for - native language, acculturation, friends and parents' alcohol use, and gender. Stacy concluded that the model showed that memory association can be construed as either a predictor or a product of drug use. It was found that more alcohol experience significantly resulted in more of the target (alcohol-related) words and pictures, being viewed as being related to alcohol use. Stacy (1995) viewed these results as being consistent with the notion that associative responses to alcohol cues activate memory processes that may influence alcohol use. The empirical findings provide further support for the Alcohol-Related Association Memory Model.

As the recruitment process, the materials and the procedure used in this study ensured that alcohol-related cues and primers were largely eradicated, the 'implicit' feature of the experiment was not jeopardised. However, there is a possible problem with the choice of participants. Although a large sample size (N=567 university students) was used, the actual alcohol-related experience reported was low. Although 93% of the participants had consumed alcohol on at least one occasion in their lives only 59% had drunk alcohol on at least one day in the previous month (M=4.8 days). Although over fifty percent of the sample did consume alcohol in the previous month it is possible to view the remaining 40% of the sample as non-drinkers. Having consumed alcohol on at least one occasion could translate as having a sip of beer or as having consumed 4 bottles of beer. Therefore this definition of consumption experience is neither clear nor conclusive, as it is difficult to establish the actual level of experience with alcohol that the participants had based on the information provided. In line with the Alcohol-Related Association Memory Model of alcohol use, associations between alcohol use and related outcomes or cues are developed and strengthened with repeated experience, therefore there is a strong possibility that

participants who have consumed alcohol on one occasion are not suitable candidates for such an experiment.

The next study (Stacy et al. 1996) addresses this possible sampling problem. The memory associations of a sample of participants who have had substantial experience of alcohol use, were assessed. Students from a continuation High School took part in this study and were asked to complete the tasks as part of a Substance Abuse and Assessment Program. Although the mean age of the sample was 16.97 years of age, 76.9% of the sample reported that they were currently using alcohol. In this study a combination of previously-used implicit association tasks were utilised - the cue-behaviour association task and the outcome-behaviour association task (a modified version of the AQ). Again, the instructions provided for completion of the tasks did not contain any alcohol-related information. As in the previous studies all of the responses to the tasks were coded as either alcohol-related responses or alcohol-unrelated responses.

Of particular interest in this study was whether measures of implicit cognition would be predictive of alcohol use in a high-risk adolescent sample. In order to investigate this issue, associations were explored between alcohol-related responses, for both tasks, and habitual alcohol consumption. Alcohol-related associations for each task were analysed separately, using multiple regression analysis. The number of alcohol-related responses given to the target items was significantly related to alcohol use, as heavier drinkers were more likely to provide an alcohol-related response to the target items. Stacy et al. concluded that responses to the memory association tasks reflected a pattern of activation in memory that is thought to influence alcohol-consistent decisions and behaviours.

Although this study provides empirical support for the Alcohol-Related Association Model, it is doubtful whether all features of the procedure can be viewed as implicit. In the previous studies (Stacy et al., 1994 and Stacy, 1995) meticulous care was taken to ensure that any possible alcohol-related primes or cues were eradicated during the recruitment and administration of the tasks - in order to avoid influencing participants' responses. However, in this study participants completed the two tasks as part of a larger survey they were required

to complete for a Substance Abuse and Assessment Program. Although no alcohol-related cues were provided during completion of the tasks, it is likely that the context in which the tasks were administered could prime and therefore bias responses to the alcohol target items. Due to the 'theme' of the classes that the participants were attending (in which the two tasks were administered) it is likely that the testing procedure involved an explicit alcohol/substance abuse element.

Thus far evidence has been provided which supports the Alcohol-Related Association Model Memory of alcohol use in terms of how positive associations are formed and how behavioural decisions may be biased due to strong associations between positive outcomes of alcohol use and consumption of alcohol. However, the role of negative aspects of alcohol use is neglected in much the same way as with traditional expectancy research (Chapter 2). In Stacy et al. memory association approach to alcohol use, negative outcomes of alcohol use should be encoded in the same manner as positive outcomes. Therefore it is possible that differences in accessibility of negative outcomes of alcohol use would also be apparent amongst differing levels of alcohol users. It would be beneficial to investigate this issue further in terms of how memory associations mediate alcohol use. The final study to be discussed investigates the relationship between both negative and positive alcohol-related memory associations and consumption level.

A study conducted by Leigh and Stacy (1998) examined whether previous alcohol use predicted associative memory responses to negative as well as positive outcomes of alcohol use. The effect of presenting behavioural outcomes available for most students (high-frequency outcomes) and those idiosyncratically available (low-frequency outcomes) was also examined in conjunction with the possibility of priming participants (by showing more than one alcohol-related outcome during a single presentation).

In this study participants were asked to complete a word association questionnaire (which consisted of behavioural outcomes of alcohol use derived from the preliminary experiment of the Stacy et al. (1994) study. They were

instructed to write down the first behaviour or action that came to mind when an outcome phrase was read (for example, you would feel relaxed). The type of outcome phrase (negative/positive), the normative frequency (low or high) of the phrase and number of outcomes presented was manipulated in this study. These three factors were varied among subjects – which resulted in twelve experimental conditions: participants were presented with either one, two or three, high-frequency positive or negative behavioural outcome phrases or one, two or three low-frequency positive or negative behavioural outcome phrases. Once the association questionnaire was completed participants were asked to report the number of days in the previous month they had consumed alcohol. All behavioural responses were coded for reference to alcohol use (alcohol-related responses were coded as 1 and alcohol-unrelated responses were coded as 0).

For the majority of individuals, some positive affect of alcohol use is likely to be encoded every time alcohol is consumed, on the basis of the inherently reinforcing effects of alcohol (Stacy, 1997). Whereas negative aspects are less likely to occur and therefore less likely to be encoded. Therefore, with reference to the valence of the outcome phrase (positive or negative outcome of alcohol use), it was postulated that memory associations for negative alcohol-related outcomes would be weaker than associations for positive outcomes, especially among participants with more alcohol consumption experience. With reference to the number of outcomes presented, it was hypothesised that a larger number would increase priming of the expectancy construct and that this increased accessibility would lead to more alcohol-related associations. Lastly, it was hypothesised that participants would be more likely to identify high-frequency outcomes items as being related to alcohol use (in comparison to low-frequency outcomes) as these behavioural outcomes are more likely to have been experienced by this sample, as indicated by the normative frequency.

Logistic regression analysis was used to analyse the relationship between alcohol-related mention and valence (positive and negative), frequency (high or low) and number of outcomes presented (one, two or three) of the behavioural outcome phrases with alcohol consumption level. The results showed that participants who were given high-frequency outcomes were more likely to write

down an alcohol-related response. The number of outcomes presented also significantly predicted whether or not an alcohol-related response was given, as it was concluded that the greater the number of outcomes presented during the test phase, the more likely an individual was to write down an alcohol-related response. Although more positive outcomes than negative were identified as being related to alcohol use, this result was not significant. However it was concluded that individuals with more drinking experience, were more likely to write down an alcohol-related response in comparison to light or non-drinking participants.

With reference to the valence condition, it is possible that significant differences were not observed in this experiment due to the overall low level of alcohol use, a difficulty with many of the studies. Only 63% of the participants reported drinking alcohol in the month prior to the study. As a low level of alcohol use experience was reported, it is possible that individuals have not had sufficient opportunities to form strong associations between alcohol use and related positive and negative behavioural outcomes. However, the other manipulations (priming) in the experiment were significant and overall alcohol use was found to increase likelihood of providing an alcohol-related response.

The role of negative outcomes in motivation is not readily explained by the results in this study. In order to experience negative effects it is likely that a higher level of alcohol use, than evident in the present sample, would be necessary. Therefore to adequately assess the accessibility and influence of negative associations of alcohol use, it would be beneficial to have a subject sample that consumed alcohol on a regular basis. Through using a sample that can be viewed as "drinkers" it is likely that they will have experienced a substantial number of both positive and negative outcomes of alcohol use.

Overall the results were consistent with the view that repetitive alcohol use strengthens associations between alcohol-related behaviours and associated outcomes. From this study, it would appear that the measures that are used (e.g. word association tasks) can be manipulated in order to assess different aspects of retrieval and accessibility. This research has shown that priming can influence accessibility of alcohol-related behaviours as can the type of outcome that is

presented to participants. This would indicate that providing individuals with alcohol-related primes might further bias behavioural options in favour of alcohol use. The fact that activation of alcohol-related concepts can be influenced has important implications for how memory associations can motivate or bias behavioural options. One such implication being that individuals are likely to encounter alcohol-related cues or primes on a daily basis.

To conclude, although the study (Leigh and Stacy, 1998) does raise some interesting issues concerning priming and the frequency of the behavioural outcome phrase, the role of negative alcohol-related outcomes and associations is still unclear. With reference to the role of negative associations in alcohol use, Stacy and Leigh (1998) postulate that as positive outcomes of alcohol use are likely to be activated first, thoughts about negative outcomes may then become inhibited, below baseline levels of activation. This view may be an accurate description of the unconscious process that may be affecting and influencing behavioural decisions. However, before such assertions are made, it is necessary to implement a procedure, which includes the recruitment of suitable participants to validly establish if there is a relationship between alcohol use and negative outcomes of alcohol use.

3.5 Methodological problems

Although the reviewed studies provide support for the Alcohol-Related Association Memory Model of alcohol use there are several methodological limitations which are summarised below.

(i) The frequency (the number of times they had consumed alcohol in the prior month) of alcohol use was used as a measure of consumption behaviour. However, this measure of alcohol use does not sufficiently distinguish between heavy and light drinkers. In order to avoid such problems a measure of units of alcohol consumed may be a more valid representation of an individual's level of alcohol use.

(ii) With reference to the samples used in the studies (with the exception of Stacy et al., 1996) the percentage of individuals who consumed alcohol in

the month prior to testing ranged from 51% to 63 %. The low level of alcohol use may be due to the legal drinking age in the United States. However, it would be advantageous to obtain data from a sample of participants who were of legal drinking age and who had more mature alcohol-related experience.

(iii) Participants were principally students at university or still attending high school. It would be important to also use an older sample group because memory associations are strengthened with experience.

(iv) Although Leigh and Stacy (1998) investigated the relationship between both negative and positive alcohol associations and consumption level, it is felt that this relationship should be investigated using an approach which gives equal and substantial weighting to both types of associations.

3.6 Proposed direction of research

Study 1

The main **aim** of this study is to construct the Memory Association Questionnaire (MAQ). This questionnaire will be designed to assess the strength of associations between both positive and negative outcomes of alcohol use and alcohol consumption level in an unbiased manner, using information derived from a young social drinking sample.

Study 2

In this study, the **aim** is to administer the Memory Association Questionnaire to a group of young social drinkers. The aim of this study is to replicate Stacy et al.'s (1994) findings (with reference to the positive significant relationship observed between culturally available positive outcomes of alcohol use and consumption level) using a sample of young social drinkers who are regular alcohol consumers. A further objective of this study is to establish whether there is a significant relationship between alcohol consumption level and memory associations between alcohol use and negative outcomes of this behaviour.

Study 3

The **main objective** in this study is to administer the Memory Association Questionnaire to a sample of mature social drinkers who have had a significantly longer consumption history in comparison to the young social drinkers. This age group will be used in order to assess whether there is a change in memory associations, between alcohol use and alcohol-related behavioural outcomes, as a result of a longer period of habitual consumption.

Study 4

Environmental contexts and cues become associated with alcohol. Do contexts and cues contribute to decisions to consume alcohol? The **aim** of Study 4 is to explore the extent to which the MAQ is sensitive to such contexts and cues.

Chapter 4 - Study 1 - Compiling the Memory Association Questionnaire.

Chapter Summary

This chapter reports the construction of a new instrument - The Memory Association Questionnaire (MAQ). The questionnaire was developed with a view to be used within an 'implicit' rather than 'explicit' framework; consequently the problems that are commonly associated with an explicit-based approach (chapter 2) were avoided. As the construction of the MAQ extends the construction of the AQ (Stacy et al. 1994), problems which are associated with the AQ (described in Chapter 3) were taken into consideration when designing the questionnaire.

There were four stages involved in developing the MAQ: (i) the framework within which the questionnaire will be developed, (ii) generating a list of suitable alcohol-related behavioural outcomes, (iii) compiling a list of suitable non-alcohol-related behavioural outcomes and (iv) constructing the final form of the MAQ.

4. Stage 1 - The framework for the memory association questionnaire.

Stacy et al. (1994) devised an implicit research tool (the AQ) as a means of assessing the strength of memory associations between alcohol use and outcomes of this behaviour. Outcomes of different behaviours including alcohol use (e.g. feeling sociable) were presented to participants as items on the AQ and they were instructed to write down what behaviour of theirs would cause the behavioural outcome to arise (e.g. they might write down drinking or going to the cinema). As the behavioural outcomes are shown to participants in an alcohol neutral context (e.g. void of all alcohol-related cues or primes that might come from the experimenters instructions, the questionnaire title or instructions and alcohol-related words or terminology) only participants who have established associations between alcohol-related behavioural outcomes and alcohol use will identify these outcomes as being related to alcohol use and respond accordingly. The AQ will be adapted for the purposes of the present research. In particular, the original framework will be altered in order to incorporate measures that reflect the additional aims and issues of the present research.

The MAQ will comprise a list of alcohol-related and non-alcohol-related behavioural outcomes. The purpose of Stage 2 is to generate the outcomes from which the MAQ will be constructed. Alcohol-related behavioural outcomes can be defined as either **common** or **uncommon.** **Common** outcomes are consequences of alcohol consumption that are known to most consumers, regardless of their actual consumption experience (often said to be culturally available). Whereas, **uncommon** outcomes of alcohol use are consequences that are idiosyncratically related to alcohol use. Reasons for incorporating both types of alcohol-related outcomes into the MAQ will now be discussed.

If the MAQ is to be used to covertly measure associations between alcohol use and behavioural outcomes of alcohol use which are (relatively speaking) commonly known to alcohol consumers need to be included. If the MAQ were only to contain uncommon outcomes of alcohol use, it is unlikely that a relationship between habitual consumption level and strength of association could emerge, even if one were present, as relatively few individuals will associate these idiosyncratic outcomes with alcohol consumption.

Although only relatively few individuals are likely to relate uncommon outcomes of alcohol use to alcohol use itself, by incorporating this type of outcome in the questionnaire structure, an element of control is introduced. For one would predict that stronger associations (e.g. more alcohol-related responses will be given to this type of outcome) would exist between alcohol use and common outcomes of this behaviour than between alcohol use and uncommon outcomes.

To ensure that the two sets of outcomes used are distinct and not overlapping in terms of frequency, a third type of outcome - **moderately common** - will be included in recruiting items for the MAQ. This category of outcome will not be used in any analysis serving only to help construct the distinct categories - common and uncommon. In previous chapters (2 and 3) the need to investigate the relationship of associations between alcohol use and both negative and positive outcomes of this behaviour has been highlighted. Therefore a valence condition was also be incorporated into the structure of the MAQ. This was not a feature of the AQ.

In common with the AQ an important feature of the MAQ is that while completing the questionnaire, participants must remain unaware of what is being explored by the experiments (i.e. strength of association between alcohol use and alcohol-related behavioural outcomes). As previously discussed, utilising this type of covert approach ensures that participants are not providing alcohol-related responses for any reason other than the implicit associations made. Unfortunately, by presenting participants with a list of alcohol-related behavioural outcomes, (even when not labelled) it is possible that they will recognise that the theme of the MAQ is alcohol-related as they work their way through each item. This potential problem can be minimised by incorporating diversion outcome items - items that patently cannot be related to alcohol use, such items are often referred to as diversion, filler or padding items.

To conclude, based on the above prerequisites and structural demands, the planned framework of the MAQ can be summarised as consisting of the following eight sections, comprising eight types of behavioural outcomes:

(i) Positive behavioural outcomes that are commonly related to alcohol use (e.g. feeling relaxed).

(ii) Negative behavioural outcomes that are commonly related to alcohol use (e.g. feeling sick).

(iii) Positive behavioural outcomes that can occur as a result of alcohol use but are not commonly associated with this behaviour (e.g. feeling exhilarated).

(iv) Negative behavioural outcomes that can occur as a result of alcohol use but are not commonly associated with this behaviour (e.g. lose respect for people).

(v) Positive behavioural outcomes that are moderately related to alcohol use (e.g. feeling warmer).

(vi) Negative behavioural outcomes that are moderately related to alcohol use (e.g. feeling dizzy).

(vii) Positive behavioural outcomes that are not related to alcohol use (e.g. feeling scholarly).

(viii) Negative behavioural outcomes that are not related to alcohol use (e.g. feeling frustrated).

To build the MAQ along these lines individual behavioural outcomes for each of the eight categories need to be identified. Stage 2 of the present study was conducted for this purpose.

4.1 Stage 2 - Study 1 - Generating a list of alcohol-related behavioural outcomes.

Stage 2 was conducted in order to generate a list of negative and positive alcohol-related behavioural outcomes to be incorporated within six of the categories the MAQ, described above, - the alcohol-related categories.

4.2 Methodology

4.2.1 Participants

300 undergraduate students took part in this study. Individuals were approached around the University of Glasgow campus (including a University Hall of Residence) and asked if they would take part in a short study.

The inclusion criteria for participation were:

(i) Participants must be of legal drinking age

(ii) Participants are to be no older than 26 years of age

(iii) Participants must be native English speaking

(iv) Participants must have consumed (on self-estimated average) at least one alcoholic drink per week in the last six months.

The final participant prerequisite was to ensure that only those who had direct experience with the behaviour in question were included. For information regarding the participant's age and gender see Table 1.

Table 1. Participants Information.

	Males	Females	Total
Median Age	20.6	20.6	20.6
Age Range	18-26	18-25	18-26
Total in sample	112	188	300

4.2.2 Materials

Each participant received three questionnaires (The Consumption Outcome Questionnaire (COQ), The Demographic Information Questionnaire (DIQ) and The Time-Line Follow-Back drinking diary (TLFB) to complete.

4.2.2.1 The Consumption Outcome Questionnaire (COQ)

This two-page questionnaire was constructed and administered to participants in order to obtain a list of positive and negative alcohol-related behavioural outcomes. On page one, participants were asked to list up to 10 good or pleasant things that might occur as a result of drinking alcohol. The following written instructions appeared at the top of the first page:

"Please write down 10 pleasant or good things that can happen to <u>you</u> when you drink alcohol. You should only spend a few minutes on this."

The instructions for the second page were as follows:

"Please write down 10 unpleasant or bad things that can happen to <u>you</u> when you drink alcohol. You should only spend a few minutes on this."

The order of these two sets of instructions in the COQ was counterbalanced so that 150 participants were asked to produce pleasant outcomes of alcohol use first and 150 were asked to generate unpleasant outcomes of alcohol use first.

4.2.2.2 Demographic Information Questionnaire (DIQ)

This questionnaire was designed to collect demographic information in conjunction with details about the participants' and their immediate family's alcohol use. The first three questions required the respondents to write down their age and gender and what age they began to consume alcohol on a regular basis. The next two questions were concerned with problematic drinking. Participants were required to state (by circling yes or no) whether they had ever received treatment for an alcohol-related problem and whether any member of their immediate family has ever had a drink problem.

4.2.2.3 Time Line Follow Back Drinking Diary (TLFB, Sobell and Sobell, 1992)

To obtain an alcohol consumption record the self-report Time-Line-Follow-Back-Diary (Sobell & Sobell, 1992) was administered to participants. This instrument was chosen as previous research has shown that the reliability and validity of the data obtained using the TLFB is relatively high (Connors, Watson and Maisto, 1985; Maisto, Sobell, Cooper and Sobell, 1979). For each day of the previous week, participants were required to provide the following information: where (if at all) alcohol was consumed (e.g. the pub or at home), the type of drink consumed (e.g. lager), how many drinks were consumed (e.g. 2 beers) and the size of the drink that was consumed (e.g. a half pint).

Once this information was given, participants then stated whether or not this information reflected a typical drinking week. If the participant stated that the alcohol consumption information provided for the previous week was not representative of a typical drinking week (for example they have been on medication and therefore have not consumed any alcohol) they are then asked to complete an additional drinking diary which depicts what a typical drinking week would be.

As the variable, alcohol consumption level, was to be included in subsequent statistical analyses in future studies presented in this thesis, it was necessary to implement a reliable method for measuring it. For this type of research, possible data collection methods included interviewing participants and self-report questionnaires. The self-report TLFB (Sobell and Sobell, 1992) was selected as means of collecting alcohol consumption information as research has shown that "...carefully collected self-report alcohol and drug use data are accurate, and may sometimes be more accurate, than information obtained by means of objective alternatives" (p. s347, Del Boca and Noll, 2000).

For a copy of the COQ, DIQ and the TLFB see Appendix B, C and D respectively.

4.2.3 Design

The main function of this part of the study was to generate a list of suitable negative and positive alcohol-related behavioural outcomes to be used within six of the eight categories of the MAQ. The Consumption Outcome Questionnaire (COQ) was used to adduce these outcomes from the sample of undergraduate students.

An additional goal of the study was to collect information to enable future comparisons (concerning age, gender and consumption level) to be made between those recruited to generate the list of positive and negative alcohol-related behavioural outcomes to be included in the MAQ (Study 1: Stage 2) and the sample who will subsequently be given the MAQ to complete (Study 2).

The Time-Line Follow-Back questionnaire (TLFB, Sobell and Sobell, 1992) and the Demographic Information Questionnaire (DIQ) were administered to participants to test consistency (in terms of alcohol consumption, age, and gender) between samples used in some of the subsequent studies.

4.3 Procedure

Individuals were approached and asked if they would take part in a short, 10-minute study. Prior to administering the questionnaires, the experimenter asked the potential participant the following questions, in order to assess whether they satisfied the participant inclusion criteria:

(i) What age are you?

(ii) Is English your first language?

(iii) Would you drink at least one alcoholic beverage on a weekly basis?

If the individual satisfied the inclusion criteria they were given the questionnaire pack to complete. The participants were informed that all questionnaire responses were confidential and anonymous. In addition to the written instructions (provided at the start of each questionnaire) participants were provided with verbal instructions (the written instruction repeated). Before the participants completed the questionnaires the experimenter asked whether they fully understood what they had to do. The completion order of the questionnaires remained the same throughout the testing process (COQ, DIQ and the TLFB).

As the MAQ was designed to contain outcome items that represent undergraduate student's conceptions of positive and negative effects of alcohol use, it was necessary to obtain a large sample of individual views. Therefore, if participants were approached in groups of two or more they were asked not to confer on any of their answers, as a primary aim of the study was to obtain 300 individual responses. The researcher remained present during questionnaire completion, to ensure that individuals were not conversing. Additionally, the participants were instructed to write down their own views of positive and effects of alcohol consumption not what they thought others might think, nor what they thought they should think.

4.4 Results

4.4.1 Participant information

Within-group statistical comparisons were carried out to test whether there were significant gender differences regarding the following demographic variables:

(i) The age of the male and female participants

(ii) The number of male and female participants who have received treatment for an alcohol-related problem.

(iii) The number of male and female participants who stated that an immediate family member had experienced an alcohol-related problem.

As the data was not normally distributed (assessed using the Kolmogorov-Smirnov test) the non parametric Mann Whitney U-test was used. To test for differences regarding the number of male and female participants, who stated that they had received treatment for an alcohol-related problem, the chi-square test was used. This test was also used to test for differences in the number of participants who stated that an immediate family member had experienced an alcohol-related problem.

The results from the statistical analyses showed that there were no significant differences between the male and female participants with regards to age, the number who had received treatment for a alcohol-related problem and for the number who stated that an immediate family member had an alcohol-related problem.

The results from these statistical comparisons are presented in Appendix A.

4.4.2 Alcohol consumption information.

From the TLFB drinking diary one is able to obtain a measure of weekly and daily consumption levels with reference to the number of drinks and the total number of alcohol units consumed. To calculate the number of units consumed per week, and for the heaviest drinking day (the day in which the most alcohol units was consumed) the guidelines outlined in Table 3 were followed.

Table 2. Alcoholic beverages - measures and units.

Drink	units
1 pub measure of spirits/fortified wine	1
1 glass of table wine	1
1 pint of low alcohol beer	1/2
1 can of beer	1 1/2
1 pint of beer	2
1 pint of stout, 'real ale' or strong lager	3
1 bottle of table wine	7
1 litre bottle	10
1 bottle of fortified wine	14
1 bottle of spirits	30
1 glass of can of alcoholic lemonade	2

(Alco Facts, A Guide to Sensible Drinking, HEBS, 1998)

Based on the information provided in the TLFB the following alcohol consumption measures were calculated for each participant:

(i) The number of days that alcohol was consumed in the previous week.

(ii) The number of alcoholic drinks consumed in the previous week.

(iii) The number of alcoholic units consumed in the previous week.

(iv) The number of alcoholic drinks consumed on the heaviest drinking day of the previous week.

(iv) The number of alcoholic units consumed on the heaviest drinking day of the previous week.

The mean amount was then calculated for each of the consumption measures. A summary of the alcohol consumption information obtained from the sample is shown in Table 3.

Table 3. Weekly alcohol consumption information.

	Male	Female	Total
Mean Number of Occasions Alcohol Consumed Per Week	2.94	2.63	2.74
Mean Number of Drinks Consumed Per Week	20.7	14.54	16.24
Mean Number of Units Consumed Per Week	28.5	17.51	20.57
Mean Number of Drinks Consumed on Heaviest Drinking Day	8.99	7.44	7.87
Mean Number of Units Consumed on Heaviest Drinking Day	12.5	8.78	9.82
Number of non-drinkers	12	24	36
Total Number in Sample	112	188	300

Based on the information obtained from the TLFB 88% of the sample reported that they had consumed alcohol during the week prior to completing the questionnaire. Although 12% of the sample reported that they had not consumed alcohol during the previous week, these participants did indicate on the TLFB that in a normal week they would consume at least one alcoholic beverage. Therefore, it was decided that these participants could be viewed as alcohol consumers, thus satisfying the inclusion criteria for this study.

4.4.3 Which drinking measure most aptly represents undergraduate student's alcohol consumption behaviour?

Often undergraduate students' weekly drinking reflects the specific academic demands that are present causing alcohol consumption to rise and fall depending on the current course work, examinations or other commitments that are present during that particular week of the academic year. However, our local experience shows that for most undergraduates, regardless of current weekly commitments, the amount any individual consumes on their weekly 'night out' tends to remain the same. Consequently, this measure is used throughout these studies to represent the difference between individuals' alcohol consumption. Furthermore,

the measure distinguishes between heavy and light drinkers whereas other measures, such as frequency, do so only poorly. If one was to use the measure frequency (number of days in which alcohol is consumed per week was), an individual who consumes one alcoholic beverage per night will be placed in the same category as an individual who consumes 4 alcoholic beverages a night as they both drink alcohol 7 nights a week. Likewise, if the consumption measure quantity (total number of alcoholic units consumed per week), is applied, an individual who drinks one pint a night and an individual who consumes 7 pints once a week will be viewed as consuming 14 units a week. However, their drinking style indicates that they are different types of alcohol consumers and are likely to experience different consequences of alcohol use.

Previous research has shown that frequency of heavy drinking or intoxication is a major predictor of alcohol-related problems (e.g. Room, Bondy and Ferris, 1995). However in light of undergraduate students' drinking patterns and the need to ensure that heavy and light alcohol consumers are adequately differentiated the consumption measure 'heaviest' will be used, to represent participants' typical consumption level in all of the subsequent analyses.

4.4.4 Strategy used to develop a list of alcohol-related behavioural outcome items.

To develop a composite list of alcohol-related behavioural outcome items for use in the MAQ the following systematic procedure was implemented.

(i) The verbatim first responses (not synonyms) from each of the 300 participants' positive and negative alcohol-related behavioural outcome lists (obtained through the COQ) were entered into a spreadsheet as two independent lists.

(ii) As the MAQ was designed to covertly provide a measure of the strength of association between alcohol use and related outcomes, all outcomes, which were overtly related to alcohol use (e.g. hangover) were removed from the list.

(iii) By removing all alcohol-related outcomes from the two lists, the possibility of providing an alcohol prime, for participants completing the MAQ was minimised.

(iv) Two researchers analysed the re-coded items that were overtly the same but not verbatim the same. For example the following outcomes "feeling relaxed" and "makes you feel relaxed" would be re-coded as identical items. There was almost 100% agreement between the two raters.

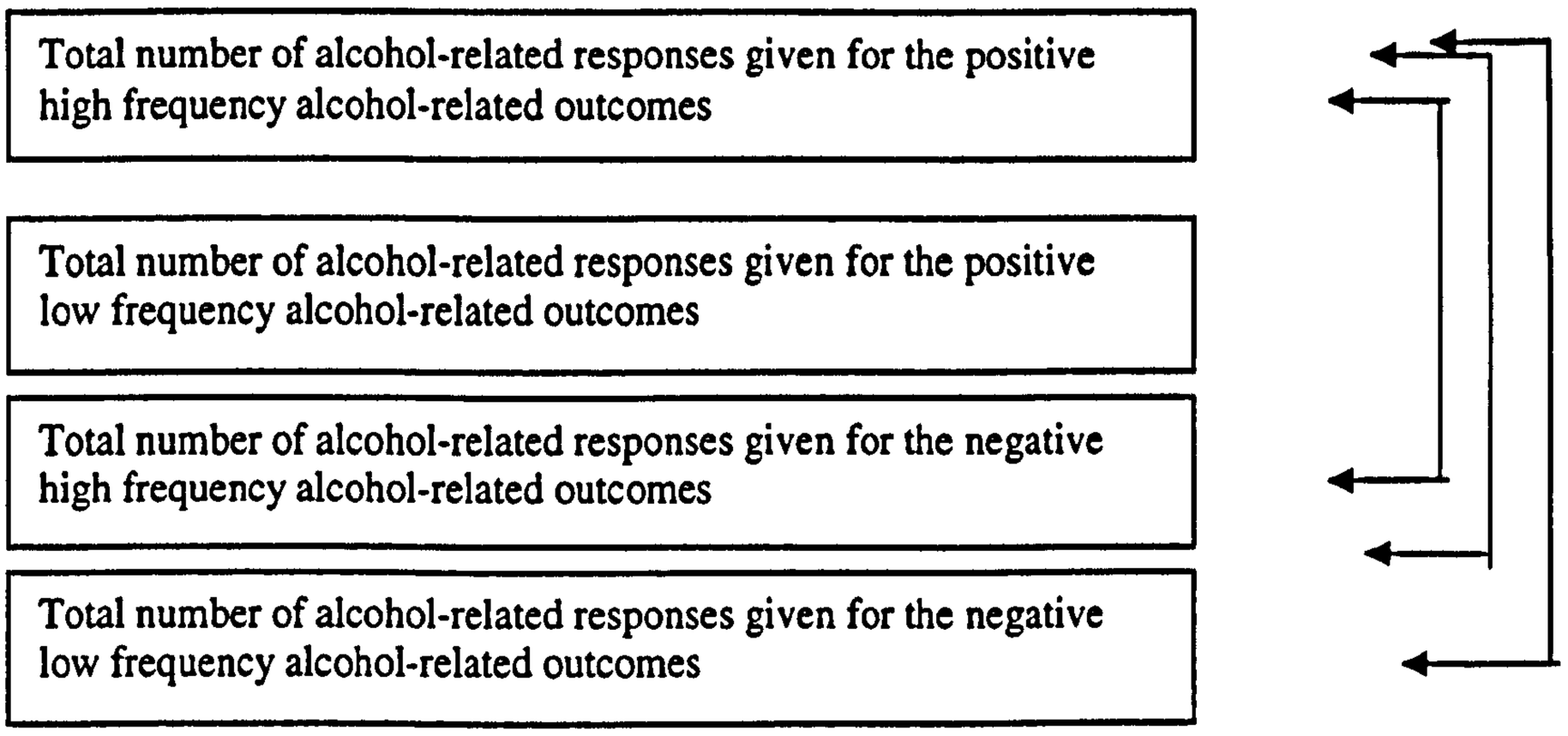
(v) The items of the condensed list were then subject to a frequency of occurrence analysis. Each item was classified as either low, moderate or high frequency outcome based on the number of participants who generated the particular outcome. Classification of frequency was done in the following way: low frequency = 1, moderate frequency = 2-4 and high frequency = 5+.

4.4.5 Results from the COQ.

After the COQ was administered to the required number of participants and their first response had been entered into a database verbatim the end product was a list of 300 positive and 300 negative alcohol-related behavioural outcomes (Table 5). Once steps (i) to (iv) of the Strategy of Analysis were completed two lists of alcohol-related behavioural outcomes (positive and negative) were produced (Tables 4 and 5).

When devising a framework for the MAQ (Stage 1) a specific requirement was that the structure must enable statistical comparisons to be made between each behavioural category, with reference to the number of alcohol-related behavioural outcomes that future participants identify as resulting from alcohol-related activities. Figure 1 shows a sample of the proposed comparisons to be made.

Figure 1. An example of the proposed statistical comparisons.



For sound statistical comparisons to be made, each category must contain an equal number of outcome items. As the number of suitable items generated for positive moderate and positive low alcohol-related behavioural outcome categories was 11, and as this was the lowest number of items in any category, 11 was set as the number of items to be included in each of the six categories.

4.4.6 Selecting appropriate behavioural outcomes for use in the MAQ.

As the remaining categories (Tables 6 and 7) contained more than 11 suitable alcohol-related behavioural outcome items, in order to have an equal number of outcomes in each category some of the outcome items had to be removed. When selecting outcomes to be removed the following issues were considered:

(i) Would a participant feel that being asked about the outcome was too personal and perhaps intrusive, and therefore not respond to the item?

(ii) Could the outcome be viewed as a severe consequence of alcohol use (e.g. death) and therefore one not likely to be encountered by social drinkers?

Reasons for not selecting, specific alcohol-related behavioural outcomes will now be discussed.

4.4.6.1 Positive and negative high frequency outcomes.

Thirteen positive high frequency alcohol-related behavioural outcome items and twelve negative outcomes were generated based on the information supplied by participants in the COQ and the subsequent analysis of this information (Table 6 and 7). In reviewing these outcomes it emerged that 'lose inhibitions' was a high frequency outcome that was also given as a high frequency negative outcome of alcohol use. As this outcome of alcohol consumption was viewed as both a positive and negative effect of alcohol use it was inappropriate to use it in the MAQ as it would not be possible to class it as being a pleasant or unpleasant effect of alcohol use. The alcohol-related behavioural outcome item 'better sex' was also removed from the list. Although the MAQ is to be an anonymous questionnaire, some individuals may not feel comfortable responding to this statement.

4.4.6.2 Negative moderate frequency outcomes.

16 alcohol-related behavioural outcome items resulted from the above process (Table 8). The following five were selected for removal at this stage: 'depressed', 'emotions', 'numbs brain', 'imprisonment' and 'say things you shouldn't' and 'rape'. On reflection, the outcomes 'depressed emotions' and 'numbs brain' were assessed as being too difficult for participants to respond to, as not many activities or behaviours result in these behavioural outcomes. The outcome phrase 'imprisonment' was also removed, as this is a severe consequence of alcohol use and one, which is not likely to have occurred as a consequence of drinking at a social level. Lastly, the outcome phrase "say things you shouldn't say' was removed as it is too similar to the negative high frequency phrase 'do something you'd regret the next day'.

4.4.6.3 Negative low frequency outcomes.

As there were 12 low frequency alcohol-related behavioural outcome items one outcome had to be removed from the list. The outcome 'dehydration' was removed, as it is a term that is commonly associated with consumption of fluids (e.g. water, juice, and alcohol). Although not explicitly related to alcohol use (and therefore not removed at the initial stage in the analysis), of the twelve outcomes this one could be viewed as being the most explicitly related to alcohol

use. The final list of the alcohol-related behavioural outcomes to be used in the MAQ is presented in Table 8.

Table 4. Positive alcohol-related behavioural outcomes.

ALCOHOL-RELATED BEHAVIOURAL OUTCOME ITEMS	NUMBER OF TIMES OUTCOME GENERATED
CONFIDENCE/MORE CONFIDENCE	62
YOU'D FEEL RELAXED	43
HAPPY	37
LOSE INHIBITIONS	18
MORE SOCIABLE	15
HAVE A GOOD TIME/NIGHT	12
(Better)SEX	11
PULL OTHER PEOPLE	11
LAUGH MORE	10
HAVE A LAUGH	9
MEET NEW PEOPLE	7
YOU'D FEEL GOOD	5
EASIER TO TALK TO PEOPLE	5
HAVE FUN	4
MORE TALKATIVE	3
SLEEP BETTER	2
YOU'D FEEL WARMER	2
THINGS SEEM FUNNIER	2
OUTGOING	2
SENSE OF WELL BEING	2
FEEL SEXIER	2
FEEL CLOSER TO PEOPLE	2
FIND PEOPLE MORE ATTRACTIVE	2
HELPS YOU APPROACH SOMEONE YOU FANCY	2
GOOD MOOD	1
FEEL GOOD ABOUT YOURSELF	1
MORE AT EASE	1
DANCE BETTER	1
HYPER	1
FEEL MORE AMOROUS	1
FEEL MORE ELATED	1
FEEL GREAT	1
FEEL HIGH	1
SING BETTER	1
MORE ENERGY	1

Table 5. Negative alcohol-related behavioural outcomes.

ALCOHOL-RELATED BEHAVIOURAL OUTCOME ITEM	NUMBER OF TIMES OUTCOME GENERATED
YOU'D FEEL SICK	38
BE SICK	30
VOMIT/THROW UP	26
FALL DOWN	18
MAKE A FOOL OF YOURSELF	16
MEMORY LOSS	14
BECOME VIOLENT	12
LOSE CONTROL/OUT OF CONTROL	10
SEX WITH SOMEONE UGLY	10
DO SOMETHING YOU REGRET THE NEXT DAY	6
LOSE INHIBITIONS	5
YOU'D ANNOY PEOPLE	5
DEPRESSED EMOTIONS	4
BECOME TOO EMOTIONAL	4
PASS OUT	4
NUMBS BRAIN	3
LOSE POSSESSIONS	3
POOR COORDINATION	3
REACTIONS SLOW DOWN	3
HAVE AN ACCIDENT	3
DIZINESS	2
ILLNESS	2
IMPRISONMENT	2
DEFENCES DROP	2
RAPED	2
FALL OUT WITH FRIENDS	2
SPEND A LOT /EXPENSIVE	2
SAY THINGS YOU SHOULDN'T	2
HEADACHE	1
CAN'T SEE PROPERLY	1
TURN HORRIBLE	1
PARANOID	1
LOSE RESPONSIBILITY	1
LOSE JUDGEMENT	1
THOUGHT PROCESSES SLOWED	1
LOSE RESPECT FOR PEOPLE	1
ACT IMPULSIVELY	1
DEHYDRATION	1
YOU'D FEEL DROWSY	1
PROBLEMS WITH SEX	1

Table 6. Positive alcohol-related outcomes - Classed by frequency.

HIGH FREQUENCY
CONFIDENCE/MORE CONFIDENCE
YOU'D FEEL RELAXED
HAPPY
LOSE INHIBITIONS
MORE SOCIABLE
HAVE A GOOD TIME/NIGHT
BETTER SEX
PULL OTHER PEOPLE
LAUGH MORE
HAVE A LAUGH
MEET NEW PEOPLE
FEEL GOOD
EASIER TO TALK TO PEOPLE
MODERATE FREQUENCY
HAVE FUN
MORE TALKATIVE
SLEEP BETTER
FEEL WARMER
THINGS SEEM FUNNIER
OUTGOING
FEEL SEXIER
FEEL CLOSER TO PEOPLE
FIND PEOPLE MORE ATTRACTIVE
GOOD MOOD
FEEL GOOD ABOUT YOURSELF
LOW FREQUENCY
GOOD MOOD
FEEL GOOD ABOUT YOURSELF
MORE AT EASE
DANCE BETTER
HYPER
FEEL MORE AMOROUS
FEEL MORE ELATED
FEEL GREAT
FEEL HIGH
SING BETTER
MORE ENERGY

Table 7. Negative alcohol-related outcomes - Classed in terms of frequency.

LOW FREQUENCY
YOU'D FEEL SICK
BE SICK
VOMIT/THROW UP
FALL DOWN
MAKE A FOOL OF YOURSELF
MEMORY LOSS
BECOME VIOLENT
LOSE CONTROL/OUT OF CONTROL
SEXUAL ENCOUNTERS WITH SOMEONE UGLY
DO SOMETHING YOU REGRET THE NEXT DAY
YOU'D ANNOY PEOPLE
LOSE INHIBITIONS
MODERATE FREQUENCY
DEPRESSED EMOTIONS
BECOME TOO EMOTIONAL
PASS OUT
NUMBS BRAIN
LOSE POSSESSIONS
POOR COORDINATION
REACTIONS SLOW DOWN
HAVE AN ACCIDENT
DIZZINESS
ILLNESS
IMPRISONMENT
DEFENCES DROP
SAY THINGS YOU SHOULDN'T
RAPE
FALL OUT WITH FRIENDS
SPEND A LOT /EXPENSIVE
LOW FREQUENCY
HEADACHE
CAN'T SEE PROPERLY
TURN HORRIBLE
PARANOID
LOSE RESPONSIBILITY
LOSE JUDGEMENT
THOUGHT PROCESSES SLOWED
LOSE RESPECT FOR PEOPLE
ACT IMPULSIVELY
DEHYDRATION
YOU'D FEEL DROWSY
PROBLEMS WITH SEX

Table 8. The positive and negative alcohol-related outcomes as presented in the MAQ.

POSITIVE HIGH FREQUENCY	NEGATIVE HIGH FREQUENCY
YOU'D FEEL CONFIDENT	YOU'D FEEL SICK
YOU'D FEEL RELAXED	YOU'D BE SICK
YOU'D FEEL HAPPY	YOU'D THROW UP
YOU'D FEEL MORE SOCIABLE	YOU'D FALL DOWN
YOU'D HAVE A GOOD TIME	YOU'D MAKE A FOOL OF YOURSELF
YOU'D FIND IT EASIER TO PULL SOMEONE	YOU'D EXPERIENCE MEMORY LOSS
YOU'D LAUGH MORE	YOU'D BECOME VIOLENT
YOU'D HAVE A LAUGH	YOU'D LOSE CONTROL
YOU'D MEET NEW PEOPLE	YOU'D HAVE SEXUAL ENCOUNTERS WITH
YOU'D FEEL GOOD	SOMEONE UNATTRACTIVE
YOU'D FIND IT EASIER TO TALK TO PEOPLE	YOU'D FEEL REGRET THE NEXT DAY
	YOU'D ANNOY PEOPLE
MODERATE FREQUENCY	**MODERATE FREQUENCY**
YOU'D HAVE FUN	YOU'D BECOME TOO EMOTIONAL
YOU'D BE MORE TALKATIVE	YOU'D PASS OUT
YOU'D SLEEP BETTER	YOU'D LOSE YOUR POSSESSIONS
YOU'D FEEL WARMER	YOU'D HAVE POOR CO-ORDINATION
THINGS WOULD SEEM FUNNIER	YOUR REACTIONS WOULD SLOW DOWN
YOU'D BE OUT GOING	YOU'D HAVE AN ACCIDENT
YOU'D HAVE A SENSE OF WELL BEING	YOU'D FEEL DIZZY
YOU'D FEEL SEXIER	YOU'D FEEL ILL
YOU'D FEEL CLOSER TO PEOPLE	YOU'D DROP YOUR DEFENCES
YOU'D FIND PEOPLE MORE ATTRACTIVE	YOU'D FALL OUT WITH FRIENDS
YOU'D BE ABLE TO CHAT UP SOMEONE YOU FANCY	YOU'D SPEND A LOT OF MONEY
LOW FREQUENCY	**LOW FREQUENCY**
YOU'D FEEL IN A GOOD MOOD	YOU'D HAVE A HEADACHE
YOU'D FEEL GOOD ABOUT YOURSELF	YOU'D COULDN'T SEE PROPERLY
YOU'D FEEL MORE AT EASE	YOU'D BECOME HORRIBLE
YOU'D DANCE BETTER	YOU'D FEEL PARANOID
YOU'D FEEL HYPER	YOU'D LOSE SENSE OF RESPONSIBILITY
YOU'D FEEL AMOROUS	YOU'D HAVE POOR JUDGEMENT
YOU'D FEEL ELATED	YOUR THOUGHT PROCESSES WOULD BE SLOWED
YOU'D FEEL GREAT	YOU'D LOSE RESPECT FOR PEOPLE
YOU'D FEEL HIGH	YOU'D ACT IMPULSIVELY
YOU'D SING BETTER	YOU'D FEEL DROWSY
YOU'D HAVE MORE ENERGY	YOU'D EXPERIENCE PROBLEMS WITH SEX

4.3.9 Are all levels of alcohol consumers familiar with the high frequency alcohol-related behavioural outcomes?

In subsequent studies, the MAQ will be used to assess the strength of memory associations between outcomes of alcohol use and alcohol use, itself. In subsequent studies, participants will be presented with alcohol-related and non-

alcohol-related behavioural outcomes, through the MAQ. They will be asked to write down what behaviour of theirs would be likely to produce these behavioural outcomes, represented as MAQ items. This method enables the strength of memory associations between alcohol use and consequences of this behaviour to be covertly assessed. It is the high-frequency categories that have been designed for this use.

This will cause a problem, though, if some of the high-frequency items have been generated at the MAQ contribution stage by heavy drinkers and others by light drinkers. There needs to be no relationship between the likelihood of any item having been generated in the critical high frequency category and the alcohol consumption level of those who did the generating.

If there were, indeed, during the MAQ construction a systematic relationship between the levels of alcohol consumption of the generators and the likelihood of a particular item being generated - it would not be possible to use the MAQ as planned in subsequent studies to test associations - since the association being explored would be automatically found.

Consequently a logistic regression analysis was conducted in order to test whether or not the generation of high frequency outcomes was related to the participants' alcohol consumption levels. In this analysis the alcohol consumption level ('heaviest') was regressed against whether or not the participant wrote down each of the 11 positive and 11 negative high frequency alcohol-related behavioural outcomes. To establish whether or not participants had written down the high frequency outcomes the lists generated by each participant, during the completion of the COQ, were examined separately. If a high frequency outcome appeared in the list this was indicated by a 1 and if it did not this was shown by a 0. Figure 2 shows how the database for this analysis was set up and a sample of the analysis that was conducted.

Figure 2. An example of the logistic regression analysis.

Sample of the regressions that were performed

Participant	Heaviest	Feeling sociable	Feeling relaxed	Feeling happy
1	10	1	1	0
2	3	0	0	1
3	8	0	0	1
4	2	1	0	0
5	1	0	1	0
6	14	0	1	1

Heaviest regressed against whether **feeling sociable** was written down as a consequence of alcohol use in the COQ. **Participant 1** wrote down this outcome, **participant 2** did not write down this outcome, **participant 3** did not write down this outcome, etc.

The results showed that the generation of four alcohol consumption outcome phrases was dependent upon alcohol consumption level when the alpha level was the conventional 0.05. However, an alpha level of 0.0045 should be adopted in the place of 0.05 as a Bonferonni correction for 11 analyses (11 positive and 11 negative) with a common predictor value (the consumption measure 'heaviest').

Once the Bonferonni correction was properly applied the relationship was no longer significant in each of the four cases. This result indicates that the generation of the high frequency alcohol-related behavioural outcomes was not dependent on actual alcohol consumption.

4.4 Stage 3 - The generation of behavioural outcomes not related to alcohol use - The subsidiary study.

When completing a questionnaire that only consists of alcohol-related behavioural outcome items, participants may recognise that an aspect of alcohol use is being assessed. As the MAQ is designed to be an implicit research tool - void of all alcohol references, primes or cues - the above possibility must be minimised. By including behavioural outcomes that are not related to alcohol

use (diversion outcomes) the likelihood of participants realising that the MAQ is an alcohol-related instrument is minimised. Therefore a subsidiary study was carried out to develop a list of positive and negative non-alcohol-related behavioural outcomes, to be included in the MAQ.

4.5 Method

4.5.1 Design

The aim of the subsidiary study was to develop a list of non-alcohol-related behavioural outcomes of both positive and negative valence. The list of outcomes will be incorporated into the MAQ and will introduce a diversion element. The outcomes will also serve as a control for a baseline rate of responding, 'alcohol response' on the MAQ in much the same way as the low alcohol-related items. To create a list of behavioural outcomes, not related to alcohol use, an undergraduate focus group was used.

4.5.2 Participants

Five undergraduate students (3 female and 2 male) took part in the subsidiary study. Individuals were approached around the University of Glasgow campus and were asked if they would like to be part of a focus group who would be given the task of developing a list of behavioural outcomes that are not related to alcohol use. The inclusion criteria for participation in the focus group was as follows:

(i) Participants must be of legal drinking age

(ii) Participants are to be no older than 26 years of age

(ii) Participants must be native English speaking

(iii) Participants must have consumed (on self-estimated average) at least one alcoholic drink per week in the last six months.

4.5.3 Procedure

The experimenter provided the focus group with a verbal synopsis of the structure of the MAQ, including what is was designed to measure, in order to convey the importance of developing a suitable list of non-alcohol-related

behavioural outcomes. The focus group were then told they were to generate a list of 33 positive and 33 negative non-alcohol-related behavioural outcomes. They were instructed to create the list by imagining scenarios based on a range of non-alcohol-related activities including cooking, becoming educated, being employed, exercising and travelling.

The focus group were instructed to write down outcomes only when there was 100% agreement amongst the group that it was not related to alcohol use. The focus group met on one occasion and spent a total of 90 minutes developing the list of non-alcohol-related behavioural outcomes.

4.6 Results

The behavioural outcomes generated by the focus group and are listed in Table 9.

Table 9. The non alcohol-related behavioural outcomes produced by the focus group.

POSITIVE OUTCOMES	NEGATIVE OUTCOMES
YOU'D FEEL HEALTHIER	YOU'D FEEL UNDER PRESSURE
YOU'D HAVE BETTER SKIN	YOU'D FEEL WASTED YOUR TIME
BREATHE BETTER	YOU'D FEEL SWEATY
YOU'D FEEL TONED	YOU'D FEEL EXHAUSTED
YOU'D FEEL DELIGHTED	YOU'D FEEL SORE
YOU'D FEEL EXHILARATED	YOU'D FEEL LIFELESS
YOU'D BE INTERESTED	YOU'D FEEL WHEEZY
YOU'D FEEL LIKE A SCHOLAR	YOU'D GET LOST
BETTER FUTURE	YOU'D FEEL ASHAMED
YOU'D GET MORE RESPECT	YOU'D BE IN DANGER
GET A GOOD JOB	YOU'D TAKE RISKS
YOU'D HAVE MORE MONEY	YOU'D FEEL DISGUSTED
YOU'D FEEL CONTENTED	YOU'D FEEL FRIGHTENED
YOU'D FEEL PLEASED	YOU'D BE IN DEBT
YOU'D FEEL PEACEFUL	YOU'D FEEL BITTER
YOU'D FEEL IMPORTANT	YOU'D FEEL RESENTFUL
YOU'D FEEL FULFILLED	YOU'D FEEL DRAINED
YOU'D EXPERIENCE NEW THINGS	YOU'D FEEL LIKE A SCAPEGOAT
YOU'D BROADEN YOUR HORIZONS	YOU'D FEEL POOR
YOU'D HAVE A SENSE OF PURPOSE	YOU'D FEEL WEAK
YOU'D EARN MONEY	YOU'D FEEL ANXIOUS
YOU'D FEEL HUMBLED	YOU'D FEEL FRUSTRATED
YOU'D FEEL SELF-SATISFIED	YOU'D FEEL IT WAS ENDLESS
YOU'D FEEL ENLIGHTENED	YOU'D FEEL STRESSED
YOU'D BE BEST AT IT	YOU'D FEEL HATED
YOU'D FEEL PROUD	YOU'D FEEL HUMBLED
YOU'D FEEL SUPERIOR	YOU'D FEEL BLOATED
YOU'D FEEL SELF-RIGHTEOUS	YOU'D FEEL GLUM
YOU'D REDUCE YOUR DEBT	YOU'D FEEL MOODY
YOU'D FEEL LIKE A HERO	YOU'D FEEL LONELY
YOU'D FEEL FIT	YOU'D FEEL NERVOUS
YOU'D FEEL SECURE	YOU'D FEEL RESTRICTED
YOU'D BECOME MORE KNOWLEDGEABLE	YOU'D FEEL BORED

4.7 Stage 4 - Constructing the MAQ.

The final stage of the MAQ compilation was concerned with the final form (formatting the items, sequence of outcome items, the standardised instructions) of the MAQ and the practicalities involved in creating an implicit-based research instrument.

4.7.1 Formatting the questionnaire outcome items.

The assessment component of the MAQ is directly related to the fact that each participant reads each of the behavioural outcome items (e.g. relaxed) and then writes down what behaviour of theirs would make them feel that particular way (e.g. having a drink or going to the cinema). In order to reinforce the point that participants are to write down what behaviour of theirs would make them feel the way depicted in the outcome item, the behavioural outcomes were prefaced with one of the following phrases; you'd feel, you'd have, you'd be or you'd get. In addition to this an element of overall uniformity was added to the MAQ.

4.7.2 The order of the questionnaire outcome items.

It is possible that placing two or more alcohol beverage consumption outcomes together could provide participants with an alcohol-related prime or cue. Therefore to minimise possible priming effects, the sequence of the outcomes (alcohol-related and non-alcohol-related) was manipulated. Construction constraints were that items from the alcohol-related and the non-alcohol-related categories should alternate and that no item from one of the three frequency categories (low, moderate or high) should be placed next to one from the same category. The sequence used is shown in Table 12 for two versions of the MAQ.

Table 10. The order of the frequency and valence distribution in the MAQ.

No.	Questionnaire 1	Questionnaire 2
1.	Moderate positive	Filler
2.	filler	Moderate negative
3.	Low negative	Filler
4.	filler	Low positive
5.	High positive	Filler
6.	filler	High negative
7.	High negative	Filler
8.	filler	High positive
9.	Low positive	Filler
10.	filler	Low negative
11.	Moderate negative	Filler
12.	filler	Moderate positive

*This sequence was repeated a total of 11 times: 11 x 12= 132 items.

To control for possible order effect (resulting from the placement of the outcome items) two forms of the MAQ were produced by simply reversing the order of the 132-items (e.g. item 1 would become item 132, item 2 would become item 131, etc). In subsequent studies administering one version to half of the participants and the other version to the other half would permit any order effects on the dependent variable to be measured. Entering the type of questionnaire (form 1 or 2) that participants receive into the regression analysis, as predictor variable will assess order effect.

4.7.3 Instructions

In devising the standardised written instructions for the MAQ the following pertinent issues were considered:

(i) As the functionality of the MAQ stems from its covert nature it is essential that no reference to or explicit mention of alcohol use be made within the instructions.

(ii) To ensure that participants are not thinking of other individuals' responses whilst completing the MAQ the fact that responses should not be made based on others (e.g. friends, family) behaviour must be stressed.

(iii) As many behaviours can give rise to the behavioural outcomes listed in the MAQ, participants will be asked to write down the first two behaviours that come to mind when answering what behaviour would make them feel that particular way.

(iv) As the strength of association between two concepts is being assessed, it is necessary to stress the fact that it is the first two behaviours that come to mind which must be written down. A time frame for completion of the MAQ will be provided so that the participants can gauge how quickly they should be responding to each item.

As a result of the above restrictions and requirements, the following instructions (Figure 3) were provided on page 1 of the MAQ.

Figure 3. Page 1 - The MAQ instructions.

This booklet contains a list of phrases that are potential results of carrying out some behaviour or activity. What you have to do is read each phrase and write down next to it the <u>first</u> and <u>second</u> behaviour or activity that immediately comes to mind.

For example one phrase in the list might be *You'd feel tired*. You might think that *staying up late* and *taking sleeping pills* causes this behaviour.

EXAMPLE **phrase** ⟶ **43. *You'd feel tired***

1. <u>Staying up late</u>

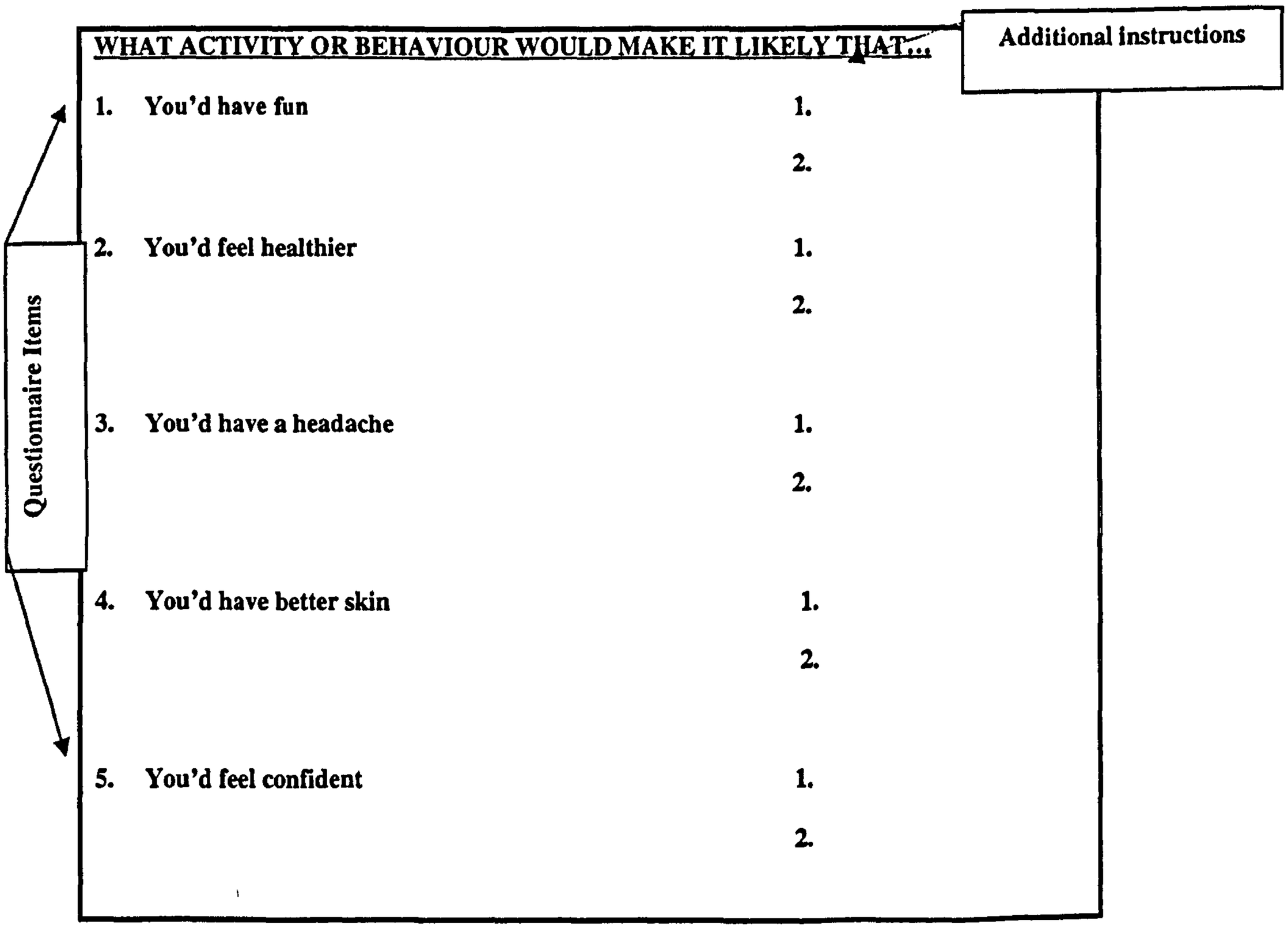
2. <u>Taking sleeping pills</u>

Behaviours or activities that make you feel tired

So, we give you a result or consequence and you give us two behaviours/activities that you think might cause it. Don't spend too long on each phrase just do it as quickly as you can and don't leave any out. It will probably take you about 45 minutes to complete. Any questions? If not please wait for the experimenter to tell you to start.

As there were 132 items in the MAQ and estimated time for completion is 45 minutes (approximately 34 seconds per item) it is possible that participants may forget that they are to write down responses based on their behaviours and activities. To ensure that participants continued to respond to each item in an appropriate manner whilst completing the MAQ, additional instructions appeared at the top of each page. Figure 3 is an example of a page from the MAQ.

Figure 4. An example of the questionnaire items and the additional instructions.



4.7.4 The MAQ - The end product.

The completed questionnaire consisted of twenty-nine-pages which contained 132 behavioural outcome phrases: 66 alcohol-related behavioural outcomes (33 positive and 33 negative) and 66 non-alcohol-related behavioural outcomes (33 positive and 33 negative). Written instructions appeared on page 1 of the MAQ with additional shortened instructions located at the top of each page.

4.8 Summary

(i) Prior to constructing the Memory Association Questionnaire, an appropriate framework, which consisted of eight sections, was developed. Stage 2 of Study 1, was conducted in order to obtain a list of suitable alcohol-related behavioural outcomes (idiosyncratically, moderate and culturally available outcomes) to be used within the MAQ. A subsidiary study was carried out in order to obtain a suitable list of non-alcohol-related behavioural outcomes.

(ii) The end result is a 132-item instrument, which is designed to covertly collect alcohol responses from participants to subsequently measure the associations between alcohol use and alcohol-related behavioural outcomes. The MAQ comprises 66 alcohol-related behavioural outcome items and 66 non-alcohol-related behavioural outcomes.

(iii) Although the MAQ is based on the Association Questionnaire, developed by Stacy et al. (1994), it is unique. Firstly, the items used within the questionnaire are derived from a sample of regular alcohol consumers (Stacy's were nearly 40% abstinent). Secondly, within the MAQ, both positive and negative alcohol-related behavioural outcomes are represented equally.

(iv) As no explicit alcohol mentions are made within the verbal or written questionnaire the MAQ avoids the common criticisms of the traditional expectancy-based approach Chapter 2). In addition, possible priming effects deriving from the content of the MAQ have been minimised by including behavioural outcomes not related to alcohol use.

As a direct consequence of the above points, the MAQ is a suitable tool for assessing the strength of association between alcohol consumption level and both positive and negative outcomes of alcohol use.

Chapter 5 - Study 2 - Alcohol Memory Associations and Young Social Drinkers.

Chapter Summary

This chapter reports the findings from Study 2. The results show that there is a positive linear relationship between alcohol consumption and memory associations for both positive and negative outcomes of this behaviour. This replicates and extends the work of Stacy and colleagues. The rationale for conducting this research and the findings are also discussed with reference to how the work may aid in elucidating and resolving the conflicting findings which surround research on negative alcohol expectancies (NAEs) and alcohol consumption level.

5. Introduction

Previous research has found a positive significant relationship between young social drinkers' memory associations for positive outcomes of alcohol use and alcohol consumption (e.g. Stacy, 1997). This research provides empirical support for the Alcohol-Related Association model of alcohol use advocated by the Stacy and colleagues. The main objective of the present study was to independently replicate Stacy's work and seek to extend these findings by assessing the relationship between memory associations held between alcohol use and both positive and negative outcomes of this behaviour.

To empirically assess this relationship an independent assessment tool was developed (Chapter 4) which enables the relationship between both negative and positive alcohol-related behavioural outcomes and alcohol consumption to be measured in parallel. In addition to complementing and extending Stacy et al's. research the study reported in this chapter has implications for an issue related to research on negative alcohol consumption outcome expectancies. This chapter will begin by introducing this issue.

During the last two decades drink-related expectancies have been viewed as critical to the onset and maintenance of alcohol use (e.g. Cox and Klinger, 1988). A number of review papers have cited expectancies as being amongst the strongest predictors of drinking (e.g. Goldman et al., 1999). Although it is recognised that alcohol expectancies include positive and negative effects (Leigh and Stacy, 1993) it is the role of positive alcohol expectances (PAEs) which has received the majority of attention in this area. In contrast, research on negative alcohol expectancies (NAEs) has been minimal.

Explanations for the lack of research into the role of (NAEs) and drinking behaviour relates to two key issues:

(i) The instruments used in this research area

(ii) The conflicting and generally inconclusive research findings concerning the relationship between NAEs and alcohol consumption.

During the initial phase of interest in the area of expectancy and alcohol research the Alcohol Expectancy Questionnaire (AEQ, Brown et al, 1987) became the instrument of choice (Leigh, 1989). As this tool did not include NAEs it was natural that little research was conducted with NAE to the extent that the potential importance of this construct began to be questioned. In response to a call for increased research on NAEs on theoretical grounds (e.g. Adams and McNeil, 1991) instruments which assessed negative expectancies in parallel with positive alcohol expectancies were constructed (e.g. The Comprehensive Effects of Alcohol (CEOA), Fromme, Stroot and Kaplan, 1993; The Negative Alcohol Expectancy Questionnaire (NAEQ), Jones and McMahon, 1994).

The initial interest in the role of NAEs in drinking behaviour was slight largely due to conflicting and inconclusive research findings. For example, Fromme et al. (1993) using the CEOA questionnaire found that there was a negative relationship between alcohol consumption and NAEs held by social drinkers. On the other hand, McMahon, Jones and O'Donnell (1994) found it to be positive at the social level of use. Still, other studies concluded that while negative expectancies might predict drinking in adolescents and young adults they typically account for less variance than do positive expectancies (e.g. Leigh and Stacy, 1993; Rather and Goldman, 1994). By contrast, it is consistently shown that positive expectancies correlate with alcohol consumption, with heavier drinking associated with stronger expectancies in adults (e.g. Brown et al., 1987) alcoholic inpatients (Brown et al., 1985), adolescents (Brown et al., 1987) and college students (e.g. Stacy, Widamen and Marlatt, 1990).

As a consequence of the consistent research findings concerning alcohol consumption and PAEs, there was a general consensus in this research area that PAEs formed a positive relationship with consumption. The evidence overwhelmingly demonstrated this and it also made good intuitive sense. In contrast, there was considerable disagreement over the relationship between NAE and alcohol consumption. First, research was inconclusive because it was contradictory (Fromme et al., 1993; McMahon et al. 1994). Second, there were two versions of "good intuitive sense'. On the one hand there was the view that the NAE-consumption relationship must be negative because the anticipation of

negative consequences (according to the laws of learning) will reduce not increase the occurrence of a behaviour (Goldman et al., 1999). On the other hand, there was the view that as consumption rises (presumably due to the rise PAEs) the number of NAEs held also rises.

This latter view has been put forward by Jones and colleagues (McMahon et al., 1994; Jones and McMahon, 1998; Jones et al. 2001). They posit that through learning, the increase in negative experiences (due to an increase in consumption) will translate to an increase in the number of NAEs held. In other words, there will be a positive relationship between consumption and negative expectancies just as there is a positive relationship between consumption and positive expectancies.

If this view is correct (that NAEs rise with consumption but do not impact on behaviour) then a point must be reached when they have do have an influence on alcohol use. Studies which investigate what motivates problem drinkers to stop drinking, show that these individuals cite adverse outcomes of alcohol use (Tuchfield, 1981) and the realisation that they are "hitting bottom" (Ludwig, 1985; Amodeo and Kurtz, 1990). Furthermore research has also identified the role of expectations of negative consequences in post treatment recovery (Amodeo and Kurtz, 1990; Edwards, Brown, Duckitt et al., 1987; Eastman and Norris, 1982). For example, Eastman and Norris (1982) concluded that 77% of recovering problem drinkers holding PAEs relapsed whereas 7% holding NAEs did not. At a less severe level, but still in relation to treatment, research examining college binge drinkers readiness to change drinking behaviour also highlights the influential role of NAEs (McNally and Palfai, 2001).

The aforementioned research suggests that NAEs increase in relation to alcohol consumption to a point at which they begin to impact on drinking behaviour. Within theories concerned with behaviour change there are examples of cognitions being present but not impacting on behaviour. For example, in the ubiquitous Transtheoretical Model of Behavioural Change (e.g. Prochaska and Diclemente, 1982) cognitions which may cause a person to be 'Contemplative' rather than 'Precontemplative' are present but do not impact on behaviour at that

time. Only when a person operationally becomes 'Active' can it be said that the cognition impacts on behaviour. Thus there is nothing unusual in suggesting that NAEs could rise with experience of drinking without impacting on behaviour but eventually reach a point at which restraint operates.

Although Jones and colleagues view has some empirical support (McMahon, et al., 1994) an important question to ask is why did early work on NAEs provide such conflicting and inconclusive findings? In response to this issue Jones et al. draw attention to the instruments that have been used to assess this relationship. In particular they highlight methodological problems associated with the CEOA (Fromme et al., 1993). They state that the negative expectancy component of the CEOA questionnaire is comprised of items that are barely negative (e.g. my handwriting would suffer). Thus, when a moderate to heavy drinker is asked whether they expect these relatively lightweight consequences to occur when they drink, they say 'no'. This response is likely to be due to the fact that when this type of alcohol consumer drinks to excess they will be experiencing more severe consequences than those depicted in the questionnaire and by contrast the lightweight items do not 'rate' in their eyes as 'negative'. Hence, moderate-to-heavy social drinkers will score low on this negative expectancy task. In comparison, light drinkers will not have had the direct experience of more severe negative consequences that the heavier drinkers will have experienced, consequently, the relatively lightweight NAEs items from the COEA will be rated as 'negative' by this group. It is for these reasons that it is purported that the use of the COEA shows a negative relationship between consumption level and NAEs held.

If there are grounds for believing the relationship between NAEs and alcohol consumption is positive (until a certain level is reached) then how does this relate to research on alcohol associations of which the present thesis is concerned? A recent issue in research concerned with alcohol-related cognitions involves the relationship between implicit (alcohol memory associations) and explicit (alcohol outcome expectancies) memory structures. In a recent paper, Wiers (cited in Wiers, Stacy, Ames et al., 2002) summarises three main theoretical perspectives;

(i) The first view is that expectancies start off as explicit cognition and gradually become implicit (automated)

(ii) The second view is that they represent different underlying cognitive mechanisms

(iii) The third is that implicit expectancies better represent the underlying mechanisms because they are less subject to problems of investigation related to introspection.

Although there is much debate surrounding the role of implicit and explicit memory structures in alcohol consumption behaviour the present argument is concerned with the way in which these memory structures are formed. There is a strong argument that explicit alcohol expectancies and implicit alcohol associations mutually and reciprocally form (Noll, 2001; Goldman, 2001). If one adopts a base-level view of the processes involved in the formation of the implicit and explicit constructs then a common starting point is found. In the initial stages of formation, both types of memory constructs develop because an individual learns that a certain behavioural outcome occurs as a result of consuming alcohol.

If this claim is defensible then it is easy to see how both positive explicit alcohol expectancies and positive implicit alcohol associations are positively related to consumption. In the same way, it is difficult to see how this mutual consistency could not also extend to the relationship between consumption and both negative explicit alcohol expectancies and negative implicit alcohol associations. If a positive relationship between negative 'memory' and alcohol consumption was found using completely different methodologies (implicit and explicit) this would help resolve the dispute surrounding research which examines the relationship between consumption and NAEs.

The present chapter is concerned with whether or not there is a relationship between consumption and memory associations for both positive and negative alcohol-related outcomes. As previously stated, the inconsistent empirical findings that surround research concerning the number of NAEs held as consumption experience increases, may be due to the nature of the items that are

used to assess the NAEs-consumption relationship (e.g. Fromme et al., 1993). Consequently, it was predicted that when appropriate methodology is implemented a positive relationship between consumption and negative alcohol implicit associations will be found in social drinkers. In order to measure this relationship the MAQ was designed and constructed (see Chapter 4). In addition, to obtain a measure of the participant's alcohol consumption level the TLFB (Sobell and Sobell, 1992) questionnaire was used.

With reference to the present study it was hypothesised that alcohol consumption level would be significantly related to the number of alcohol-related behavioural outcomes that are identified as being related to alcohol use (target responses) in the MAQ. Specifically it was postulated that there would be a positive significant relationship between alcohol consumption level and the number of target responses given to the positive and negative high frequency alcohol-related behavioural outcomes. However, it was expected that there would not be a significant relationship between alcohol consumption level and the target responses made in response to the low frequency alcohol-related behavioural outcomes or for non-alcohol-related behavioural outcomes.

5.2.1 Methodology

5.2.2 Participant Recruitment

The MAQ was designed to covertly assess memory associations between alcohol use and related outcomes of this behaviour. Consequently, measures were taken to ensure that the participant recruitment process did not reveal the main experimental element of the study. Recruitment posters were placed on notice boards around the University of Glasgow, but not in the Psychology Department. Each poster contained the following information:

(i) All participants will be paid £5.00 for completing a questionnaire

(ii) To be suitable for the study you must be a Native English speaker below the age of twenty-seven years.

(iii) If you are interested in taking part go to one of the three testing sessions (information about where and when the testing sessions would take place was provided).

In case it had become widely known (by undergraduate students) that alcohol-related research is conducted within the Psychology Department, all of the recruitment and subsequent testing sessions took place away from the Psychology Department and without reference to it.

5.2.3 Participant Information

Ninety-eight undergraduate students took part in Study 2. Table 1. Provides information regarding the participants age and gender.

Table 1. Participants Information

	Total	Males	Females
Median Age	19	19	19
Age range	18-26	18-26	18-26
Total Number	98	35	63

5.2.4 Materials

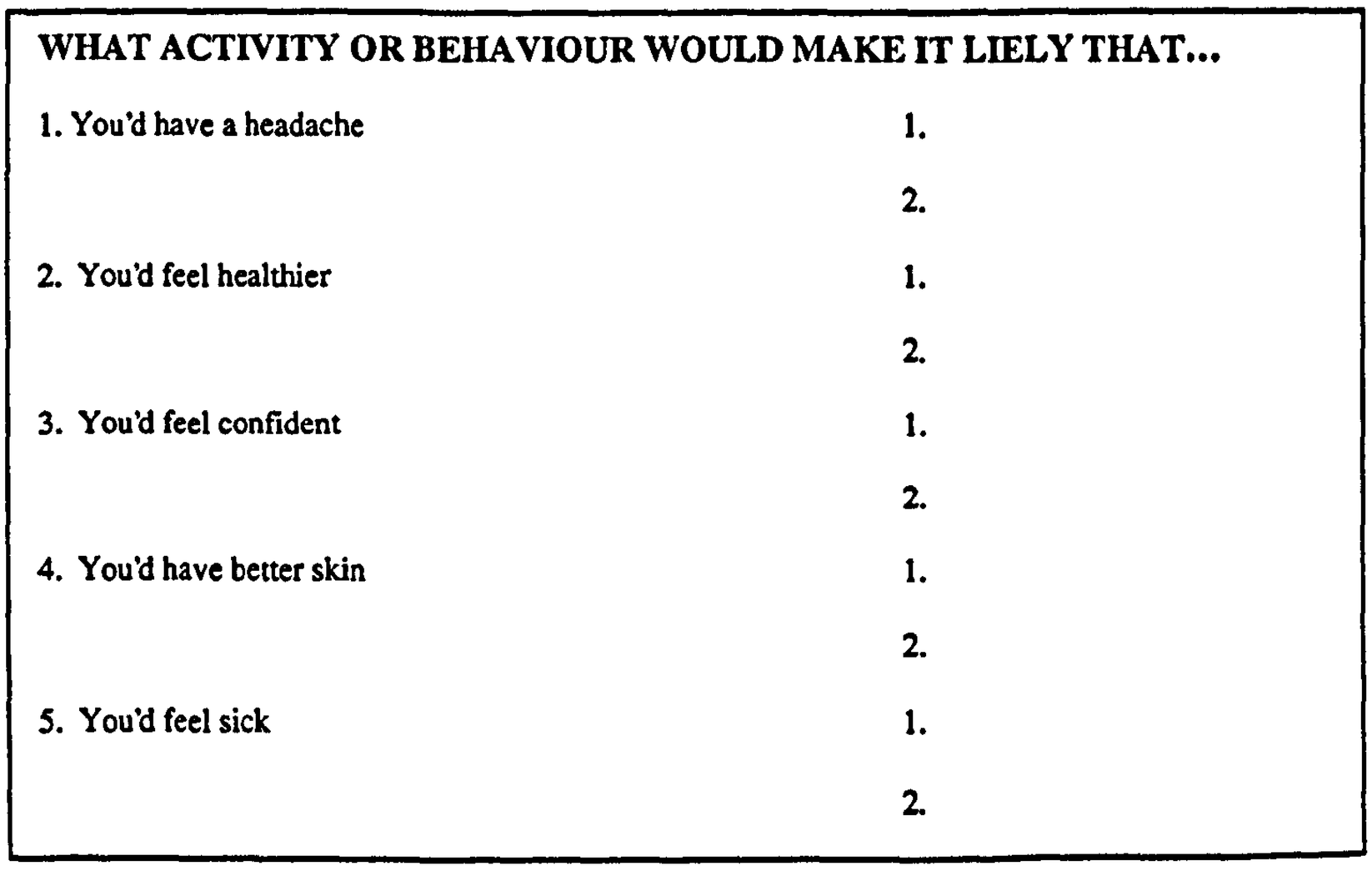
Each participant completed the following questionnaires: the Memory Association Questionnaire (MAQ), the Demographic Information Questionnaire (DIQ) and the Time-Line-Follow-Back-Diary (TLFB, Sobell and Sobell, 1992). The questionnaires were completed in the order above - note that the MAQ was completed first. For detailed information on the DIQ and the TLFB refer to Chapter 4 p. 68-69). To see a copy of the aforementioned questionnaires refer to Appendix E, C and D, respectively.

5.2.4.1 The MAQ

The 132-item MAQ was derived from Study 1 (described in Chapter 4) and comprised (as items) 132 different outcomes of performing particular behaviours (e.g. "you'd feel relaxed"). The MAQ consists of 66 alcohol-related outcome items (33 positive and 33 negative) and 66 non-alcohol-related outcome items (33 positive and 33 negative). Participants were instructed (page 1) to read each outcome item and to write down the first two activities or behaviours, which

came to mind, that would result in their feeling the way depicted in the outcome. In addition to the instruction page, the instructions phrase 'What activity or behaviour would make it likely that... appeared at the top of each page. Figure 1 is a sample page from the MAQ.

Figure 1. A Sample page from the MAQ.



WHAT ACTIVITY OR BEHAVIOUR WOULD MAKE IT LIELY THAT...

1. You'd have a headache	1.
	2.
2. You'd feel healthier	1.
	2.
3. You'd feel confident	1.
	2.
4. You'd have better skin	1.
	2.
5. You'd feel sick	1.
	2.

Through the MAQ, participants were given an *outcome* (as an MAQ item) without reference to the activity or behaviour that might have caused it. They were then asked to write down what **activity or behaviour** of theirs would cause that outcome (the response was called the **behaviour response**). The **target** responses (the target of the study) were the **alcohol-related behaviour responses** made by participants to the 50% of items that were **alcohol-related behavioural outcomes** and the 50% that were *not.*

At no point in the recruitment process and at no point in the booklet, its instructions, nor the MAQ, were references made to alcohol beverages, alcohol beverage consumption, alcohol beverage paraphernalia nor any related activities. Two forms of the MAQ were to control for order of inclusion of the items: Form 2 was identical to Form 1, but with the order of the 132 items reversed. Half of the sample received Form 1 and half received Form 2. Pilots showed that on average, the MAQ took 45 minutes to complete.

To measure memory associations between alcohol use and related outcomes, it was essential that participants followed the standardised instructions, specifically that they were to write down the first two behaviours/activities that come to mind after reading each outcome item. To increase the probability of the instructions being followed, the participants were informed that they would be presented with a cash incentive for taking part in the study when they had completed the questionnaires. Previous research (Ferrari and McGowan, 2002) has shown that participants who were offered an incentive for participating in an experiment completed the requirements of the study more frequently than participants who were not offered an incentive.

5.2.5 Design

The main research objective of Study 2 was to measure memory associations between alcohol use and alcohol-related behavioural outcomes in relation to consumption level. Two questionnaires were used to explore this relationship - the MAQ and the TLFB.

The TLFB was used to obtain a measure of alcohol consumption level. The MAQ was used to collect alcohol-related behaviours written down and made in response to the outcome items the questionnaire contains. The nature of the relationship between consumption (TLFB) and alcohol-related behaviour (MAQ) was the relationship of interest. With reference to the responses made in the MAQ the dependent variables, were the number of **alcohol-related behaviour responses** (target responses) generated by participants in response to the items represented in the MAQ. Therefore, there were six discrete dependent variables represented by the number of alcohol-related target responses given to the following six groups of outcomes - positive low frequency alcohol-related outcomes, positive high frequency alcohol-related outcomes, negative low frequency alcohol-related outcomes, negative high frequency alcohol-related outcomes, positive non-alcohol-related and negative non-alcohol-related. Each participant was asked to provide two responses to each of the 132 behavioural outcome items represented in the MAQ.

To test whether there were differences between the participants in Study 1 (the sample who generated the list of alcohol-related behavioural outcomes used in the MAQ) and the participants in Study 2 (young social drinkers who completed the MAQ) comparisons were made between the two groups with regards to demographic (e.g. age) and alcohol consumption (e.g. number of units consumed on the heaviest drinking day of the previous week) variables. To obtain the information for use in the subsequent analyses, the DIQ and the TLFB were administered to all participants.

5.3 Procedure

Information concerning the location of the testing room, the date and time of each testing session appeared on the participant recruitment posters. The testing room was a large room with a table and chairs. The room was free from any references to alcohol use. Participants arrived at the testing room during the specified times. On entering the room, each participant was given the MAQ and asked to read the instruction page. The researcher verbally repeated and asked the participants whether they understood what they were required to do. If there was more than one participant completing the questionnaires at any time they were instructed not to discuss possible responses and to respond to items in the MAQ as quickly as possible. The researcher was present throughout the testing session to ensure that participants were not conversing or comparing responses.

Once the MAQ was completed, it was taken from the participant. Each participant was then given the DIQ to complete. It was only at this stage in the testing process that participants would have become aware that the experiment might be concerned with alcohol use. Once the DIQ was finished participants then completed the TLFB. As the data collection process was anonymous, in order to match the completed MAQs with the demographic and alcohol consumption information participants were instructed to write their date of birth on the first page of each of questionnaire. Research shows that by introducing anonymity the degree of truthfulness in answering questions of a sensitive nature is increased (Ong and Weiss, 2001; Brink, 1995).

5.4 Results

5.4.1 Strategy of analysis

The data was analysed using the statistical program Statistica 4.1 for Macintosh. The α level for all tests was set at 0.05 (with the exception of tests where the Bonferonni correction was applied).

<u>Primary analysis</u>

Through stepwise, hierarchical incremental multiple regression analysis, the relationship between self-reported alcohol consumption level and the target responses to items representing alcohol-related behavioural outcomes and items representing non-alcohol-related outcomes were explored.

<u>Supplementary Analysis</u>

To test for equivalency (demographic variables and alcohol consumption level) between the participants in Study 1 (in which the MAQ was built) and 2 (in which the MAQ was used) a series of statistical tests were carried out. As a theoretical assumption of parametric tests is that the data should be normally distributed (Statsoft, 2001) the Kolmogorov-Smirnov test was used to assess the distribution fit of the data. If the results from this analysis showed that the data were not normally distributed an equivalent non-parametric test was used. Information regarding which tests were used will now be presented.

As the data for the participant's age were not normally distributed the Mann Whitney U- tests was used to test for differences between participants in Study 1 and Study 2 (for the whole sample and for the males and females). To test whether there was a significant difference regarding the number of participants in Study 1 and 2 who stated that they have been treated for an alcohol-related problem or reported that an immediate family member had an alcohol-related problem a non-parametric tests was used. As the data was from two independent samples and as it was discrete the chi-square was used.

In addition to the tests that were conducted to highlight the similarities and differences between the two research samples, the aforementioned tests were also carried out to assess whether males and females in the present sample (Study 2)

significantly differed with regards to age, the number who had received treatment for an alcohol-related problem and the number who had an immediate family member who had experienced an alcohol-related problem.

To test whether there was a significant difference in the number of target responses given to the low and high alcohol-related behavioural outcomes, independent t-tests were conducted.

5.4.2 Participants information

To test for equivalency between the sample that generated the alcohol-related behavioural outcomes used in creating the MAQ (Study 1) and the present sample, analyses were carried out to test for differences between the age of the participants, and the number of participants who had been treated for an alcohol-related problem and the number of participants who stated that an immediate family member had experienced an alcohol-related problem. Statistical comparisons were made between the research samples from Study 1 and Study 2. Analyses were also carried out to test for differences between the male participants in each sample and the female participants. As the data was not normally distributed, the Mann Whitney U-test was used to test for differences for between group differences regarding the participants age. The chi-square test was used to test for between group differences in the number of participants who had received treatment for an alcohol-related problem and the number who stated that they had an immediate family member who had experienced an alcohol-related problem.

The analyses conducted showed that the two research samples were of similar ages. This was found for the research samples as a whole and for the comparisons conducted between the male and female participants in each sample. In addition, no significant differences were found between the samples of between the male and female participants in each group for the number of participants who had received treatment for an alcohol-related problem. Furthermore, no significant between group (for the samples as a whole and by gender) differences were found with reference to the number of participants who

stated that an immediate family member had experienced an alcohol-related problem.

Tests were also carried out to determine if they were any within-group (male and female) differences for the participants from Study 2. To establish equivalency between the male and female participants statistical comparisons were made for the participants age, the number of males and females who had received treatment for an alcohol-related problem and the number who stated that they had an immediate family member who had experienced an alcohol-related problem. Tests conducted to determine if they were any within group (male and female) differences found that they were no significant differences between the male and female participants for the aforementioned variables.

For all of the results of the demographic comparisons, see Appendix A.

Alcohol consumption information

To test for equivalency (in terms of alcohol consumption level) between the participants in Study 1 and Study 2, the results from the TLFB were used. The consumption measure 'heaviest' was used as a means of representing participant's alcohol consumption level. Reasons for adopting this measure have been explained in full (Chapter 4, p. 73-74); however, to summarise, 'heaviest' is used as it is the measure that most aptly represents the regular alcohol consumption level of young social drinkers.

To calculate participants' consumption level for the previous week (based on the information given in the TLFB government guidelines (HEBS, 1998) on alcohol units per alcoholic drink were adhered to (refer to Chapter 4, p. 72).

Alcohol consumption level - a comparison between the samples from Study 1 and 2.

As the datum was not normally distributed, a series of independent t-tests were conducted to test whether there were significant between-group differences for participant's alcohol consumption level. Although participants in Study 2 had a higher consumption level ($\underline{M}$ = 10.34, $\underline{S.E.}$ =.76) in comparison with the

participants in Study 1 (M = 9.81, S.E. =.54) this difference is not significant as t(396) = -0.59, p = 0.55 (Figure 2).

The male participants in Study 1 consumed more alcohol (M = 12.60, S.E. = 1.47) compared with the male participants in Study 2 (M = 11.60, S.E. = .89) however, there is no significant between-group difference as t(145) = 0.57, p =.56 Figure 11). The females in Study 2 consumed a mean 9.63 (SE = .87) alcohol units in comparison to the female participant in Study 1 who consumed a mean of 8.15 (SE = .54) alcohol units; however, the difference in consumption was not significant as t(249) = -1.69, p =.09 (Figure 12).

Figure 2. The mean alcohol consumption level of the participants in Study 1 and 2.

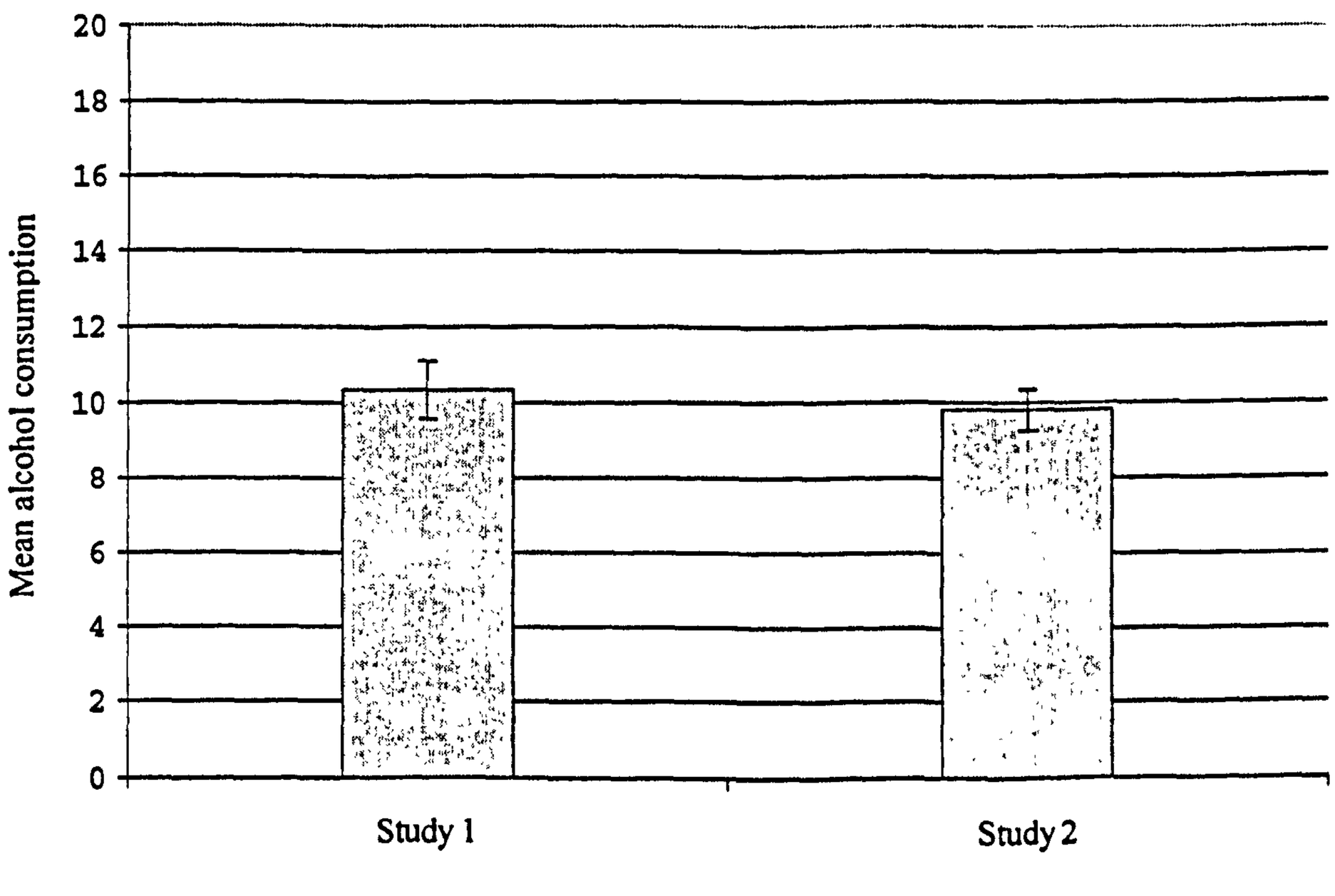


Figure 3. The mean alcohol consumption of the male participants in Study 1 and 2.

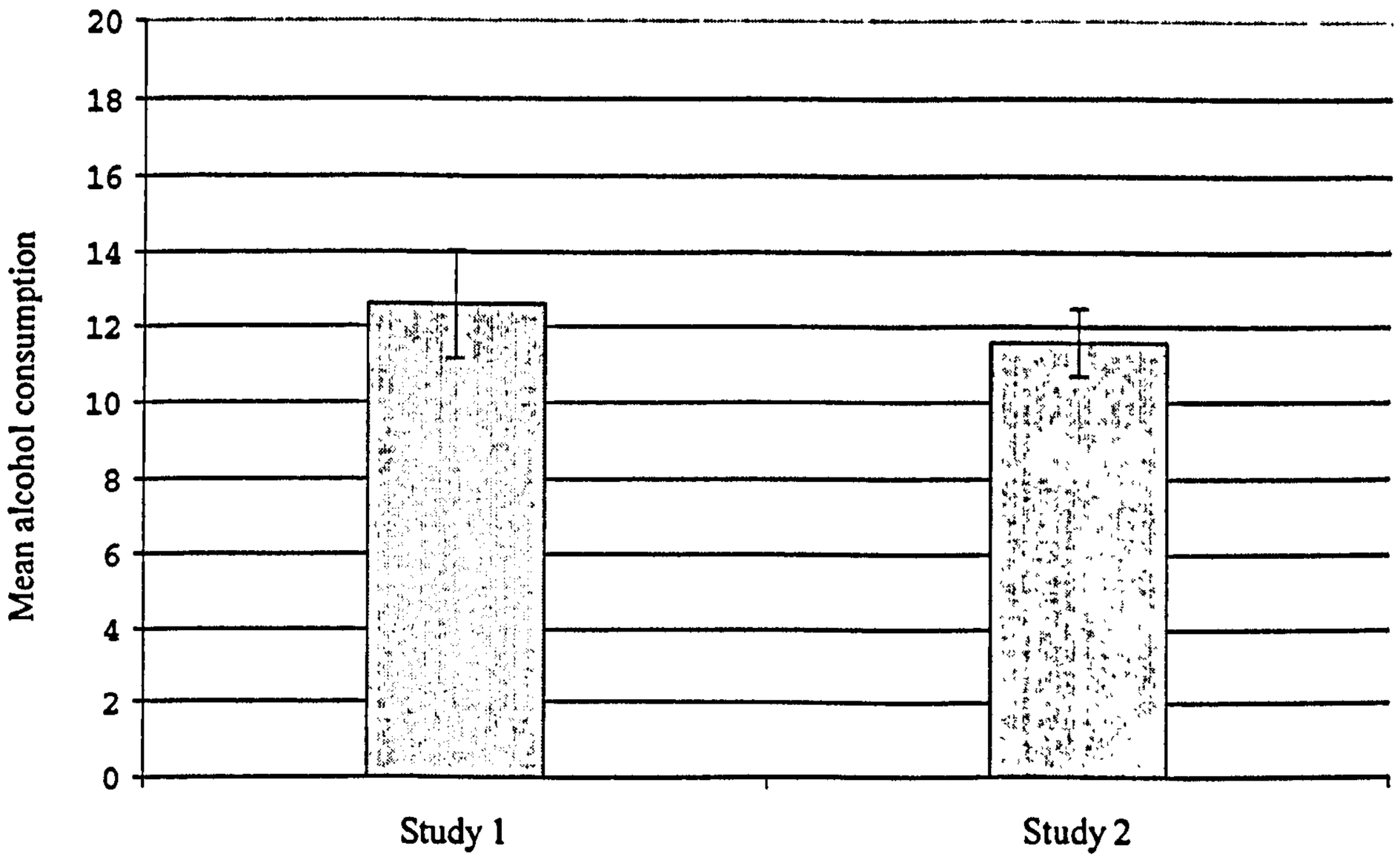
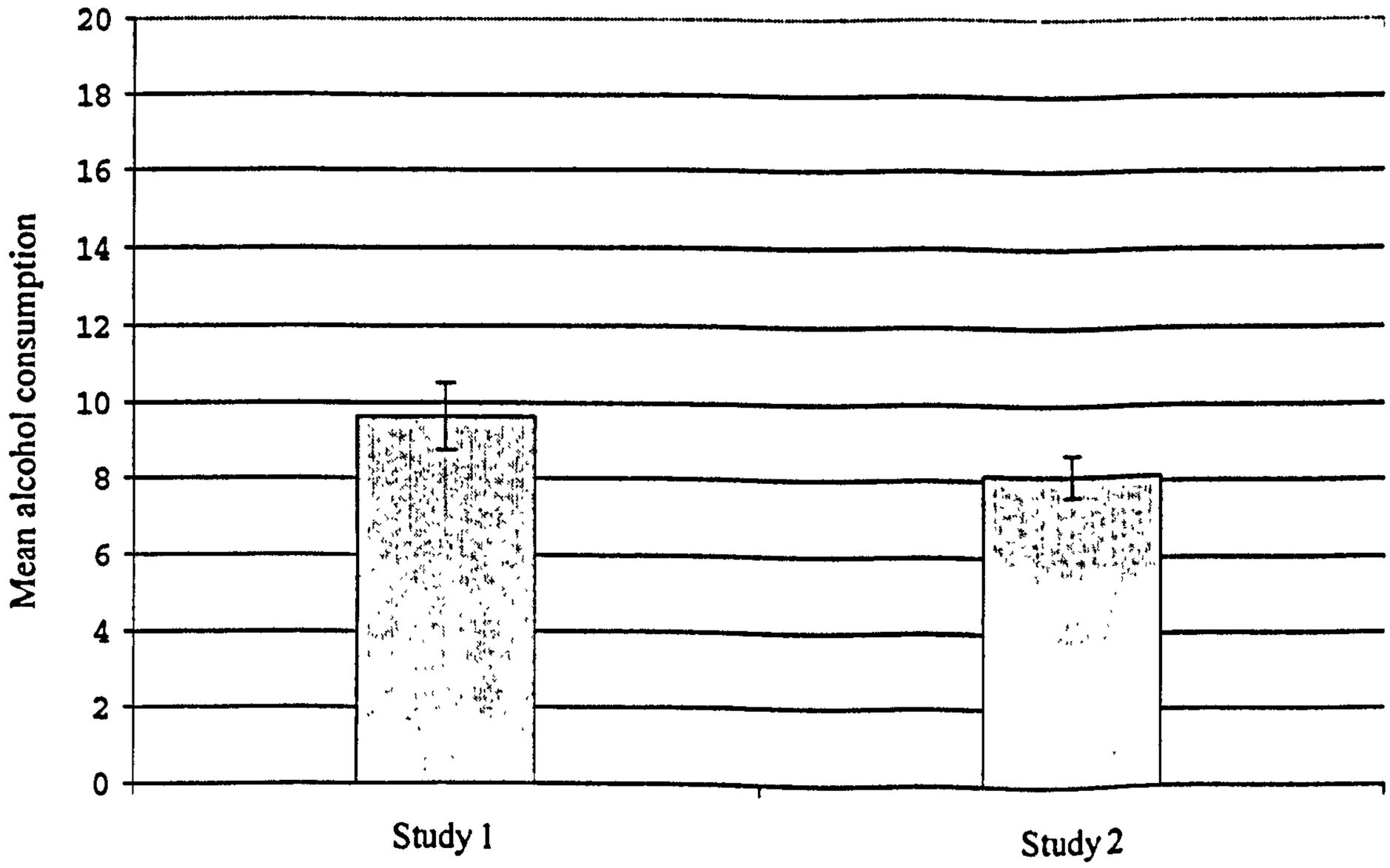


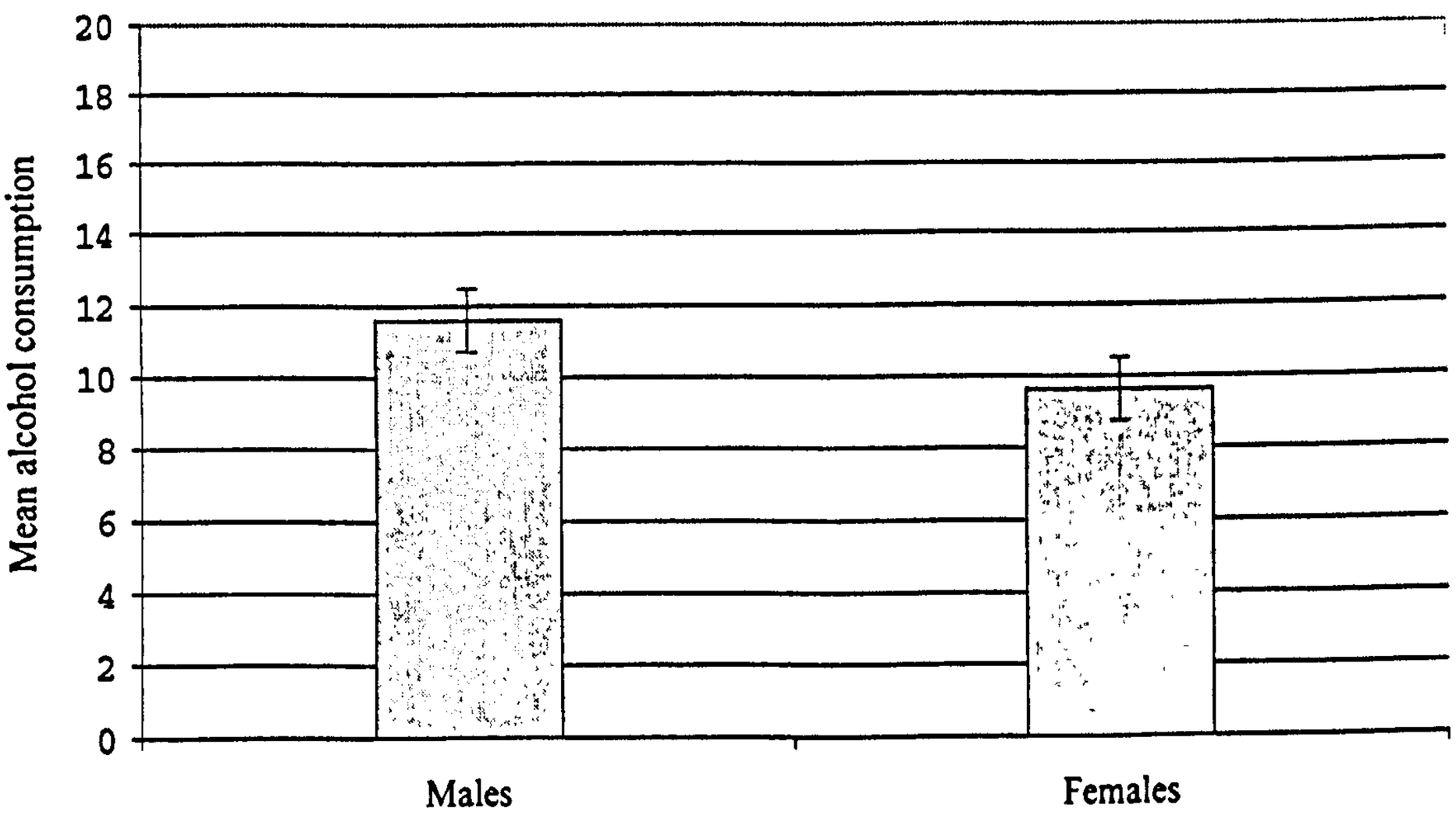
Figure 4. The mean alcohol consumption of the female participants in Study 1 and 2.



A comparison of the male and female participants from Study 2.

Although the male participants in Study 2 consumed more alcoholic units (M = 11.6, SE = .89) compared with the female participants (M =9.63, SE = .87) the difference was not significant t(96) = 1.23, p =.22 (Figure 5).

Figure 5. Mean alcohol consumption of male and female participants in Study 2



In this sample, nine participants (5 female and 4 male) reported that they had not consumed alcohol during the week prior to taking part in the study. However, of this group, five participants stated that the previous week had not been a typical drinking week and that normally they would consume alcohol. In the present study, it was not possible to recruit or advertise for alcohol users, as the main theme of the study could not be revealed to future participants. Prior to collecting the data, it was decided that to represent a wide range of alcohol consumers it was necessary to include data from non-drinking participants.

However, as a criticism of previous research in this area (Chapter 3) centred on research samples overall low level of alcohol experience, the low level of alcohol experience, the data from non-drinking participants would be included in subsequent analyses if the percentage of non-drinkers did not equal more than 5% of the sample. Table 2 provides a summary of the descriptive information for alcohol consumption level of the participants in Study 1 and Study 2.

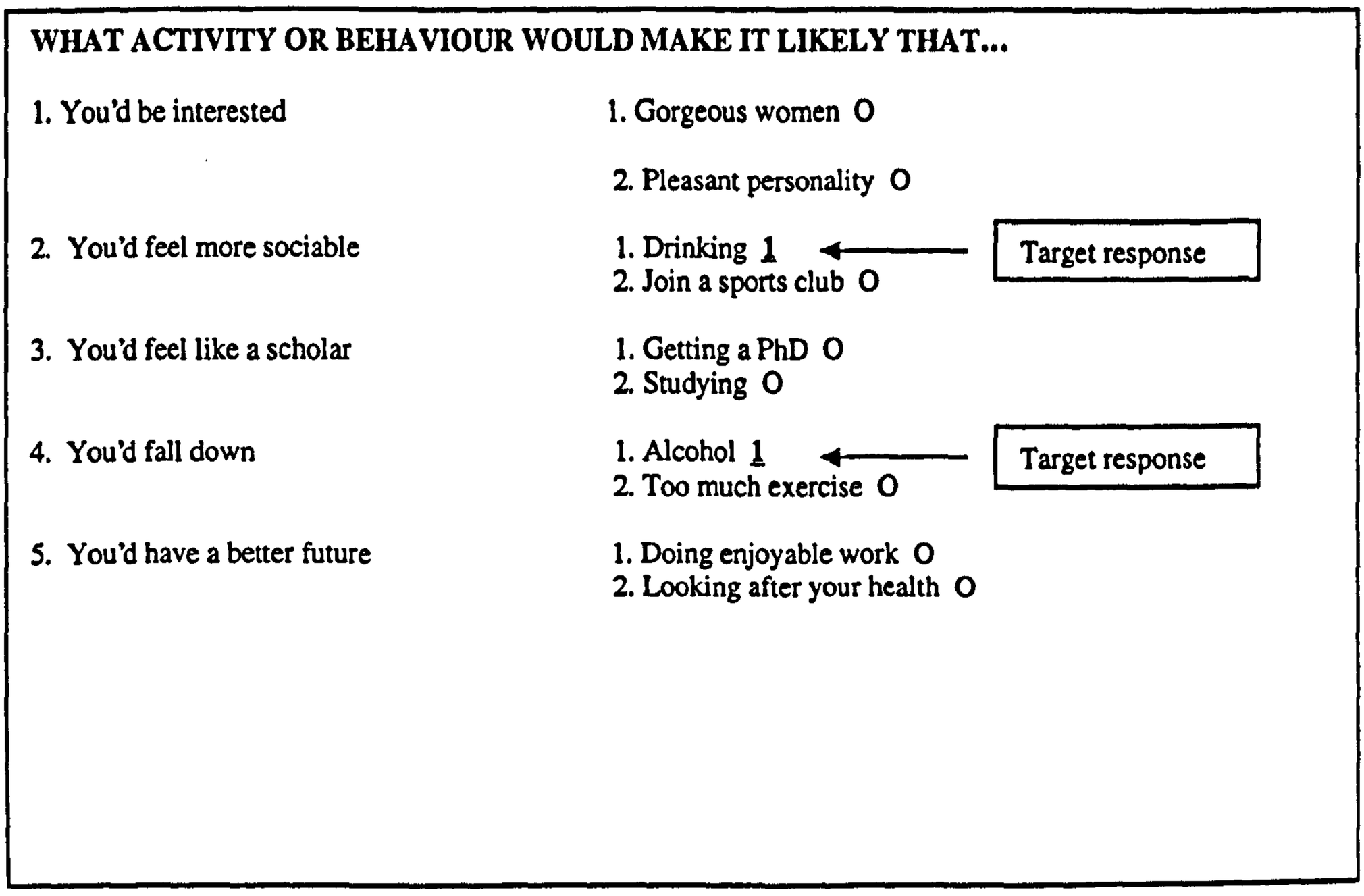
Table 2. Weekly alcohol consumption information for consumption level.

	Male		Female		Total Sample	
	Study 1	**Study 2**	**Study 1**	**Study 2**	**Study 1**	**Study 2**
M and S.E	12.60(±0.89)	11.60(±1.47)	8.15(±0.54)	9.63(±0.87)	9.81(±.54)	10.34(±.76)
Range	0-37	0-37	0-32	0-32	0-45	0-37
Number of non drinker:	4	4	24	5	36	9
Total	35	112	188	63	300	98

5.4.2.1 The primary analysis - Investigating the relationship between consumption level and memory associations for alcohol-related behavioural outcomes.

The two responses to the 132 items in the MAQ were coded for reference to alcohol use. Responses were coded as either 1- related to alcohol use (target response) or 0 - unrelated to alcohol use. Only responses that explicitly mentioned alcohol use (e.g. drinking beer, getting drunk) were coded as being related to alcohol. Figure 6. is a sample of a participant's responses to the MAQ outcome items and a sample of the coding procedure adopted in the present study.

Figure 6. An example of the coding system used to rate responses in the MAQ.



Participant no. 49

The total number of target responses given by each participant was calculated for each of the alcohol-related behavioural outcome categories (positive low and high frequency and negative- low and high frequency) and for the non-alcohol-related behavioural outcomes (positive and negative).

To test what relationship exists between alcohol consumption (as measured by total number of units consumed on the heaviest drinking day - information obtained from the TLBF) and the number of behavioural outcomes associated with alcohol use (for positive/negative-low, and high frequency outcomes and positive/negative fillers), systematic, stepwise hierarchical multiple regression analyses were performed. As other factors may contribute to individuals attributing alcohol-related behaviours to the alcohol-related and non-alcohol-

outcomes, (iii) negative low frequency alcohol-related outcomes, (iv) negative high frequency alcohol-related outcomes, (v) positive non-alcohol-related outcomes and (vi) negative non-alcohol-related outcome.

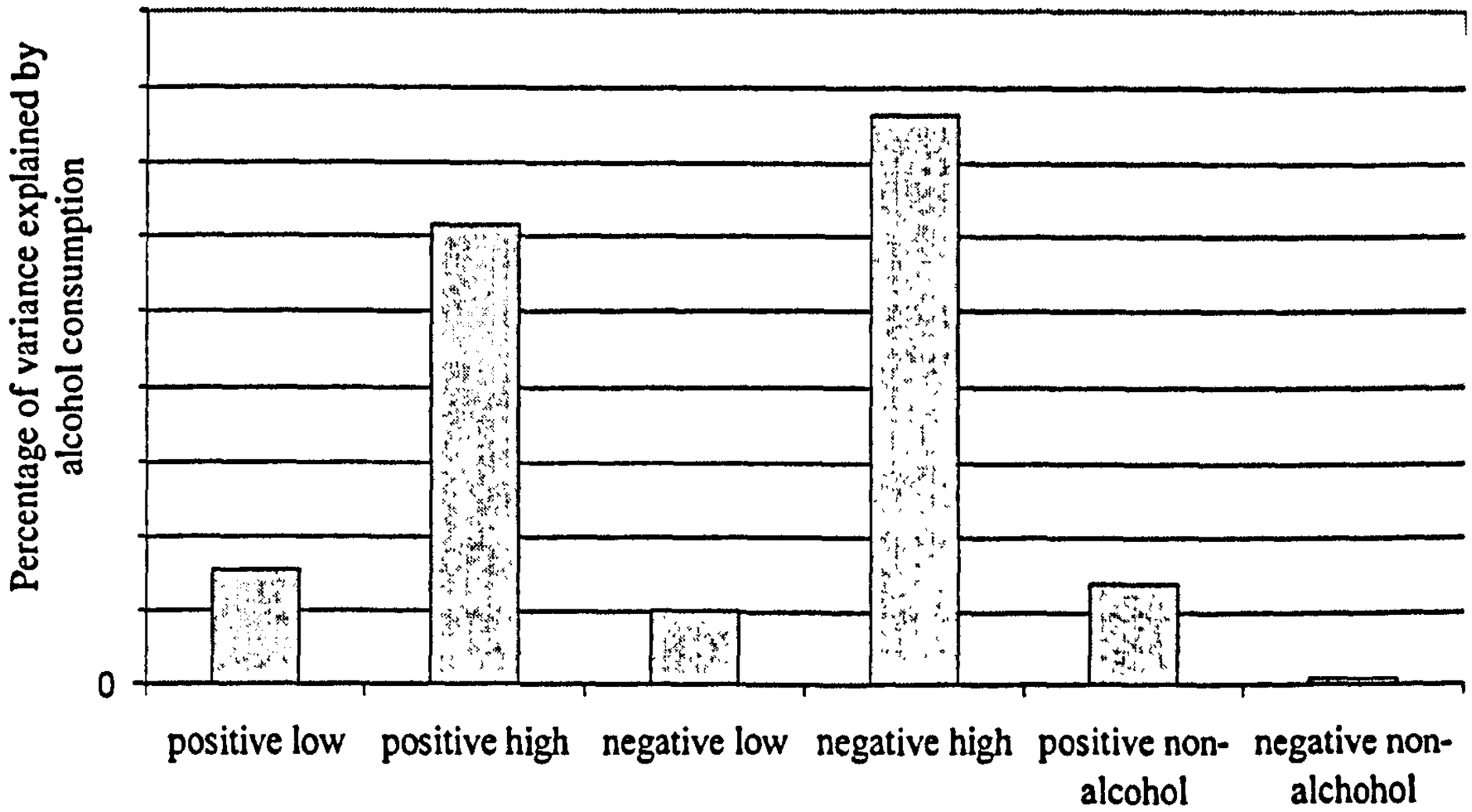
The five mediator predictors (form, gender, age, age started to consume alcohol) were added into the regression (in this order) prior to the predictor consumption. For each of the six regression analyses, an alpha level of 0.008 was adopted in the place of 0.05 as a Bonferonni correction for 6 analyses with a common set of predictors. The amount of variance explained ($\underline{R^2}$ change) as each predictor was added is shown, as is the β value and the significance level of the change for each of the dependent variables was calculated.

A significant increment in variance was found when the predictor alcohol consumption was added (after the mediator variables) to the following dependent variables - positive alcohol-related (12.29%) and negative alcohol-related (15.28%) high frequency outcomes. Significant increments in variance were not found for the other four dependent variables. Table 4. summarises the results from this analysis and Figure 7. shows the additional percentage of variance explained by alcohol consumption level of each of the dependent variables.

Table 3. Stepwise hierarchical multiple regression analysis results - An investigation into the amount of variance (with reference to target responses) explained by form, gender, age started to consume alcohol (ASD) and consumption for each of the dependent variables.

	P1	P3	N1	N3	PF	NF
Form						
% inc	0.00	0.05	1.43	0.12	0.00	0.05
P value	0.991	0.84	0.241	0.738	0.817	0.823
Beta value	-0.03	-0.05	-0.13	-0.05	-0.07	0.04
Gender						
% inc	0.14	0.15	0.72	0.03	3.31	1.97
P value	0.711	0.71	0.403	0.872	0.074	0.170
Beta value	0.05	0.01	0.09	0.02	-0.17	-0.16
Age						
% inc	0.04	0.53	1.04	0.12	0.30	0.07
P value	0.845	0.48	0.317	0.735	0.59	0.792
Beta value	-0.00	0.05	0.06	-0.00	-0.08	-0.01
ASD						
% inc	0.29	0.12	1.33	0.85	0.25	0.83
P value	0.603	0.74	0.258	0.373	0.625	0.376
Beta value	0.04	0.00	0.11	0.06	0.04	0.10
Consumption						
% inc	3.11	**12.29**	2.03	**15.28**	2.78	0.20
P value	0.088	**0.000***	0.160	**0.000***	0.101	0.666
Beta value	0.18	**0.36**	0.15	**0.41**	0.17	-0.05
Total variance	3.60%	13.13%	6.56%	**16.40%**	6.70%	3.11%
P value	0.634	0.022	0.275	**0.005***	0.262	0.706

Figure 7. Additional percentage of variance explained by the predictor variable consumption in each of the six analyses.



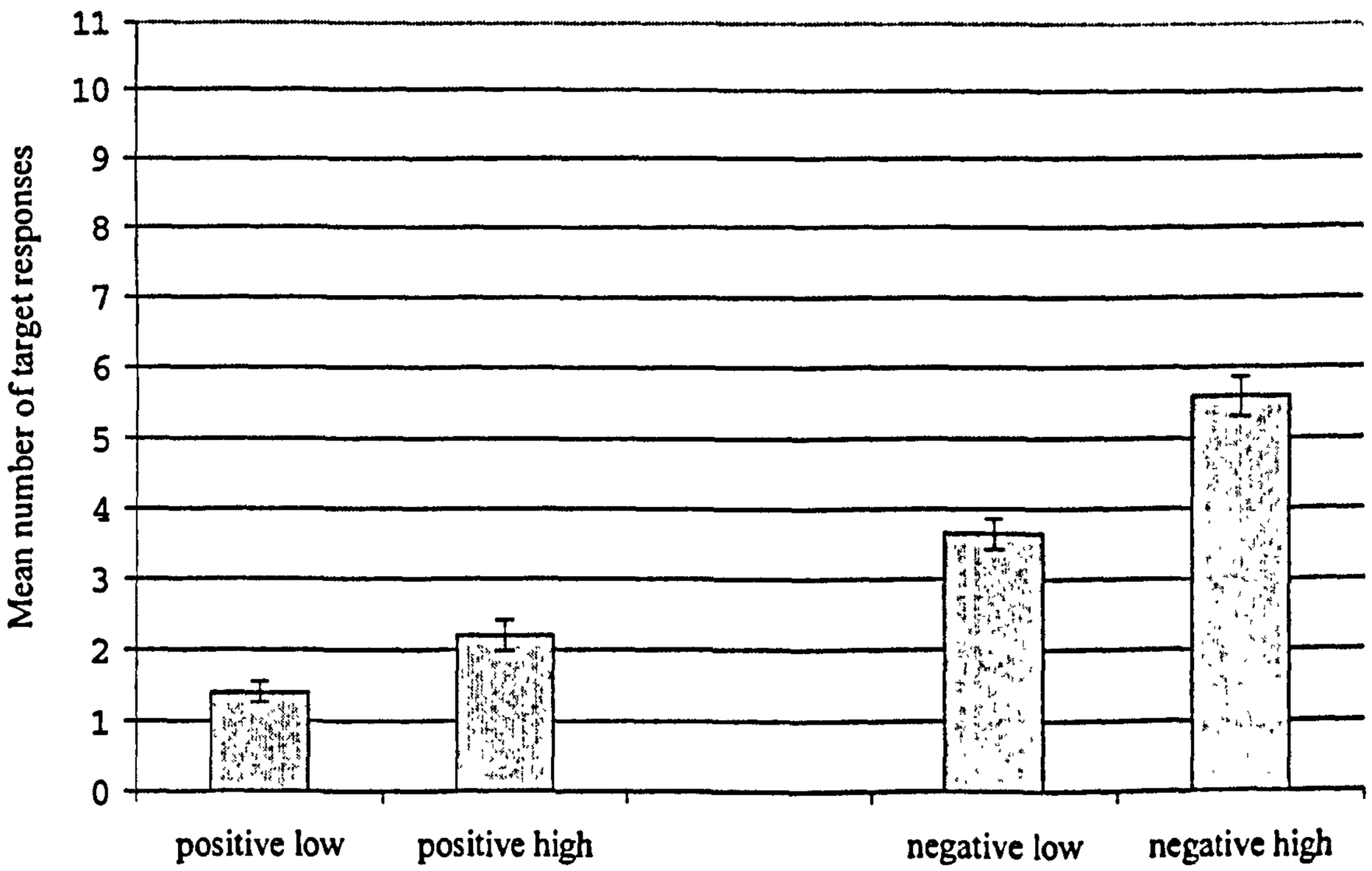
5.4.4 Additional analyses - The number of target responses generated for the negative and positive low and high frequency alcohol-related behavioural outcomes.

When devising the MAQ (Chapter 4), a systematic procedure was conducted in order to correctly classify the alcohol-related behavioural outcomes as either low-frequency or high-frequency outcomes. Based on the process and the subsequent categorisations it is predicted that more target responses will be given in response to the high frequency alcohol-related behavioural outcomes compared with the number of target responses given to the low alcohol-related frequency outcomes.

To statistically examine whether significantly more target responses are given to the high frequency outcomes compared with the low frequency outcomes, two independent t-tests were conducted. Significant differences were found for the number of target responses given to the positive low alcohol-related behavioural outcomes compared with the number of target responses given to the positive high alcohol-related behavioural outcomes as t (194) = -3.00, p = .05. More target responses were produced for the high frequency positive outcomes (M =

2.20, SE = .14) than for the low positive frequency outcomes (M = 1.41, SE =.22) (Figure 8). A similar relationship was observed with the negative outcomes as there was a significant difference in the number of target responses generated for the low and high outcomes t (194) = -5.52, p = .05. As before, more target responses were given to the high frequency outcomes (M = 3.65, SE = .21) than the low frequency outcomes (M = 5.59, SE= .28) (Figure 8).

Figure 8. Mean number of target responses generated for each of the alcohol-related behavioural outcomes in each of the six analyses..



5.4.5 Summary of Results

(i) No significant differences were found between the participants in Study 1 and Study 2 when the two samples were compared on the demographic and alcohol-related problem information.

(ii) With reference to the participants in Study 1 and Study 2, no significant differences were found for consumption level for the group as a whole. Likewise, no significant differences were found when the data were split across gender type.

(iii) In the present sample, no gender differences were found with reference to age, age started to consume alcohol, for the number of individuals that reported that they been treated for an alcohol-related problem and for male and female participants who reported that an immediate family member had experienced an alcohol-related problem.

(iv) Additionally, no significant differences were found between the male and female participants' alcohol consumption.

(v) A significant positive relationship was found between alcohol consumption level and alcohol-related behavioural outcome identified as being related to alcohol use for the following dependent variables: positive high
(12.29%) and negative high (15.28%) frequency outcomes.

(vi) Independent t-tests showed that significantly more target responses were generated for the high frequency behavioural outcomes in comparison with the low frequency alcohol-related behavioural outcomes.

5.5 Discussion

The present study was designed to assess the relationship between alcohol consumption and memory associations between alcohol use and both positive and negative outcomes of this behaviour amongst undergraduate social drinkers. An independently generated assessment tool (MAQ) was designed to measure the relationship between memory associations and negative and positive outcomes of alcohol use. To gain a measure of the participants' consumption level an adapted version of the TLFB (Sobell and Sobell, 1992) was used. With direct reference to the empirical findings it can be stated that the research hypothesis - alcohol consumption level will be significantly positively related to the number of alcohol-related behavioural outcomes that are identified as being related to alcohol use (target responses) in the MAQ - was supported.

The findings from the present study showed that as consumption rises there is an increase in MAQ responses representing both positive and negative outcomes of alcohol use. This study replicates Stacy et al. (1994) findings with reference to the positive relationship between positive outcomes of alcohol use. In addition

to replicating previous findings the fact that an independently devised association questionnaire was used adds weight to the support given by the replication of previous results. In addition, the results extend existing research as a significant relationship between alcohol consumption and memory associations for negative aspects of alcohol use has been found.

Previously, information was presented which showed that explicit alcohol expectancies and implicit alcohol associations are mutually and exclusively formed (Noll, 2001; Goldman, 2001). Therefore, the findings from this study can be viewed as being part of a collective group of research, which examines the relationship between negative alcohol-related experiences and consumption. The accepted view in the area of alcohol expectancy research is that there is no lawful relationship between NAEs and alcohol consumption or if there is one it is negative. However this view has been challenged by Jones et al. who claim that NAEs rise with alcohol consumption but do not impact on behaviour until a point is reached when the adverse effects of alcohol use become increasing salient. The results from the present study appear to support Jones et al. claim as a significant association was found between alcohol consumption and memory associations for high frequency negative outcomes of alcohol use.

The primary analyses of the data show that there is a significant positive relationship between alcohol use and memory associations for positive and negative alcohol-related outcomes. Based on the design and compilation procedure which was carried out in order to construct the MAQ (Chapter 4), it was claimed that alcohol consumers would be more likely to identify the high frequency alcohol-related outcomes as being related to alcohol use in comparison to the low frequency outcomes. As predicted, this significant relationship was only found with the high-frequency positive and negative alcohol-related outcome items. This result was expected because it is claimed the high frequency alcohol-related outcomes are culturally available for social drinkers whereas the low frequency outcomes are only idiosyncratically available (Chapter 4). Indeed, a supplementary analysis showed that more alcohol-related responses were provided for the high frequency outcome items in comparison to the low frequency outcome items. This finding provides further support for this

claim and indicates that the design and structural procedure undertaken to compile the MAQ is satisfactory.

It is interesting to note that consumption level explains a greater percentage of the variance for the high frequency negative outcomes identified as being related to alcohol use than for the positive outcomes. This may relate to the fact that with increased experience one is more likely to experience the adverse effect of alcohol use (e.g. Midanik, 1995). However, as a covert assessment tool was used to measure the strength of the memory associations between alcohol use and related outcomes of this behaviour (indicated by whether or not a participant identified an outcome item as being related to alcohol use), this would indicate that as consumption increases so does the strength of memory associations between alcohol use and the negative alcohol-related outcomes.

This finding is particularly interesting in light of alcohol outcome expectancy research which highlights the immediate positive consequences of alcohol use (which are thought to influence behaviour more strongly than delayed negative effects) (Rohsenow, 1983). This theory is known as the *Accessibility Hypothesis* and is based on the notion that positive effects of alcohol are more immediate than negative effects and hence more powerful in their influence on behaviour (e.g. Rohsenow, 1983). As positive effects of alcohol are more immediate and occur earlier in drinking sessions (Marlatt 1992) it is likely that at the start of subsequent drinking sessions thoughts about positive effects of alcohol use will be more accessible than negative. This is because time of retrieval will be similar to time of encoding. However, when no context (e.g. a pub setting) is defined or suggested, heavier-drinking participants appear to identify a greater number of negative alcohol-related outcomes with alcohol use than positive outcomes and this relationship is correlated with consumption level. This finding provides further support for research which purports that a rise in NAE does not necessarily impact behaviour (McMahon and Jones, 1994; Jones and McMahon, 1992) as within the present sample heavier drinkers appear to hold stronger associations with negative high frequency alcohol-related outcomes than the positive outcomes.

In the primary analyses four predictor variables (form, gender, age and age started to drink alcohol) were regressed against each of the dependent variables (positive and negative low and high alcohol-related frequency outcome items and positive and negative alcohol-unrelated outcomes) prior to the predictor variable 'consumption'. The variables gender, age and age started to consume alcohol were regressed prior to consumption as previous research has shown that: (i) there is a relationship between gender and consumption level with males consuming more alcohol than females (e.g. Wilsnack et al., 2000) and (ii) an individual's age and the number of years of drinking experience can contribute to the strength of the memory associations between alcohol use and related outcomes (e.g. feeling relaxed) of this behaviour (e.g. Hintzman, 1986).

Although previous research has demonstrated that gender, age and age started to consume alcohol may be involved in drinking behaviour, the primary analysis showed that there was no significant relationship between gender and the number of items identified as being related to alcohol use. Nor was there a significant relationship between the age of participants and the age that they started to consume alcohol and the number of items identified as being related to alcohol use. Although previous research has shown that there is a significant difference in the amount of alcohol that males and females consume, with reference to the present sample this trend was not found. This may be because there was no significant difference between the amount of alcohol that male and female participants consumed on the heaviest drinking day of the previous week. This finding may mean that both sexes may be experiencing the same 'type' or 'amount' of negative and positive outcomes of alcohol use. With reference to the predictor variables age and age started to consume alcohol the null finding may be due to the fact that there was a specified age range for participation. Hence, there was little variability with reference to the age of participants and the number of years that they had consumed alcohol on a regular basis.

To conclude the empirical findings from the present study replicate and extend Stacy et al. findings as a significant relationship between alcohol consumption and both positive and negative memory associations for alcohol-related outcomes was found. This finding provides empirical support for the Alcohol-Related-

Memory Association model of alcohol use. In addition, the results show that when implicitly assessed the negative effects of alcohol use can be measured. This indicates that memory association between alcohol use and both positive and negative effects of alcohol use are formed in the same manner.

Although the results from this study support the research hypothesis the fact that the research sample consisted of undergraduate students only must be acknowledged and issues associated with using this type of sample need to be identified. Methodological and theoretical issues associated with using university students as the main research sample and the benefits of using alternative research samples are addressed in the next study.

Chapter 6 - Study 3 and 4 - Mature Social Drinkers and Memory Associations.

Chapter Summary

The study reported in this chapter (Study 3) was designed to test the effects of a much longer alcohol consumption history (than found in young adults) on memory associations for positive and negative alcohol-related outcomes. This chapter begins by discussing the rationale for conducting this study, which is linked to two issues. The first issue relates to the over-use of undergraduate student samples in alcohol research. The second relates to a fundamental concept in the Alcohol-Related-Memory-Association model of alcohol use (e.g. Stacy et al., 1994), **experience.**

The results from Study 3 indicated that a longer alcohol consumption history results in stronger and a larger array of memory associations being formed between alcohol use and positive and negative alcohol-related behavioural outcomes. However, an unexpected significant association was found between alcohol consumption and memory associations for non-alcohol-related negative behavioural outcomes for mature social drinkers. To investigate this result, Study 4 was conducted. The rationale for this study and the empirical findings are also reported in this chapter. The results from this additional study showed that individuals who have been consuming alcohol for a longer period (mature social drinkers) have a larger array of associations for alcohol use and negative outcomes in comparison to individuals who have been consuming alcohol for a shorter time period (young adults). Consequently, for the mature alcohol consumers some of the non alcohol-related negative behavioural outcomes have acquired the status of alcohol-related.

6. Introduction

The main objective in the present study was to measure mature social drinkers' memory associations for alcohol use and alcohol-related negative and positive behavioural outcomes in relation to alcohol consumption. The rationale for measuring this type of alcohol consumers memory associations is linked to two issues. First, the majority of research findings in this area are based on the use of young college or university students. This raises the question of whether it is possible to extrapolate findings from this age group to other age cohorts. The second reason relates to a concept that is central to the Alcohol-Related Memory Association model of alcohol use (e.g. Stacy et al., 1994), experience. These concerns will now be discussed.

Research that examines social drinker's motivations (e.g. alcohol expectancies) for consuming alcohol (e.g. McNally and Palfai, 2001) generally uses samples consisting of adolescents and university students. To illustrate this, a literature search using the Psychological Abstracts International (Psycinfo) database was carried out which looked for the key words "alcohol" and "expectancies" in the title of journal articles published between the years 1962 and 2002. One hundred and four articles were retrieved based on the search terms used and information from the abstracts can be summarised as follows:

(i) 21 of the 104 studies used non-student participants

(ii) 54 of the 104 studies used university students as participants

(iii) 9 of the 104 studies used adolescent participants

(iv) In 20 of the abstracts participation information was not supplied.

When non-student participants were tested (total 21 studies) 10 of these studies examined the alcohol expectancies of specific clinical groups such as dependent and problem drinkers or individuals with social or panic disorders. In general, it would appear that university students are the research sample of choice with the exception of studies which examine specific disorders and alcohol use. The issue of over reliance on undergraduate students has been recognised by Schafer and Leigh (1996) as they state that:

" Research on both adolescents and adult expectancies has largely been based on samples gathered by a variety of methods, including convenience samples of college students and school based samples of adolescents" (p. 403).

The phenomenon of convenience sampling may relate to where research takes place. For studies and experiments that are carried out on campus, it is easier and more time-effective to recruit university students than participants from the public. In addition, at some academic establishments students receive course credits for taking part in research hence perpetuating the over reliance on this type of participant in research. When a research sample consists solely of university students a degree of externality and generality may be sacrificed (Bordens and Abbott, 1993) as students differ in a number of ways from non-student populations. For example, with reference to the present research, differences have been found between university students and non-student alcohol consumption level. Research shows that the heaviest periods of alcohol consumption tend to occur in the early 20's after which age drinking levels and patterns tend to alter substantially for most individuals (Houghton and Roche, 2001). As research which provides support for the Alcohol-Related Association model of alcohol use, has based empirical findings on university or high school students the generality of the theoretical assumptions concerning motivation to consume alcohol purported by this model are questionable. In the present study, this issue is addressed, as a non-student research sample will be used.

A study conducted by Stacy and Newcomb (1998) addresses this issue as an older age group is recruited to take part in the study. The mean age of the research sample is 29.1 years. The participants were initially recruited from junior high schools and were part of an ongoing longitudinal study. Although this group are older than students in high school or college they can still be viewed as young adults.

The second rationale for conducting this experiment relates to the theoretical assumptions which arise from the Alcohol-Related Memory Association Model of Alcohol use (e.g. Stacy et al., 1994). A key concept in this model is experience, as the level of experience or exposure to behaviour and outcomes of

the behaviour is thought to predict the level of association between the two concepts. Hence an individual who is a heavy alcohol consumer and often feels relaxed as a consequence of alcohol use is more likely to have stronger memory associations between the two concepts (e.g. alcohol use and feel relaxed) in comparison to a light alcohol consumer who rarely feels relaxed after consuming alcohol. With reference to this model of alcohol use the term 'experience' can be interpreted in two ways:

(i) Experience can be viewed as relating to the amount of alcohol that an individual consumes. Therefore someone who consumes a large quantity of alcohol can be viewed as having more alcohol-related experience in comparison to an individual who consumes a moderate amount of alcohol.

(ii) Experience can also be measured in terms of the number of years that an individual has been consuming alcohol. Consequently, an individual who has been consuming a moderate amount of alcohol over a twenty-year period can be viewed as having more alcohol 'experience' than a heavy drinker who has been consuming alcohol for two years.

In testing the assumptions of the Alcohol-Related Memory Association model it is necessary to assess both aspects of 'experience'. In Study 2, the alcohol memory associations of young social drinkers were measured in relation to alcohol consumption. This study illustrated the effects of alcohol consumption level. The results from this study showed that there is a positive linear relationship between alcohol consumption and memory associations for culturally available positive and negative outcomes of alcohol use and alcohol use. The present study was designed to assess the second interpretation of the word 'experience' - the effect of performing certain behaviours over a number of years. In order to investigate the effects of a substantial alcohol consumption history the alcohol memory associations of mature alcohol consumers were assessed.

In accordance with the theoretical assumptions which derive from the Alcohol-Related Memory Association model (e.g. Stacy et al., 1994) it was hypothesised

that individuals who have had a substantial amount of alcohol use experience (older social drinkers - present study) will have stronger memory associations between alcohol use and related behavioural outcomes compared with individuals who have been consuming alcohol for a relatively short time period (young social drinkers - Study 2). It is predicted that this relationship will be observed, even if a younger sample is consuming more alcohol, as an individual who has been consuming alcohol for 20 years will have had more opportunities to form associations between alcohol use and related outcomes in comparison to an individual who has been consuming alcohol for two years.

6.1. Methodology

6.1.1 Participant Recruitment

To recruit a representative research sample individuals were approached in the following places: public libraries, social clubs, cafes and unemployment centres. Each location was within the Greater Glasgow area. The minimum age for participation was 27 years of age. As the main objective in the present study was to measure mature social drinkers memory associations between alcohol use and positive and negative alcohol-related behavioural outcomes, the independently developed Memory Association Questionnaire (MAQ) was used. As this instrument was designed to covertly measure memory associations between alcohol use and related outcomes, the true nature of the study could not be revealed to prospective participants during the recruitment process. Therefore potential participants were approached and asked the following questions:

(i) Were they 27 years of age or over?

(ii) Was English their first language?

(iii) Would they like to take part in an hour-long study, for which they would receive £5.00?

To minimise the possibility that individuals who had taken part in the study would reveal to future participants that the research was concerned with alcohol use, the recruitment and subsequent testing sessions took place during one afternoon in each location.

6.1.2 Participants Information

Table 1. displays relevant descriptive statistics for the research sample (N=98) collapsing across gender. The participants in this sample will be referred to as mature social drinkers.

Table 1. Participants Information

	Total	Males	Females
Median Age	45	47.5	42
Age range	27-74	27-70	29-74
Total Number	98	50	48

6.1.3 Materials

Each participant received three questionnaires to complete - (i) The Memory Association Questionnaire (MAQ), (ii) the Demographic Information Questionnaire (DIQ) and (iii) the Time-Line-Follow-Back diary (TLFB, Sobell and Sobell, 1992). Participants completed the questionnaires in this order. For detailed information on the DIQ and TLFB refer to Chapter 4, p. 68-69. For a copy of these questionnaires see Appendix C and D respectively. For information on the MAQ refer to Chapter 5, p. 99-101. For a copy of this questionnaire see Appendix E.

6.1.4 Design

The primary research objective of Study 3 was to measure mature social drinkers' memory associations for alcohol use and alcohol-related behavioural outcomes in relation to alcohol consumption. To investigate this relationship the TLFB and the MAQ were administered. The TLFB was used to obtain a measure of alcohol consumption and the MAQ was used as a means of establishing strength of memory association between alcohol use and alcohol-related behavioural outcomes. By presenting participants with alcohol-related outcomes (e.g. You'd feel relaxed) and asking them to write down the first two behaviours that came to mind which would make them feel the way depicted in the outcome item, strength of association was measured.

The dependent variables in the study were the number of alcohol-related behaviour outcome responses (target responses) generated by participants in response to the behavioural items represented in the MAQ. In total there were

six discrete dependent variables represented by the number of alcohol-related target responses given to the following six groups of outcomes:

(i) Positive low-frequency alcohol-related outcomes
(ii) Positive high alcohol-related outcomes
(iii) Negative low-frequency alcohol-relate outcomes
(iv) Negative high-frequency alcohol-related outcomes
(v) Positive non-alcohol-related positive outcomes
(vi) Negative non-alcohol-related outcomes.

A further objective of Study 3 was to assess whether a longer drinking history would result in stronger memory associations being formed between alcohol use and alcohol-related outcomes. To investigate this issue comparisons were made between the empirical findings from Study 2 (young social drinkers) and the present study (mature social drinkers).

As comparisons were to be made regarding the young social drinkers and the mature social drinkers associations with alcohol use and related behavioural outcomes, it was useful to statistically examine if the two groups significant differed with regards to the following aspects:

(i) The participant's alcohol consumption level
(ii) The age the participants began to consume alcohol on a regular basis.
(iii) The proportion of participants who had received treatment for an alcohol-related problem.
(iv) The proportion of participants who stated that an immediate family member had an alcohol-related problem.

The DIQ and the TLFB were administered to the participants to obtain information for the above analyses.

6.2 Procedure

In the area of alcohol cue-reactivity research non-dependent individuals have been found to exhibit urges to consume alcohol when presented with alcohol-related cues (e.g. Greely, Swift, Prescott and Heather, 1993; Cox, Yeates and Regan, 1999 and Schulze and Jones, 2000). Hence, it is possible that alcohol-related images will cue or prime an individual while they are completing the MAQ, which could result in an inaccurate measure of strength of association of alcohol use and related behavioural outcomes. As the MAQ was designed to covertly assess memory associations between alcohol use and related outcomes of the behaviour it was necessary to ensure that there were no explicit visual references to alcohol use (e.g. posters) or alcohol-related activities occurring (e.g. consumption of alcohol) in the testing setting. An additional aspect that was considered when developing a list of potential testing sites was that the surroundings must be sufficiently quiet and comfortable (e.g. table and chair available) in order for participants to complete the three questionnaires with minimal distraction.

Once a list of suitable recruitment and testing sites was developed, the experimenter sought permission to run the study at each site. Once authorisation was given, arrangements for testing sessions (e.g. suitable dates and times) were then made. In each of the recruitment and testing locations, individuals were approached and asked if they were over the age of 27 years and if English was their first language. If this criteria was met they were then asked if they would like to take part in an hour-long study which involved completing three questionnaires for which they would receive £5.00. They were assured that all information supplied would remain anonymous. If an individual agreed to take part in the study they were given the MAQ to complete first.

The standardised instructions given to the young social drinkers in Study 2 (Chapter 5, p. 102) were also given to the mature social drinkers in the present study. To recapitulate, the participants were firstly asked to read over the instruction page. The experimenter then verbally repeated the written instructions to each participant to ensure that they understood how to complete the MAQ and informed participants that they were to reply to each behavioural

outcome item in the MAQ as quickly as possible. In instances where two or more participants were sitting together they were instructed not to discuss or compare any of their responses, as a key aim of the study was to obtain individual's responses to the outcome items. The experimenter was present throughout the questionnaire completion process.

Once the participants had finished the MAQ and returned it to the experimenter, they were given the DIQ and the TLFB to complete. As the questionnaires were anonymous participants were asked to put their date of birth at the top of each questionnaire to enable the experimenter to match the three completed. At the end of each testing session participants were thanked for their time and debriefed about the study.

6.3. Results

6.3.1 Strategy of analyses

The data was analysed using the statistical program Statistica 4.1 for Macintosh. The α level for all tests was set at 0.05 (with the exception of tests where the Bonferonni correction was applied).

Primary analysis

Through stepwise, hierarchical incremental multiple regression analysis, the relationship between self-reported alcohol consumption level and the target responses to items representing alcohol-related behavioural outcomes and items representing non-alcohol-related outcomes was explored.

To assess the effects of a longer drinking history with reference to memory associations and negative and positive outcomes of alcohol use, comparisons were made between the empirical findings from the present study and Study 2.

Supplementary analysis

A primary purpose of the present study was to investigate whether stronger memory associations between alcohol use and related outcomes of this behaviour would occur as a result of a longer alcohol consumption history. To obtain a measure of alcohol experience the age that participants began to consume alcohol

on a regular basis was subtracted from their age. This measure will now be referred to as alcohol consumption history. To test whether the participants from Study 3 had a longer alcohol consumption history than the participants from Study 2 a Mann Whitney U test was used.

As a means of establishing similarities and differences regarding the demographic variables (e.g. age, the number who have received treatment for an alcohol-related problem), comparisons were made between the young and mature social drinkers, male participants and female participants, by conducting a series of non-parametric and parametric tests. The data obtained from the DIQ and the TLFB was used in these comparisons. As a key assumption of a parametric test is that the known population data is normally distributed the Kolmogorov-Smirnov test was used to test the distribution fit of the data from the two independent research samples for alcohol consumption and age and alcohol consumption. When the data was not normally distributed an equivalent non-parametric test was used. The chi-square test was used to test whether the number of participants who stated that they had been treated for an alcohol-related problem significantly differed in each sample. This test was also used to statistically assess whether the number of participants who had an immediate family member who had an alcohol-related problem significantly differed in the two samples.

6.3.2 Participants information

The chi-square test was used to test for significant differences between participants in Study 2 and 3 with regard to the number of participants who had received treatment for an alcohol-related problem. A significant difference was found as more participants in Study 3 stated that they had received treatment for an alcohol-related problem. When between group gender comparisons were made, significantly more male participants in Study 3 compared with those in Study 2 had received treatment for an alcohol-related problem. However, no significant difference between the females in Study 2 and 3 with regard to the number who had received treatment was found. With reference to the number of participants who stated that an immediate family member had experienced an

alcohol-related problem no significant between group or by gender difference were found.

When statistical comparisons were made between the male and female participants in Study 3 it emerged that significantly more male participants had received treatment for an alcohol-related problem. However, there was no significant difference was found for the number of participants who stated that an immediate family member had experienced an alcohol-related problem.

For the statistical results from these analyses see Appendix A.

Alcohol Consumption Information

Comparisons between Study 2 and Study 3 for alcohol consumption history

To obtain a measure of alcohol consumption history the number of years that the participant had been consuming alcohol on a regular basis was subtracted from the participant's age. To test whether the participants from Study 3 had a significantly longer consumption as the data was not normally distributed (the distribution fit of the data was assessed using the Kolmogorov-Smirnov test), the non-parametric Mann Whitney U-test was conducted. This test showed that there was a significant difference in the participants alcohol consumption history as $U = 76.50$, $p = 0.000$. The participants in Study 3 had a longer drinking history (Mdn years drinking on a regular basis = 26 years) compared with the participants from Study 2 (Mdn years drinking on a regular basis = 4 years).

To test for significant differences regarding consumption history between male participants from Study 2 and Study 3 as the data was not normally distributed (as before the distribution fit of the data was assessed using the Kolmogorov-Smirnov test) a Mann Whitney U-test was also used. The analysis showed that there was a significant difference between the two samples as $U = 5.50$, $p = .000$. As expected the males in Study 3 had a longer drinking history (Mdn number of years drinking on a regular basis = 29 years) than the males in Study 2 (Mdn number of years drinking on a regular basis = 4 years). Likewise, a significant difference was also observed between the female participant's consumption history as $U = 11.00$, $p = .00$. As anticipated the females in Study 3 had a longer

drinking history (Mdn years drinking on a regular basis = 21 years) than the females in Study 2 (Mdn years drinking on a regular basis = 4 years).

A comparison of the male and female participants from the present sample.

As before, in order to make statistical comparisons between alcohol consumption history of the male and female participants, as the data was not normally distributed the Mann Whitney U-test was used. A significant difference was found as U = 791.00, p = .003. It was concluded that the male participants had a longer alcohol consumption history (Mdn number of years drinking on a regular basis = 29 years) compared with the female participants (Mdn number of years drinking on a regular basis = 21 years).

Alcohol consumption information

To calculate participant's consumption level for the previous week (based on the information supplied in the TLFB) the procedure used in the preceding experimental chapters was used. For information regarding this approach, refer to Chapter 4, p.72.

As in Study 2 'heaviest' (total number of alcohol units consumed on the heaviest drinking day of the previous week) was used as a measure of alcohol consumption.

Statistical comparisons between the participants from Study 2 and Study 3.

To make statistical comparisons between the mean amount of alcohol consumed by the young and mature social drinkers, as the data was normally distributed (assessed using the Kolmogorov-Smirnov test) an independent t-test was used. A significant difference was found as t (194) = 5.73, p = .000. An examination of the descriptive information shows that the young social drinkers reported that they had consumed more alcohol units on the heaviest drinking day of the week prior to participating in the study (M = 10.34, SE = .76) in comparison to the mature social drinkers (M = 4.98, SE =.54) (Figure 1). A similar relationship also emerged when statistical comparisons were made between the males from Study 2 and Study 3 as a significant difference was found t (83) = 3.49, p = .000.

The descriptive results show that the male participants from Study 2 were consuming a greater amount on their heaviest drinking day (M = 11.60, SE = .89) in comparison to the males from Study 3 (M = 5.96, SE =.90) (Figure 2). A significant difference in consumption level was also found for the female participants in Study 2 and 3 as t (109) = 5.12, p =.000. The female participants from Study 2 had consumed more alcohol (M = 9.63, SE = .87) than the participants from Study 3 (M = 3.96, SE = .54) (Figure 3) on their heaviest drinking day in the previous week.

Figure 1. The mean alcohol consumption level for participants from Study 2 and 3.

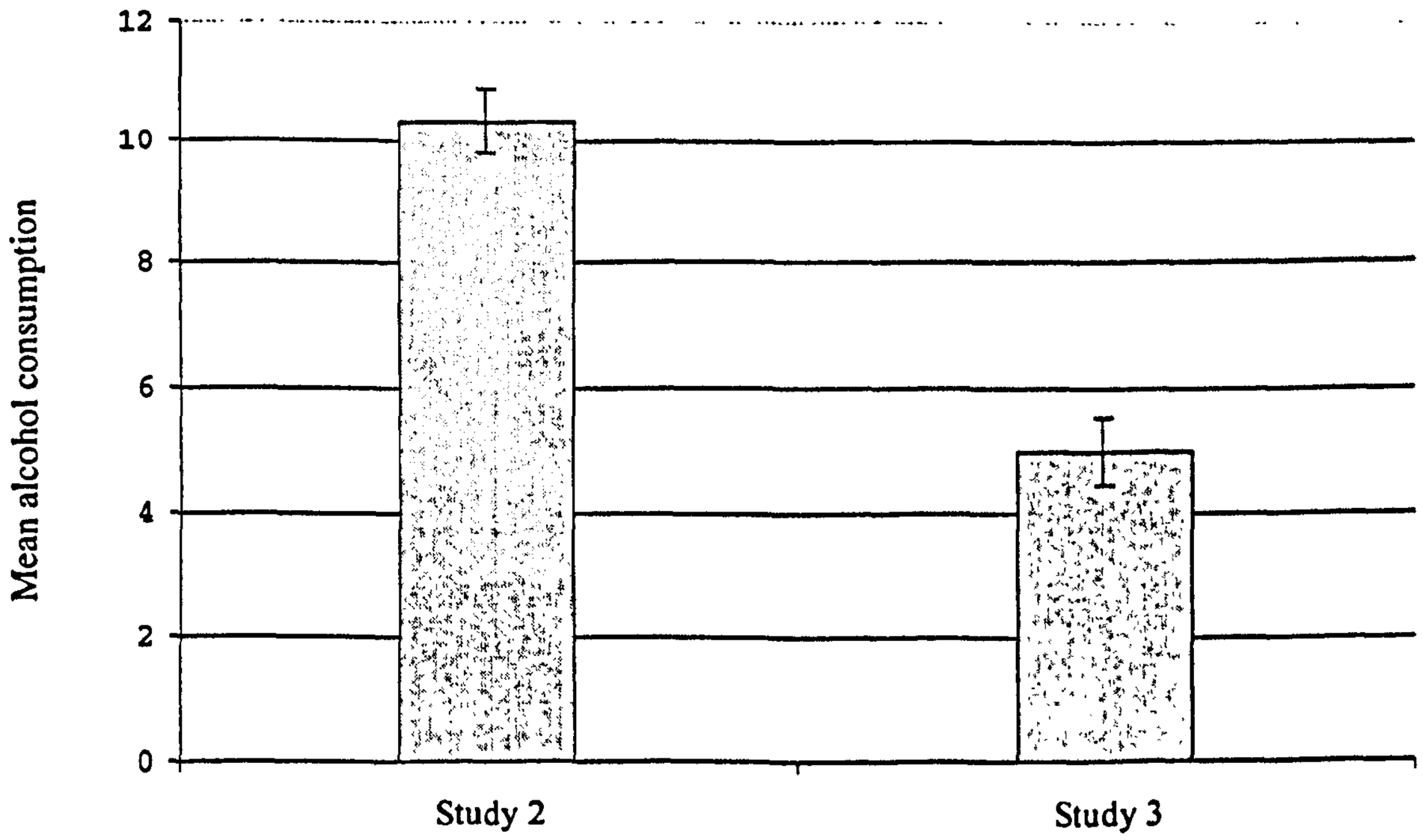


Figure 2. The mean consumption level for the male participants from Study 2 and Study 3.

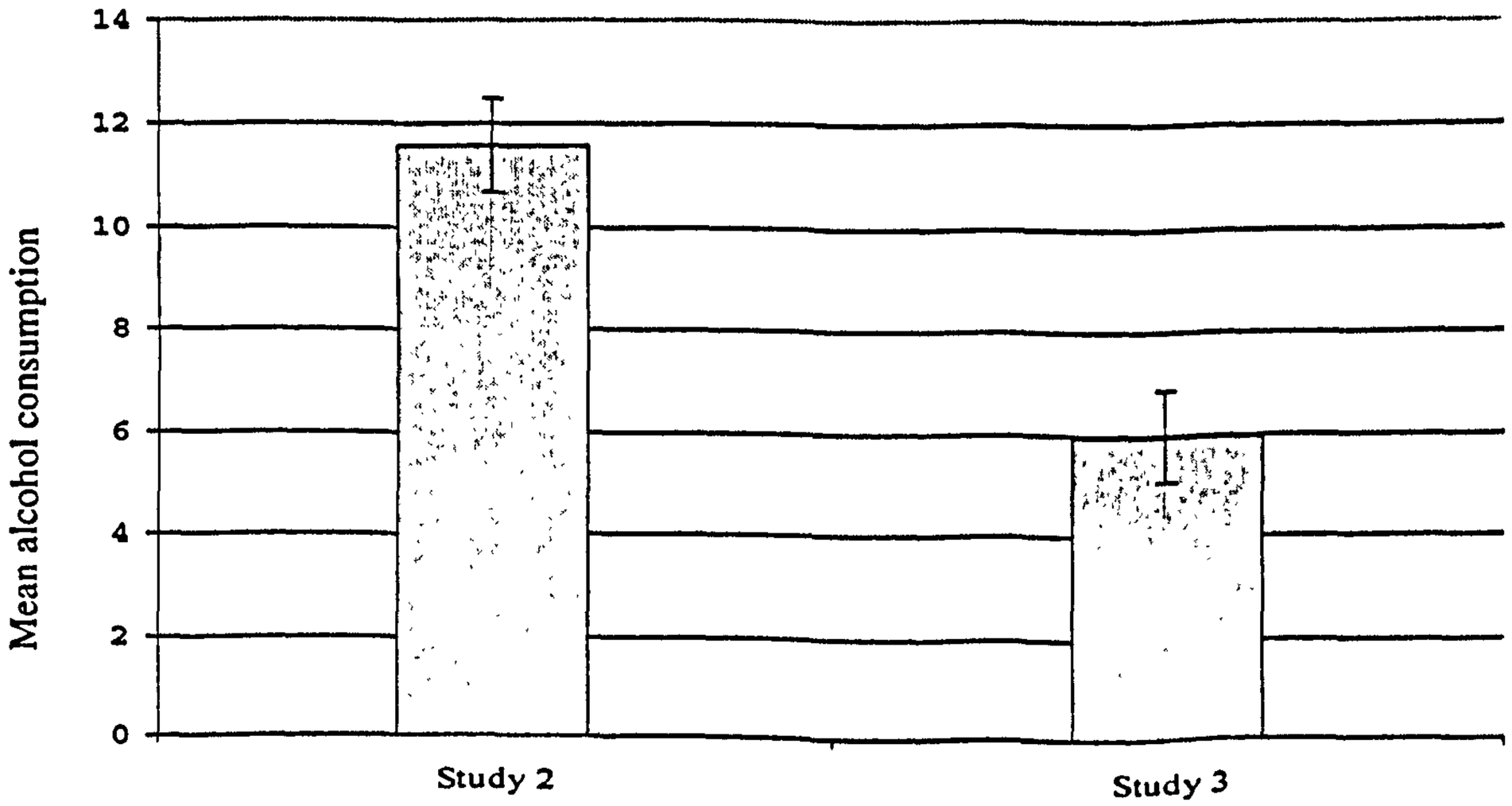
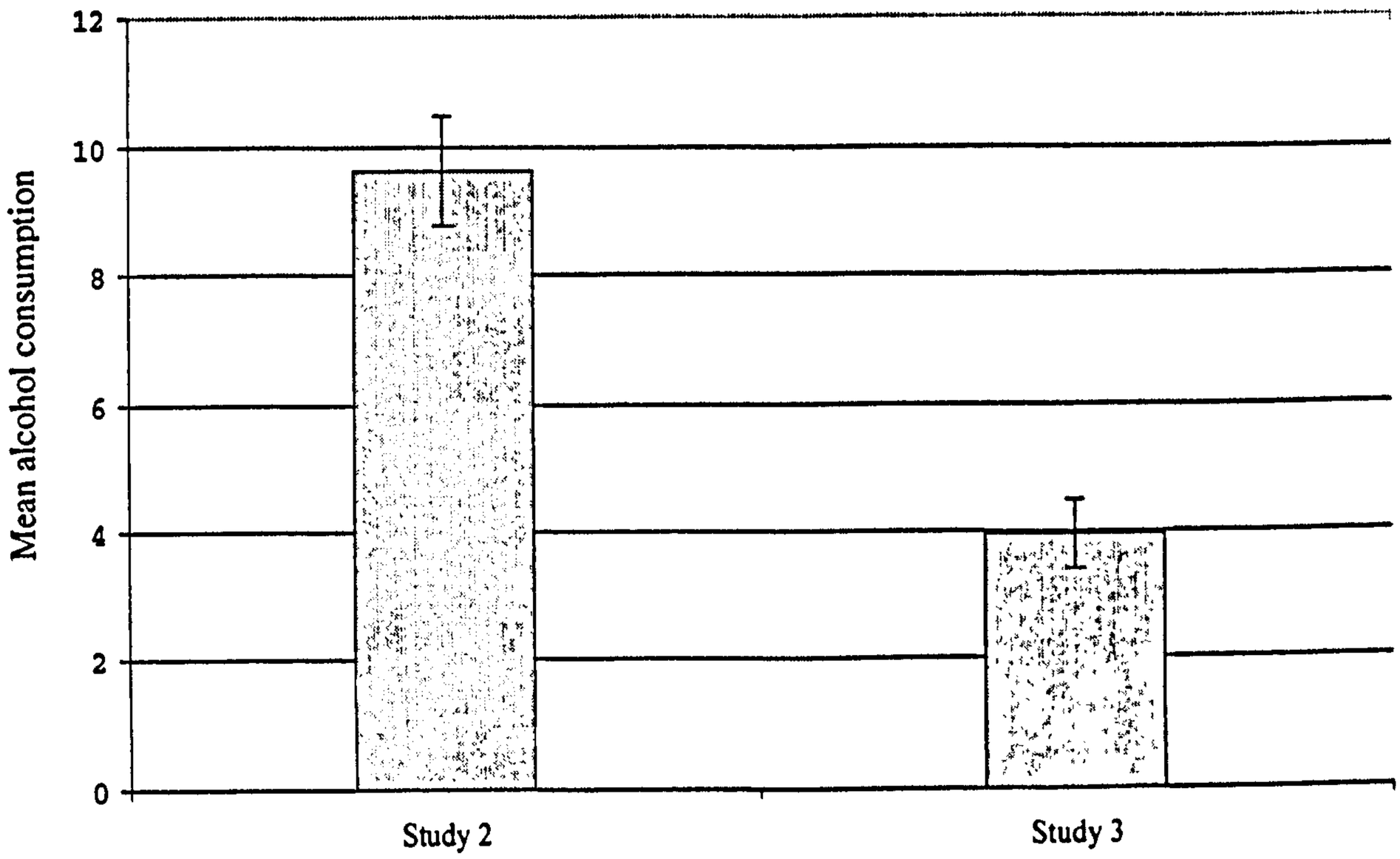


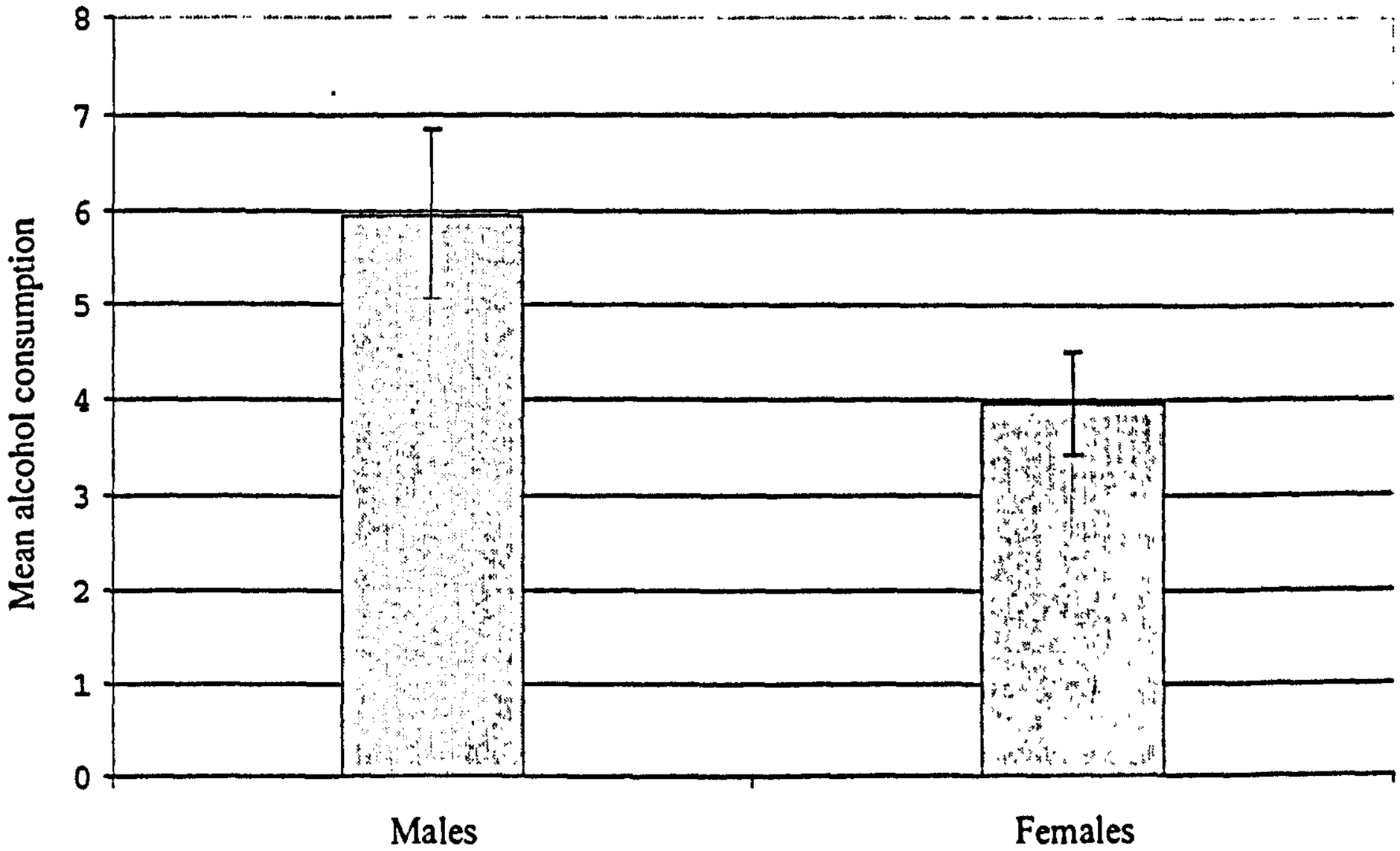
Figure 3. The mean consumption level for the female participants from Study 2 and Study 3.



A comparison of the male and female participants from the present sample.

When the mean consumption level of the male and female participants from the present sample was examined it emerged that the male participants consumed more alcohol on their heaviest drinking day (M=5.96, SE = .90) in comparison to the female participants (M=3.96, SE =.54) (Figure 4). However, this difference was not significant as t (109) = 1.89, p = .06.

Figure 4. The mean alcohol consumption level for the male and female participants from Study 3.



Of the research sample from Study 3 a total fifteen mature social drinkers (8 female and 7 male) stated that they had not consumed alcohol during the week prior to taking part in the study. However ten of these participants stated that the previous week had not been a typical drinking week and that normally they would consume alcohol. Verbal explanations that were provided to explain why alcohol was not consumed during the previous week included the use of antibiotics or pressing work commitments.

Due to the recruitment process adopted in the present study it was not possible to recruit or advertise for alcohol users as the main theme of the study could not be revealed to prospective participants. Therefore, prior to collecting the data it was decided that data from non-drinking participants would be included in subsequent analyses if the percentage of non-drinkers equalled more than 5% of the sample. Additionally, in order to obtain data from a range of alcohol consumers

it was decided that information from non alcohol-users would be included if as previously stated this type of alcohol consumer did not represent more than 5% of the research sample.

6.3.3 Primary Analysis - Investigating the relationship between consumption level and memory associations for alcohol-related behavioural outcomes.

The Coding Procedure for the MAQ.

All of the participant's responses to the MAQ behavioural outcome items were coded as either 1 for an alcohol-related responses (target response) or 0 for a non alcohol-related response. For an example of the coding procedure used see Chapter 5, p. 109-110). The total number of target responses given by each participant was calculated for each of the alcohol-related behavioural outcome categories (positive low and high-frequency and negative low and high-frequency) and for the non-alcohol-related behavioural outcomes (positive and negative).

To test what relationship exists between alcohol (information obtained from the TLBF) and the number of target responses given to each of the six types of behavioural outcome items a systematic, stepwise hierarchical multiple regression analyses were performed. As other factors may contribute to individuals associating alcohol-related behaviours to the behavioural outcome items four predictors; form, gender, age and age started to drink on a regular basis, were regressed prior to the predictor, alcohol consumption. Once these variables had been added into the analyses the aim was to test whether consumption (the variable we are interested in) explains any of the remainder of the variance (by adding it in last).

Previously (Chapter 4), the possibility that the order of questionnaire items could prime or prompt participants was discussed. To assess whether the order was contributing to target responses being generated two forms of the MAQ were developed (Form 1 - items 1 to 132, Form 2 the reverse order). This variable was used as a predictor in the multiple regression analysis.

The predictor gender was the second variable to be added into the analysis. Previous research shows that males and females experience different adverse effects of alcohol use (e.g. Wilsnack, Vogeltanz, Wilsnack and Harris, 2000) therefore the predictor gender was added into the regression analysis. Because the length of experience between a behaviour and outcomes of that behaviour appear to contribute to strength of memory associations between the two concepts (Hintzman, 1986), the predictors age and age started to consume alcohol were also regressed prior to the predictor alcohol consumption.

Each predictor (form, gender, age, age started to consume alcohol, and alcohol consumption) were regressed against the following dependent variables in six different analyses; the number of target responses given to:

(i) Positive low-frequency alcohol-related outcomes
(ii) Positive high-frequency alcohol-related outcomes
(iii) Negative low-frequency alcohol-related outcomes
(iv) Negative high-frequency alcohol-related outcomes
(v) Positive non-alcohol-related outcomes
(vi) Negative non-alcohol-related outcome.

Once these variables had been added into the analyses, the aim was to test whether consumption (the variables of interest) explains any of the remainder of the variance (by adding it in last). For each of the six regression analyses, an alpha level of 0.008 was adopted in the place of 0.05 as a Bonferonni correction for six analyses with a common set of predictors.

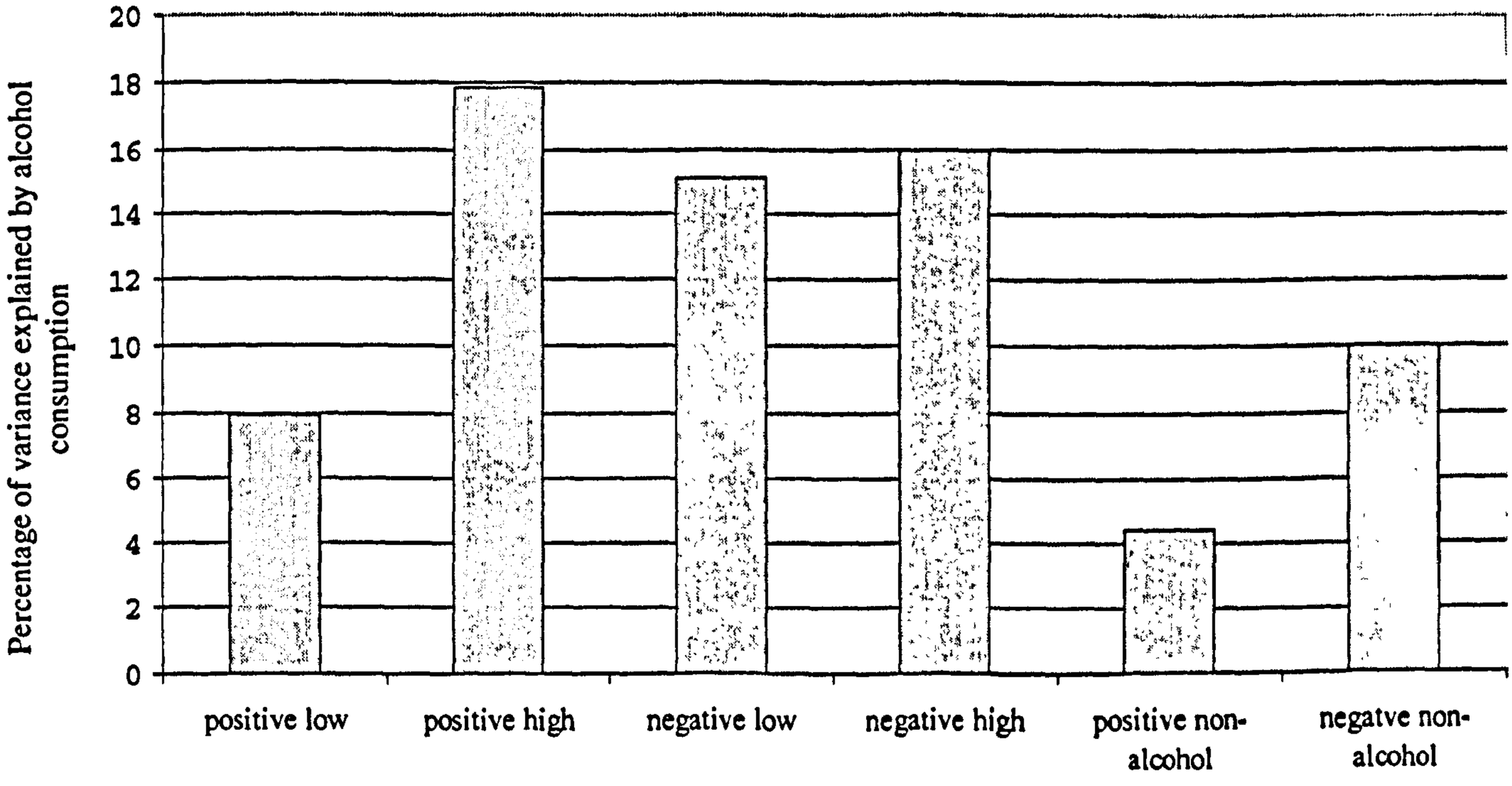
A significant increment in variance was found when the predictor alcohol consumption was added into the analysis (after the mediator variables) for the following dependent variables - positive low (7.94%), positive high (17.87%), negative low (15.14%), negative high (15.98%) and negative non-alcohol-related (10.04%). As the low-frequency and non-alcohol-related behavioural outcome items were originally included in the MAQ as control outcomes, the implication of this finding will be discussed in detail in an ensuing section.

A significant association was also found between age and negative low alcohol-related outcomes (6.73%). However, the beta value indicates that the significant relationship is negatively related. The amount of variance explained ($\underline{R^2}$ change) as each predictor was added into the analysis is shown as is the β value and the significance level of the change is shown in Table 2. The percentage of variance explained by consumption level is depicted in Figure 5.

Table 2. Stepwise hierarchical multiple regression analysis results - An investigation into the amount of variance explained by form, gender, age started to consume alcohol (ASD) and consumption for each of the dependent variables.

	P1	P3	N1	N3	PF	NF
Form						
% inc	3.7	5.2	1.59	0. 69	0.63	0.42
P value	0.057	0.024	0.216	0.419	0.435	0.527
Beta value	0.18	0.21	0.10	0.06	0.07	-0.09
Gender						
% inc	0.11	1.24	3.99	3.87	0.74	1.98
P value	0.742	0.264	0.05	0.052	0.400	0.168
Beta value	0.00	-0.05	-0.14	-0.13	-0.04	-0.08
Age						
% inc	0.96	5.9	**6.73**	3.01	0.00	0.12
P value	0.332	0.014	**0.008***	0.084	0.966	0.286
Beta value	-0.04	-0.13	**-0.14**	-0.06	0.04	-0.02
ASD						
% inc	0.32	0.00	0.22	0.00	0.03	0.96
P value	0.579	0.834	0.633	0.985	0.848	0.336
Beta value	0.07	-0.11	-0.03	0.01	0.03	-0.08
Consumption						
% inc	**7.94**	**17.87**	**15.14**	**15.98**	4.44	**10.04**
P value	**0.005***	**0.000***	**0.000***	**0.000***	0.04	**0.001***
Beta value	**0.30**	**0.45**	**0.42**	**0.42**	0.22	**0.35**
Total variance	13.04%	**30.23%**	**27.67%**	**23.56%**	5.86%	14.59%
P value	0.023	**0.000***	**0.000***	**0.000***	0.34	0.011

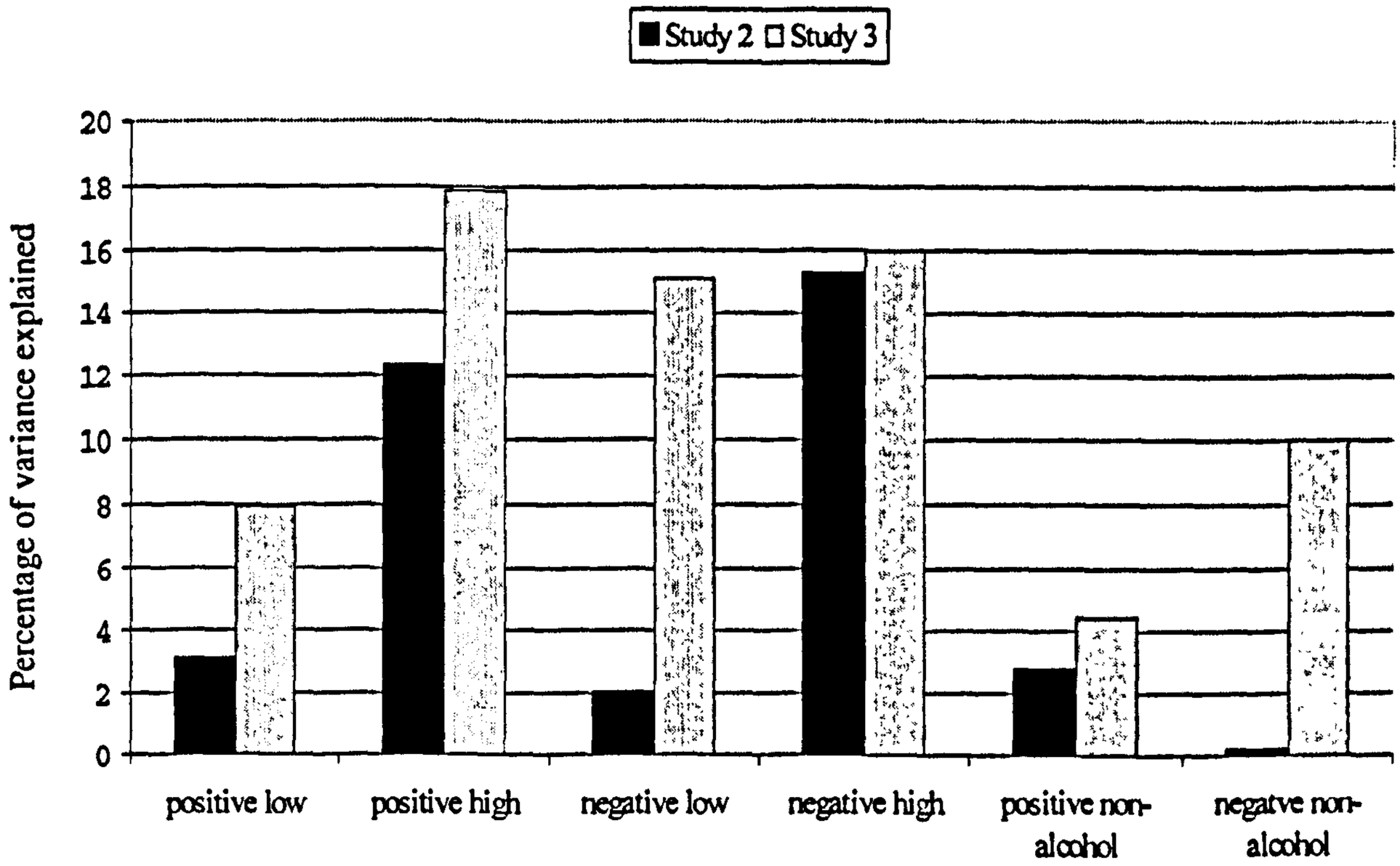
Figure 5. Additional percentage of variance explained by alcohol consumption level for target responses generated by participants in each of the 6 analyses.



6.3.4 Does a longer alcohol consumption history result in stronger alcohol memory associations?

As the mature social drinkers have a significantly longer alcohol consumption history in comparison to the young social drinkers (Study 2) it is possible to assess if a longer consumption history results in stronger memory associations being formed between alcohol use and related outcomes. When the additional percentage of variance explained by the predictor alcohol consumption was examined for each of the behavioural outcome categories in the MAQ, it emerged that alcohol consumption accounts for a greater percentage of the variance for number of target responses given to the six behavioural outcome categories in the mature social drinkers analysis. This indicates that the mature social drinkers have stronger associations between alcohol use and related outcomes of this behaviour (Figure 6).

Figure 6. Results for additional percentage of variance explained by consumption level for the target responses - A comparison of the results from Study 2 and Study 3.



In addition to a greater percentage of variance being explained by alcohol consumption for the six categories (dependent variables) of behavioural outcomes in the MAQ more significant associations were found for alcohol consumption and target responses given to the behavioural outcomes in the MAQ for the mature social drinkers in comparison to the young social drinkers. For both the young and mature social drinkers a significant relationship was found for alcohol consumption and target responses given to the high-frequency positive and negative alcohol-related behavioural outcome items. Additional significant associations were also found for the mature alcohol consumers and alcohol consumption and low-frequency positive and negative alcohol-related behavioural outcomes and for non-alcohol-related behavioural outcomes.

6.3.5 Summary of results

(i) The participants in Study 3 (mature social drinkers) had a significantly longer alcohol consumption history in comparison to the participants from Study 2 (young social drinkers). This was found for the groups as a

whole and for comparisons made between the male participants in each group and the female participants in each group. However, the male participants in Study 3 had a significantly longer consumption history in comparison to the female participants.

(ii) A significant difference with reference to the proportion of participants who had received treatment for an alcohol-related problem was found. A greater proportion of participants in Study 3 stated that they had received treatment. A greater proportion of males in Study 3 compared with the males in Study 2 stated that they had received treatment for an alcohol-related problem. However, there was no significant difference between the female participants in the two research samples.

(iii) With reference to the proportion of participants in each sample who stated that they had an immediate family member who had a drink-related problem no significant difference was found.

(iv) Participants in Study 2 consumed significantly more alcohol in comparison to the participants in Study 3. This was true for the groups as a whole and for comparisons made between the male participants and the female participants in each study.

(v) In the primary analysis, significant associations were found between mature alcohol consumer's consumption level and positive low (7.94%), positive high (17.87%), negative low (15.14%) and negative high (15.98%) outcomes and negative non-alcohol-related behavioural outcomes (10.04%).

(vi) An unexpected result emerged as a significant positive relationship was also found between the negative non-alcohol-related behavioural outcomes and alcohol consumption. This result was unexpected as this type of behavioural outcome was previously judged as being unrelated to alcohol use by the focus group who generated a list of positive and negative non-alcohol-related behavioural outcomes for use in the MAQ (Study 1). Based on the findings from Study 1, this type of outcome and the positive counterpart were incorporated in the MAQ as control behavioural outcomes.

(vii) The fact that this type of outcome was not related to alcohol use was reaffirmed by the results in Study 2 as a non-significant associations was

found between alcohol consumption and target responses made to this and the positive control behavioural outcome. Therefore in the present study of particular interest is the fact that a significant relationship was not found between the number of target responses made to the positive non-alcohol-related outcomes and alcohol consumption. The significant relationship that was found between negative non-alcohol-related outcomes and alcohol consumption will be discussed in greater detail in an ensuing section of the present chapter.

(viii) When the results from the primary analyses in Study 3 were compared with the results from the primary analysis in Study 2 it emerged that a higher percentage of the variance for the number of target responses given to the alcohol and non-alcohol-related behavioural outcomes was explained by alcohol consumption in Study 3.

6.4. Discussion

In Study 2 a positive significant relationship was found between alcohol use and memory associations for positive and negative high-frequency alcohol-related behavioural outcomes when a group of undergraduate social drinkers were tested. A main objective of the present study was to test whether the same relationship would be found when alcohol memory associations of mature social drinkers were assessed. Based on the findings from Study 2 it was hypothesised that there would be a significant relationship for alcohol consumption and memory associations for high-frequency positive and negative alcohol-related behavioural outcomes when a group of mature social drinkers were tested.

The hypothesis was upheld as a significant positive relationship was found between alcohol consumption and target responses made to the positive and negative high alcohol-related behavioural outcomes. However, unexpected findings also emerged as significant positive relationship was also found for positive and negative low alcohol-related behavioural outcome and non-alcohol-related behavioural outcomes.

Originally, the low-frequency behavioural outcomes were included in the structure of the MAQ as control outcomes (Chapter 4). Although they are viewed as alcohol-related behavioural outcomes, they are only idiosyncratically related to this behaviour. Therefore, it was hypothesised that a non-significant relationship would be found between alcohol consumption and target responses made to this type of behavioural outcome. However, the results from Study 3 indicated that mature social drinkers do associate this type of outcome as being related to alcohol use. This is likely to indicate that due to a longer consumption history more opportunities arise for associations to be formed between alcohol use and idiosyncratic outcomes of this behaviour.

An additional unexpected finding emerged which showed that there was a significant positive relationship between alcohol use and target responses to negative non-alcohol-related behavioural outcomes of this behaviour. The negative non-alcohol-related behavioural outcomes were incorporated into the structure of the MAQ in order to minimise the possibility of individuals realising that the questionnaire was concerned with alcohol use. As this type of outcome was previously viewed as not being related to alcohol use, at first it would appear that this finding could indicate that the MAQ is not measuring what it is purported to measure. However, as a significant relationship was also found between alcohol use and alcohol memory associations for the low-frequency alcohol-related behavioural outcomes, it would seem that this result relates to the fact that mature social drinkers have a substantial alcohol consumption history and therefore have had more opportunities to have experience a greater array of alcohol-related outcomes and more opportunities to form associations between alcohol use and related outcomes. As the mature alcohol consumers have had more opportunities to form memory associations between alcohol use and related outcomes it would appear that this group have come to associate outcomes previously viewed as unrelated to alcohol use by younger, less experienced alcohol consumers, as being related to alcohol. This explanation will be empirically tested in the next study (Study 4).

Of the other predictors, the only significant relationship that emerged from the analyses was between the negative low alcohol-related behavioural outcomes and

age. This association was negative, which would indicate that the younger participants in the group were making target responses to this type of behavioural outcomes than the older participants in this group. Although this sample is viewed as mature social drinkers within the sample, there is a wide age range - 27 to 74 years of age. Within this age range it is likely that there are differences in alcohol consumption patterns. It is also possible that the older participants have decreased their alcohol consumption for a range of reasons such as medication.

An additional objective in the present study was to test whether a longer alcohol consumption history results in stronger memory associations being formed between alcohol use and related behavioural outcomes. The number of years that an individual has been consuming alcohol is related to a key concept in the Alcohol-Related Association Memory model of alcohol use (Stacy et al., 1994) - experience. This model purports that associations between alcohol use and outcomes of this behaviour become increasingly associated in memory with increased drinking experience. Based on this assumption it was hypothesised that a longer alcohol consumption history would result in stronger associations being made between alcohol use and related outcomes of this behaviour. To test the hypothesis the additional percentage of variance explained by consumption level was compared for each of the dependent variables, for the young and mature social drinkers.

Prior to comparing the hierarchical multiple regression analysis results from the two studies it was necessary to statistically demonstrate that the mature social drinkers did have a significantly longer alcohol consumption history in comparison to the young social drinkers. In addition a series of statistical tests were performed to test whether the two groups differed with regards demographic details and alcohol-related history. It was found that the mature social drinkers had a significantly longer alcohol consumption history. However, it also emerged that the male participants in Study 3 had a significantly longer alcohol consumption history compared with the mature female social drinkers.

It is possible that the gender difference observed in this older age group may be due to the fact that females were originally influenced by stereotypical views on alcohol use and gender. Traditionally there was a high level of intolerance towards women consuming alcohol in taverns or public houses (Houghton and Roche, Chapter1, 2001). Based on findings from Study 1 and 2, which shows no significant gender difference for undergraduate male and female alcohol consumption level, it would appear that there is no longer a gender divide with reference to alcohol consumption behaviour. However in contemporary Western society the increase in alcohol consumption among women has occurred with their changing roles and position in society (Park, 1990). This observed change is likely to have affected alcohol consumption behaviour of younger social drinkers but not the older females in the mature social drinkers sample.

With reference to the proportion of participants in each study who have received treatment for an alcohol-related problem there was a significant between group difference with more participants in Study 3 having received treatment in comparisons to the participants in Study 2. Differences were also found when the number of males in Study 2 and 3 who have received treatment were compared. However there was no significant between group differences when comparisons were made between the proportion of female participants Study 2 and 3 who had received treatment for an alcohol-related problem.

The result regarding the male participants may be due to the fact that the participants in Study 3 are older, have had a longer alcohol consumption history and therefore may be more likely to have experienced or developed alcohol-related problems. An additional explanation may involve the manner in which different age cohorts seek help for alcohol-related problems. It is possible that young adults may resolve alcohol problems without participating in support groups or formal treatment programs opting for more self-resolution based methods. It emerged that significantly more males in the sample had received treatment for an alcohol-related problem. This finding may be due to gender issues, concerning alcohol consumption behaviour that are related to this age cohort.

Analysis showed that participants in Study 2 were consuming significantly more alcohol in comparison to the participants in Study 3. This result was also found when comparisons were made between the male participants in each study and the female participants. A recent survey of alcohol consumption in Britain showed that men and women aged between 16-24 years were more likely than people from other age cohorts to exceed the recommended number of daily units on at least one day (Boreham and Shaw, 2001). Indeed, drinking level is thought to decrease with age as the significance that alcohol previously held as a facilitator of socialisation, self discovery and experimentation during one's youth tends to change in the adult years in concert with broader lifestyle changes (Houghton and Roche, 2001, Chapter 1). Although the younger age group are consuming significantly more alcohol on their heaviest drinking day the fact that the mature social drinkers have a significantly longer alcohol consumption history is the key issue. Therefore, the proposed statistical comparisons concerning alcohol memory associations and alcohol consumption (primary analysis) are suitable.

To assess the effects of a longer alcohol consumption history comparisons were made between the empirical findings from the present study (mature social drinkers) and the results from Study 2 (young social drinkers). The results showed that a longer consumption history resulted in stronger associations being made between positive and negative culturally available (high-frequency) outcomes of alcohol use. In Study 2 significant positive associations between target responses made to the high-frequency positive and negative outcomes and alcohol consumption was also found, however, in Study 3 a higher percentage of the variance was explained by the predictor alcohol consumption level. In addition, more significant associations emerged with the mature social drinkers and also indicative of more associations being formed between alcohol use and related outcomes of this behaviour is the fact that **both** culturally and idiosyncratically known positive and negative outcomes of alcohol use were significantly related to alcohol consumption in Study 3.

To summarise the results from the present study show that the MAQ is a suitable research tool to use with mature social drinkers. Although the items in the MAQ

were developed by a group of young undergraduate students, the results from the present study indicate that social drinkers, regardless of age, experience these alcohol-related behavioural outcomes. The fact that a significant associations was found between low-frequency outcomes and alcohol consumption would indicate a substantial alcohol consumption history results in stronger associations being made between common and uncommon outcomes of alcohol use. The findings from the present study support the research hypotheses and ultimately provide further support for the Alcohol-Related Association Model of alcohol use (Stacy et al., 1994). When the results were compared with the findings from Study 2 this also provided support for the model as the effect of a substantial drinking career could be viewed.

As previously stated, central to the Alcohol-Related Association Memory model (e.g. Stacy et al., 1994) is that increased experience results in stronger associations being made between alcohol use and related outcomes. Within the model, there are two ways to view experience. Firstly, an individual who consumes a substantial amount of alcohol can be viewed as having a lot of alcohol experience. Also, an individual who has a substantial alcohol consumption history but does not necessarily consume large quantities of alcohol on a regular basis can be viewed as an individual who has a lot of alcohol experience. The research presented in this thesis, thus far, has addressed both of aspects of experience as the relationship between alcohol consumption and responses to the MAQ has been examined and comparisons between two groups who significantly differ with regards to alcohol consumption history have been made.

Although the two research hypotheses were supported, the results from the primary analysis for Study 3 produced two unexpected findings. Firstly the percentage of variance explained by alcohol consumption for the number of target responses made in response to both the negative low and high alcohol-related behavioural outcomes is nearly identical. As the negative low alcohol-related behavioural outcomes are thought to be only idiosyncratically known to alcohol users (Study 1) one would not expect a high correlation between alcohol consumption and the number of target responses made to this type of outcome.

However, this result may have emerged simply because individuals in this age group do have strong associations between alcohol use and this type of alcohol-related behavioural outcome because of the wider range of experiences with alcohol that they have had.

The second unexpected finding concerns the significant positive association found between alcohol consumption and the negative non-alcohol-related behavioural outcomes. This type of behavioural outcome and the positive equivalent was included in the structure of the MAQ as a way of introducing a control element and in Study 2 as expected, no significant association was observed between alcohol consumption and the negative and positive non-alcohol-related behavioural outcome. There are two pertinent issues associated with this result which will now be examined:

(i) Why does this age group associate negative non-alcohol-related behavioural outcomes items as being related to alcohol use?

(ii) A significant relationship was found between target responses given to the non-alcohol-related behavioural outcomes and alcohol use. However there was no significant relationship between alcohol consumption and the positive non-alcohol-related behavioural outcomes. If a substantial alcohol consumption history results in associations being made between an array of behavioural outcomes and alcohol use why was there a non-significant relationship between alcohol consumption and the target responses given to the positive non-alcohol-related behavioural outcomes and alcohol?

Possible explanations for the unexpected finding involve the fact that the older age group have had more alcohol consumption experience hence they have had more opportunities to experience/learn about outcomes of alcohol use. Therefore it is possible that they have experienced a wider range of alcohol-related outcomes and as a consequence of this identify different or more outcomes as being related to alcohol use in comparison to a younger age group would not necessarily relate to alcohol use. Hence, it is likely that with increased drinking experience (not necessarily quantity) there are more outcomes of alcohol use

available/accessible in memory storage. Indeed, research shows that with increased alcohol experience an individual is more likely to experience the adverse effects of alcohol use (e.g. Makela and Mustonen, 2000). However, one may assume that the same would hold true for the positive aspects of alcohol use hence, one might expect to observe a similar outcome with positive outcomes because of a longer drinking history.

It is possible that an individual experiences the positive aspects of alcohol use early on in their drinking career. In a sense a ceiling effect may occur, as there are only so many positive aspects of alcohol use and these are likely to be familiar to all ages of alcohol consumers early on during a drinking career. With increased drinking experience the knowledge store of positive outcomes of alcohol use does not necessarily grow, but associations between the behaviour and the outcomes become strengthened over time. Whereas with negative associations it may be that the memory store of such outcomes does indeed expand in conjunction with the strengthening process between the behaviour and associated outcomes. An additional explanation may involve the manner in which people view consequences of alcohol use as they become older. Aspects associated with hangovers may not be as problematic or detrimental when an individual has the day off university or one lecture to attend. However for an individual who has a job or children to look after the detrimental and debilitating affects of a hangover may be more salient and problematic.

Young undergraduate social drinkers were asked to develop a list of positive and negative non-alcohol-related behavioural outcomes for use in the MAQ (Chapter 4). It is possible that as a result of a longer drinking history the mature social drinkers have come to view some of the negative non-alcohol-related behavioural outcomes as being related to alcohol use. This would explain why the unexpected significant association between alcohol consumption and target responses given to non-alcohol-related behavioural outcomes has occurred. To test this explanation for the unexpected finding Study 4 was conducted.

6.5 Study 4

The following study was conducted to investigate whether a longer consumption history would result in a wider range of negative behavioural outcomes being associated with alcohol consumption and related activities. The rationale for conducting this study directly relates to the fact that behavioural outcomes previously viewed as negative non-alcohol-related outcomes by young social drinkers (Study 2) were viewed as alcohol-related outcomes by middle aged to elderly individuals (Study 3). Based on the empirical findings from Study 3 it was hypothesised that a longer drinking history may result in a wider range of negative alcohol-related behavioural outcomes being learnt and associated with alcohol use. To investigate this hypothesis one study consisting of three parts was conducted. As different participants were recruited and different materials and procedures were implemented in each of the three parts of Study 4 each section will be discussed separately.

6.6 Part I

6.6.1 Methodology

6.6.2 Participant Recruitment

As the main objective of this study was to discover if mature social drinkers have experienced a wider range of negative behavioural outcomes as a consequence of a substantial alcohol consumption history only mature social drinkers (individuals over the age of 27 years) were asked to take part in the present study. Participant recruitment took place in a variety of public places namely: Bingo Halls, The Ferry Service from Stranraer to Belfast, shopping centres, Cafes and Food canteens.

6.6.3 Participant Information

In total 300 participants took part in this study. Individuals were approached in the aforementioned public places and asked if they would like to take part in the study on the grounds that they fulfilled the following inclusion criteria for participation:

(i) The minimum age for participation was 27 years.

(ii) Participants must be native English speaking.

(iii) Participants must have consumed (on self-estimated average) at least one alcoholic drink per week in the last six months.

Information on age and gender is summarised in Table 3.

Table 3. Participants Information

	Total	Males	Females
Median Age	47.5	42	49
Age range	27-74	27-70	29-74
Total Number	300	91	209

6.6.4 Materials

Each participant was asked to complete the COQ, the TLFB and the DIQ questionnaires. For information on these questionnaires refer to Chapter 4, p. 67-69. For a sample of the COQ, DIQ and TLFB see Appendix B, C and D.

6.6.5 Design

In Study 3 a significant positive relationship was found between alcohol consumption and target responses given to the negative non-alcohol-related behavioural outcome items represented in the MAQ. This indicated that mature social drinkers were viewing behavioural outcomes previously classified (by a focus group of young undergraduate students) as negative non-alcohol-related behavioural outcomes as alcohol-related outcomes. The present study was designed to systematically test this assumption.

To ascertain what mature social drinkers viewed as negative consequences of alcohol use the Consumption Outcome Questionnaire (COQ) was used. This

questionnaire was originally used in Study 1 to obtain a representative list of positive and negative alcohol-related behavioural outcomes for use in the MAQ. Following the procedure used in Study 1 participants were asked to generate a list of ten pleasant and 10 unpleasant consequences of alcohol use. Based on the information provided a composite list of negative outcomes of alcohol use which represent mature social drinkers experiences and views on this aspect of alcohol consumption was developed. The information obtained for the positive consequences of alcohol use was not examined.

As habitual alcohol users' views were of interest in the present study, it was necessary to ensure that the research sample were regular alcohol consumers. To obtain a measure of present alcohol use the TLFB questionnaire was administered to the participants.

6.7 Procedure

To enlist a representative sample of mature social drinkers, as previously stated, prospective participants were approached in the following places, Bingo Halls, The Ferry Service from Stranraer to Belfast, Shopping centres, Cafes and Food canteens; and asked if they would like to take part in a short study lasting approximately 10 minutes. If the individual agreed to take part and they satisfied the participant recruitment criteria they were given the COQ to complete.

Once the COQ was finished, participants were then given the DIQ to complete. Participants were informed that this questionnaire required them to provide information about themselves (e.g. age, gender, etc) and whether or not they or an immediate family member had experienced an alcohol-related problem. The last questionnaire that participants were required to complete was the TLFB.

In total, the three questionnaires took an average of 10 minutes to complete. The order to the completion of the questionnaires (COQ, DIQ and TLFB) remained the same throughout the testing procedure. The researcher was present when participants were completing the questionnaires to ensure that individuals were not conversing with one another. Once the three questionnaires had been filled out the experimenter debriefed participants and again informed that information

provided was confidential. Lastly, participants were thanked for taking part in the study.

6.8 Results

6.8.1 Strategy of analysis

Primary analysis

In total, 300 mature social drinkers completed the COQ. Only responses given to the question that asked participants to write down negative effects of alcohol use were used in this analysis. As the first response was viewed as the outcome which is most strongly related to alcohol use each of the 300 first responses were entered into a database verbatim. Two researchers examined the 300 responses and removed any responses that were explicitly related to alcohol use (e.g. hangover). There was 100% agreement between the researchers as to which responses should be removed. Responses that were identical or semantically similar were then grouped together by the two researchers. As before there was 100% agreement as to which negative outcomes of alcohol use where similar in meaning or identical.

Subsidiary analysis

Within group statistical comparisons were carried out to test whether the male and female participants significantly differed with regards to the following variables: length of alcohol consumption history, alcohol consumption level, number who have received treatment for an alcohol-related problem and the number who stated that an immediate family member has an alcohol-related problem.

As a key assumption of parametric tests is that the data is normally distributed the Kolmogorov-Smirnov analysis was used to test whether the data violated this assumption. When the data was not normally distributed an equivalent non-parametric test was used.

6.8.2 The generation of negative outcomes of alcohol use by the mature alcohol consumers

To assess if this age group were producing negative effects of alcohol use that could be likened to the non-alcohol-related negative behavioural outcomes used in the MAQ as control outcomes the first stage involved asking 300 participants to write down negative outcomes of alcohol use. In the first stage the responses from the COQ were analysed. Only the first outcome generated by the 300 participants in response to the question which instructed participants to - write down up to 10 negative or unpleasant consequences of alcohol use - was used during this procedure. The first outcome generated was used as it was felt that this outcome could be viewed as the most accessible outcome and therefore the one, which the participant most was most strongly associated with alcohol use. All of the participant's first responses to the question concerned with negative outcomes of alcohol use were put into a database verbatim.

Two researchers read through each of the outcomes and grouped identical or semantically similar outcomes together. There was 100% agreement between the researchers. A list of negative alcohol-related outcomes (Table 4) was compiled based on the information from the first part of the study. The list was developed for use in Part II of the present study.

Table 4. List of negative behavioural outcomes derived from the 300 responses to the COQ.

ALCOHOL-RELATED BEHAVIOURAL OUTCOME ITEMS	NUMBER OF TIMES OUTCOME GENERATED
GET SICK	28
FEEL SICK	23
HEADACHE	20
LOSE SENSES	12
SPEND TO MUCH	12
AGGRESSION	12
HAVE AN ACCIDENT	9
BAD BEHAVIOUR	8
FORGET THINGS	7
PRODUCE HEALTH PROBLEMS	7
MAKE A FOOL OF YOURSELF	6
FALL OVER	5
SAY THINGS YOU REGRET	5
BECOME ARGUMENTATIVE	4
CHANGE OF PERSONALITY	3
BECOME DEPRESSED	3
LOSE CONSCIOUSNESS	6
LOSS OF CONTROL	3
LOSE YOUR TEMPER	3
FAMILY BREAK UP	2
FEEL SAD	2
YOU'D DIE	2
DROWSY	2
LOSE INHIBITIONS	2
CAN'T DRIVE	2
FAMILY UNHAPPINESS	3
DEHYDRATION	2
BECOME ADDICTED	2
TIRED	2
JAIL	2
HURT YOURSELF	1
TALK NONSENSE	1
BAD BREATH	1
HARD TO TOLERATE IDIOTS	1
BECOME A HABIT	1
OVER INDULGING	1
ANXIOUS	1
LOSE FRIENDS	1
LACK OF SLEEP	1
CAN CAUSE TROUBLE	1
LOSS OF APPETITE	1
DIZZY HEAD	1
FACE GOES ALL RED	1
BECOME HARDENED	1
SWEARING	1
BAD CONCENTRATION	1
CREATES PROBLEMS	1
BE ATTACKED	1
IMPAIRED VISION	1
CONFUSION	1
CAN'T SPEAK ACCURATELY	1
BECOME IRRATIONAL	1

6.8.3 Participants information

When the male and female participants from this sample were compared for the following variables: age, alcohol consumption history, and the number who had received treatment and number who stated that an immediate family member had experienced an alcohol-related problem no significant differences were found.

However, a significant difference was found for alcohol consumption level with male participants consuming more alcohol on the heaviest drinking day of the previous week in comparison to the female participants. For information on the tests used and statistical findings refer to Appendix A.

In total, 36 (12%) of the participants from Study 4 - Part 1, indicated that they had not consumed alcohol in the previous week. However of this subgroup 24 individuals indicated that they would normally consume alcohol and demonstrated this by completing an additional TLFB which showed what a typical drinking week would be.

In the present study a large number of participants was required (N=300) in order to get a representative sample of mature social drinkers. Prior to commencing the study the experimenter decided that data from individuals who indicated that they did not drink regularly would be included if it did not exceed 5% of the total sample. Once the participants who normally consumed alcohol (and demonstrated this by completing an additional TLFB) were viewed as regular alcohol consumers, 4% of the participants who took part in the study (n= 12) indicated that they did not consume alcohol on a regular basis.

6.8.4 Summary of results

(i) Based on a systematic procedure conducted by two researchers a list containing 52 negative consequences of alcohol use was developed. This list was representative of mature social drinkers view of negative consequences of alcohol use.

(ii) No significant gender differences were found with regards to alcohol consumption history, the proportion of males and females who had received treatment for an alcohol-related problem or the who stated that an immediate family member had an alcohol-related problem.

(iii) The male participants in the sample were consuming significantly more alcohol compared to the female participants.

6.9 Part II

6.9.1 Methodology

6.9.2 Participants Information

Five participants were recruited to take part in a focus group. The inclusion criteria for participation in the focus group were:

(i) The minimum age for participation was 27 years.

(ii) Participants must be native English speaking.

(iii) Participants must have consumed (on self-estimated average) at least one alcoholic drink per week in the last six months.

Information concerning age and gender of participants in the focus group is summarised in Table 5.

Table 5. Participants Information

	Total	Males	Females
Median Age	46	45	43
Total Number	5	2	3

6.9.3 Materials

Participants in the focus group were presented with the two lists of negative behavioural outcomes:

(i) List of 33 negative non-alcohol-related behavioural outcomes used in the MAQ.

(ii) The list of negative consequences of alcohol use generated by participants in Study 4 - Part I.

6.9.4 Design

The aim of the second part of this study was to assess if any items in the list of negative consequences of alcohol use developed in Part I are identical or similar to the negative non-alcohol-related behavioural outcome items used in the MAQ. A focus group consisting of mature social drinkers was recruited to identify if individual outcomes on the two lists could be viewed as identical or similar in meaning.

6.10 Procedure

Participants in the focus group were asked to examine the list of negative non-alcohol-related behavioural outcomes and the list of negative alcohol-related behavioural outcomes generated by the participants in Study 4 (these will be referred to as List A and List B, respectively). They were then instructed, as a group, to identify whether any of the outcomes from List A were identical or semantically similar to the outcomes in List B. The focus group was then instructed that 100% agreement amongst the group was necessary in order to conclude that two outcomes from List A and B were identical or semantically similar in meaning.

6.11Results

In total 21 of the 33 negative non-alcohol-related behavioural outcomes were identified as being identical or semantically similar to outcomes in the list of negative consequences of alcohol use. Table 12 shows the outcome phrases from List A and List B that were judged by the focus group as being similar in meaning.

Table 6. Negative non-alcohol-related behavioural outcomes identified by the focus group as being semantically similar to the negative alcohol-related outcomes generated by the mature social drinkers.

LIST A - Negative non-alcohol-related outcomes used in the MAQ	**LIST B** - Mature social drinkers views of negative consequences of alcohol use.
1. Feel anxious	Feel anxious
2. Feel nervous	Feel anxious
3. Feel stressed	Feel anxious
4. Feel frightened	To be attacked
5. Feel frustrated	Feel confused
6. Feel sore	To hurt yourself
7. Feel exhausted	Feel tired
8. Feel weak	Feel tired
9. Feel lonely	Feel depressed
10. Feel moody	Feel depressed
11. Feel drained	Feel drowsy
12. Feel glum	Feel sad
13. Feel sweaty	Your face goes red
14. To be in danger	To have an accident
15. To take risks	To have an accident
16. To feel poor	To spend too much money
17. To be in debt	To spend too much money
18. To feel ashamed	To make a fool of yourself
19. To get lost	To forget things
20. To feel bloated	To feel sick
21. To feel lifeless	T o get sick

*As 'to feel anxious' and 'anxious' are identical phrases, this phrase pair was not included in the subsequent Similarity Questionnaire (Stage 4 - Part III).

6.11.1 Summary of results

(i) In total the focus group concluded that 21 of the 33 negative non-alcohol-related behavioural outcomes were semantically or identically similar to the negative alcohol-related behavioural outcomes produced by participants in Part I of the present study. One of the outcomes 'feel anxious' was identical to a negative non-alcohol-related behavioural outcome. The remaining 20 behavioural outcomes were viewed as being semantically similar in meaning.

6.12 Part III

6.12.1 Methodology

6.12.2 Participants

Individuals who appeared to be over the age of 27 years were approached around the Glasgow University campus and asked if they would complete two short questionnaires. In total 30 people took part in the final part of Study 4. Table 7. provides a summary of gender and age information.

Table 7. Participants Information

	Total	Males	Females
Median Age	40	42	43
Total Number	30	12	18

6.12.3 Materials

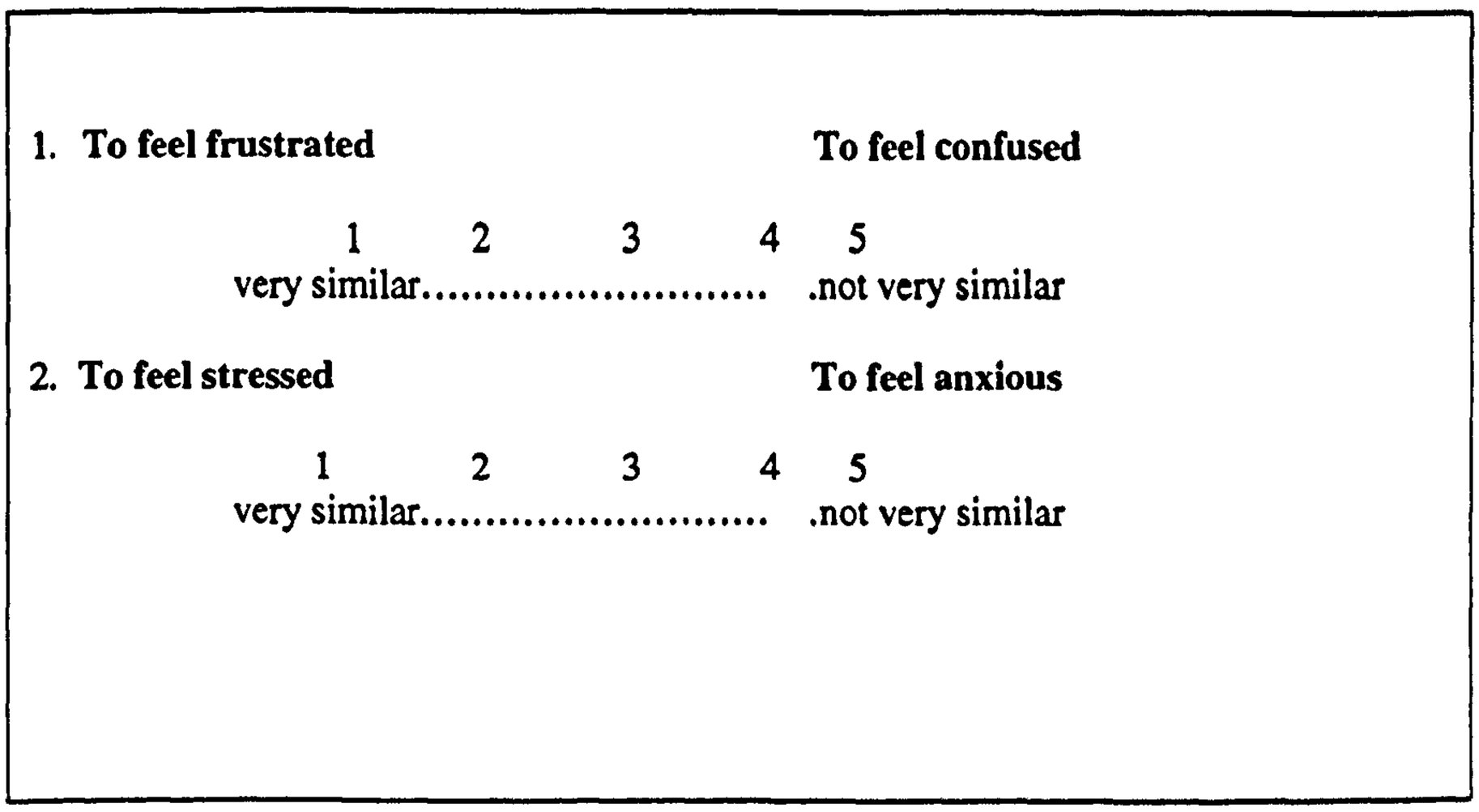
6.12.3.1 The Similarity Questionnaire (The SQ)

This questionnaire consisted of 6 pages - a face page, which contained standardised instructions, and an example of how to respond to each question and five pages each containing five pairs of outcome phrases that the focus group in Part II assessed as being semantically similar in meaning.

Participants were instructed to rate on a scale of 1-6 how semantically similar or dissimilar they thought the pairs of phrases were in meaning

Figure 7. is an example of a page from the SQ.

Figure 7. Presentation of Phrases in the SQ.



For a copy of the SQ see Appendix F.

6.12.3.2 The condensed version of the DIQ.

In this questionnaire, participants were asked to write down their age and gender.

6.12.4 Design

The aim of Part III of Study 4 was to independently assess the focus groups views that 21 of the 33 non-alcohol-related behavioural outcomes were semantically similar to items in a list of negative consequences given by mature social drinkers in Part I of the present study. In order to assess whether an independent group of individuals would view these outcomes as being similar in meaning the Similarity Questionnaire (SQ) was constructed. This questionnaire was developed based on the results from the focus group - that twenty of the non-alcohol-related behavioural outcomes used in the MAQ were semantically similar to negative alcohol-related outcomes generated by the mature social drinkers.

6.13 Procedure

Individuals who appeared to be over the age of 27 years were approached and asked if they would take part in a short study lasting approximately 5 minutes.

If the participant agreed and if they were over the age of 27 they were firstly given the SQ to complete. They were asked to read the instruction page of the SQ after which the experimenter verbally repeated the instructions to ensure that each participant understood how to complete the questionnaire. Once the SQ was completed the participants then completed a short demographic questionnaire in which they were asked to provide their age and gender. The participants were then thanked for their time.

6.14 Results

To obtain a measure of how similar the participants thought the pairs of outcome phrases were the thirty responses to each phrase pair was averaged and the error score was calculated. With reference to the scale, in the SQ, 1 represented very similar and 6 represented very dissimilar. Therefore all phrase pairs, which received a mean rating of 3.5 and below, were viewed as being similar in meaning. In total the information obtained from this procedure indicated that a total of 10 pairs of outcomes were viewed as being similar in meaning. The phrases that were viewed as being similar in meaning are shown in Table 8. Figure 8. shows the results from the above procedure.

Figure 8. Results of the pooled information obtained from the SQ.

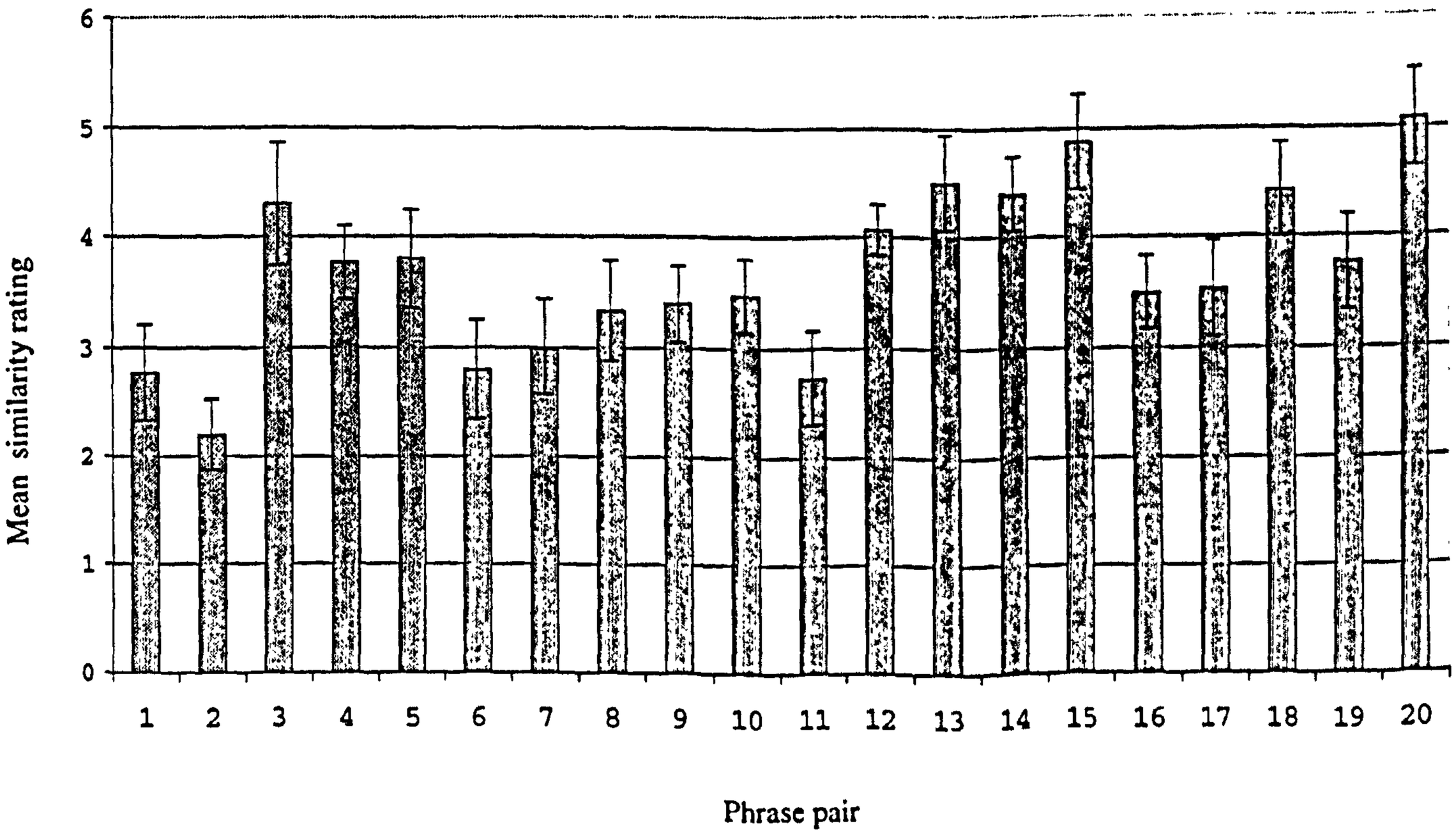


Table 7. Outcome phrase pairs that were viewed by the focus group as being similar in meaning.

List A - negative non-alcohol-related outcomes used in the MAQ	**List B** - Outcomes judged to be similar in meaning from Study 4 -
Feel stressed	Feel anxious
Feel nervous	Feel anxious
Feel exhausted	Feel tired
Feel weak	Feel tired
Feel lonely	Feel depressed
Feel moody	Feel depressed
Feel drained	Feel drowsy
Feel glum	Feel sad
To be in debt	To spend too much money
To feel ashamed	To make a fool of yourself

6.14.1 Summary of Results

(i) Of the 20 non alcohol-related behavioural outcome items identified (by a focus group Part II) as being similar in meaning to negative outcomes of alcohol use generated by a group of mature social drinkers (Part I) an independent group of 30 participants viewed 10 of these outcomes as being similar in meaning.

(ii) The behavioural outcome 'feel anxious' was an outcome generated in Part I of the present study. As this outcome is identical to an outcome classified as a non-alcohol-related behavioural outcome it was not included in the SQ.

(iii) In total, the results from Study 4 show that 11 of the 33 non-alcohol-related behavioural outcomes used in the MAQ are viewed by mature alcohol consumers as being related to alcohol use. This information was used to reanalyse the data from Study 3.

6.15 Results from Study 3 reanalysed based on information from Study 4.

6.15.1 Strategy of analysis

The results from Study 4 show that 11 of the 33 non-alcohol-related behavioural outcomes used in the MAQ were viewed by mature social drinkers as being related to alcohol use. Based on this information two new analyses were conducted on the data obtained in Study 3. The additional analyses were conducted to test whether the fact that older alcohol consumers view some of the non-alcohol-related outcomes used in the MAQ as being related to alcohol use could explain the significant association found between alcohol use and target responses given to the non-alcohol-related behavioural outcomes in the MAQ. The rationale for each new analysis is discussed below.

The final stage in this investigative study is concerned with the statistical analyses that evolved as a result of the above stages. Based on the information obtained from the systematic procedure that was carried out **11** of the negative non-alcohol-related behavioural outcomes were reclassified as negative alcohol-related behavioural outcomes. These outcomes will herein be referred to as **additional negative-alcohol-related behavioural outcomes.**

In Part II a focus group concluded that 12 of the negative non-alcohol-related behavioural outcomes (from the MAQ) were not related or viewed as having any possible matching phrases from the list of negative alcohol-related behavioural outcomes generated by the mature social drinkers in Part I. This showed that this group of non-alcohol-related behavioural outcomes were in no way related or viewed as negative consequences of alcohol use. For the purposes of the present analysis this group of outcomes were renamed **negative filler outcomes.**

In total the focus group agreed that 21 of the 33 negative non-alcohol-related behavioural outcome phrases were identical or semantically similar to negative alcohol-related outcomes generated by mature social drinkers in Part I. However, an independent group, who completed the SQ classed only 11 of the possible 21 outcome pairs as being similar in meaning. Therefore as the results from the SQ indicated that the independent raters did not view these outcomes as

being related to alcohol use these 10 outcomes were renamed **non-classifiable outcomes.**

To summarise the original group of negative non-alcohol-related behavioural outcomes used in the MAQ (total 33) was, for the purposes of the new analyses reclassified into the following three groups:

(i) **Negative filler outcomes** - 12 outcomes in total

(ii) **Additional negative-alcohol-related behavioural outcomes** - 11 in total

(iii) **Non-classifiable outcomes** - 10 in total

6.15.2 Analysis 1

Using the data obtained from Study 3 a stepwise hierarchical multiple regression analysis was carried out to assess the relationship between consumption level and target responses to the following types of negative outcomes - negative filler and additional negative alcohol-related behavioural outcomes. The non-classifiable outcomes were not included in the analysis as a general consensus did not occur between the focus group and the group who completed the SQ with reference to whether these outcome phrases were semantically similar or dissimilar to negative outcomes produced by participants in Study 4.

As stated above the two dependent variables used in the analysis were the negative fillers and the additional negative alcohol-related behavioural outcomes. As in the previous regression analyses, each of the dependent variables was separately regressed against the following predictors: form, gender, age, age started to drink alcohol and consumption level. It was hypothesised that if the positive significant association between alcohol consumption and target responses given to the non-alcohol-related behavioural outcomes is due to the fact that the mature social drinkers associate a wider range of negative behavioural outcomes with alcohol use then:

(i) There will be a significant association between alcohol consumption and the number of target responses generated for the newly classified **additional negative alcohol-related behavioural outcomes** as the results

from Study 4 show that mature social drinkers view these previously classified non-alcohol-related outcomes as being related to alcohol use.

(ii) There will be a non-significant association between alcohol consumption and target responses generated for the newly classified **negative filler outcomes** as the results from Study 4 indicate that mature social drinkers do not associate these behavioural outcomes as being related to alcohol use.

To summarise the above predictors will be regressed against the following dependent variables (which represent the type of behavioural outcome categories used in the MAQ):

(i) Positive low

(ii) Positive high

(iii) Negative low

(iv) Negative high

(v) Positive filler

and the additional dependent variable categories as a result of the findings from the Study 4 -

(vi) The additional negative alcohol-related outcomes

(vi) Negative fillers

(vii) Negative behavioural outcomes viewed as non-alcohol-related by the mature social drinkers.

The Bonferonni Correction was applied to control for multiple tests. Although the results from the above analyses will be discussed separately they will be viewed as an analysis consisting of 9 analyses with a set of common predictors (form, gender, age, age started to consume alcohol and consumption). Therefore in order to test for a significant relationship between the predictor and dependent variables for the ensuing analyses an α level of 0.005 was adopted in the place of 0.05 as a Bonferonni correction for 9 analyses with a common set of predictors.

In the Primary Analysis (Study 3) the Bonferonni Correction was for 6 analyses with a common set of predictors, hence the α level was set at 0.008. However as a result of the additional analyses the results from Primary analysis will be discussed with reference to the above Bonferonni Correction due to the addition of three analyses described above.

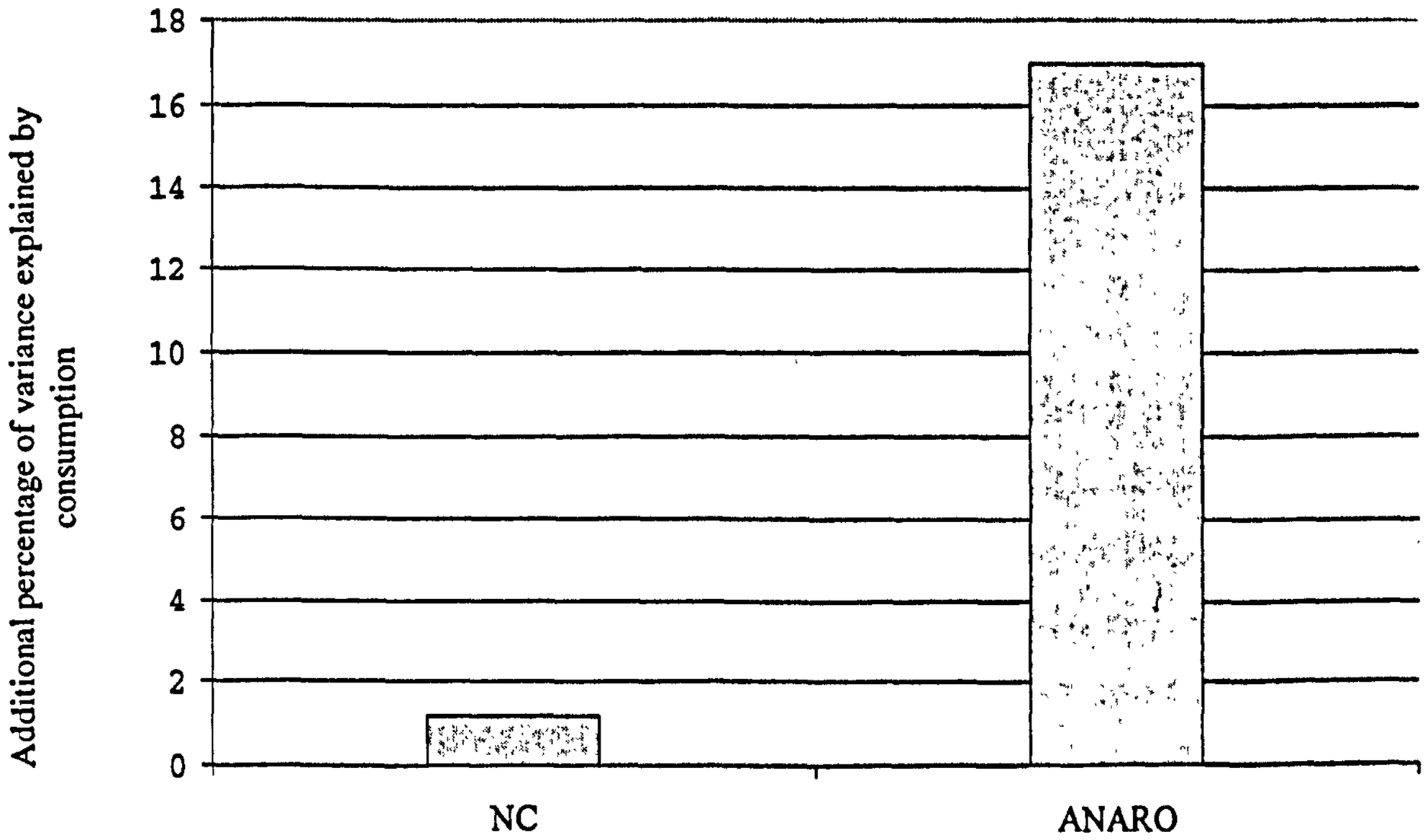
The amount of variance explained ($\underline{R^2}$ change) as each predictor was added is shown as is the β value and the significance level of the change. The results of the analysis show that there is a positive significant association between alcohol consumption level and the additional negative alcohol-related outcomes (16.98%). As postulated, there is no significant association between alcohol consumption level and the number of target responses generated in response to the negative filler outcomes. Only 1.18% of the variance for target responses generated for the negative fillers are explained by the addition of the predictor consumption. No other predictors were found to be significantly associated with the dependent variables. The results from the regression analysis support the above hypotheses.

Table 9. shows the results from this analysis and Figure 9. shows the additional percentage of variance explained by consumption level for each of the dependent variables.

Table 9. Regression analysis results for the negative filler outcomes (NF) and the additional negative alcohol-related behavioural outcomes (ANARO) - A summary of the percentage increment, beta value and significant level for each of the predictors and the model as a whole.

	NF	ANARO
Form		
% inc	1.2	1.86
P value	0.283	0.181
Beta value	-0.11	-0.16
Gender		
% inc	5.65	0.09
P value	0.012	0.766
Beta value	-0.23	0.13
Age		
% inc	0.22	0.15
P value	0.636	0.703
Beta value	0.04	0.08
ASD		
% inc	0.56	0.07
P value	0.454	0.802
Beta value	-0.08	-0.02
Consumption		
% inc	1.18	**16.98**
P value	0.278	**0.003***
Beta value	-0.11	**0.44**
Total variance	8.82%	**19.15%**
P value	0.13	**0.001***

Figure 9. Additional percentage of the variance explained by alcohol consumption level for the negative filler and the negative alcohol-related fillers.



6.15.3 Analysis 2

The next analysis was conducted as a further way of investigating whether the significant association between alcohol consumption and target responses given to the negative non-alcohol-related behavioural outcomes is due to the mature social drinkers viewing some of the previously classified non-alcohol-related behavioural outcomes as alcohol-related. In Study 4 it was found that 11 of the 33 negative non-alcohol-related outcomes were generated as negative consequences of alcohol use when mature social drinkers were asked to write down negative consequences of alcohol use.

Any target responses (alcohol-related responses) given to these eleven behavioural outcomes were removed from the present analysis. This was done in order to test whether the previously observed effect disappears once negative outcomes viewed as being related to alcohol use are removed. Therefore only

target responses made in response to the negative fillers and non-classifiable outcomes (total 22) were included in the regression analysis.

It was hypothesised that once target responses to the 11 newly classified additional negative alcohol-related outcomes were removed from the analysis the previously observed positive significant association between alcohol consumption and target responses made in response to the negative non-alcohol-related behavioural outcomes would disappear.

In the present analysis there are six dependent variables: positive low and high alcohol-related behavioural outcomes negative low and high alcohol-related behavioural outcomes and positive and negative non-alcohol-related behavioural outcomes. As before four predictors (form, gender, age, age started to consume alcohol) were added into the regression (in this order) **prior** to the predictor consumption. Once these variables had been added into the analyses the aim was to test whether consumption (the variables of interest) explains any of the remainder of the variance (by adding it in last).

For each of the six regression analyses, an alpha level of 0.005 was adopted in the place of 0.05 as a Bonferonni correction for 9 analyses with a common set of predictors. The amount of variance explained ($\underline{R^2}$ change) as each predictor was added is shown as is the β value and the significance level of the change.

The research hypothesis is upheld as once the target responses made to the additional negative alcohol-related behavioural outcomes are removed, the significant association previously observed between alcohol consumption and negative non-alcohol-related behavioural outcomes disappears. The previously observed significant association between alcohol consumption level and negative non-alcohol-related behavioural outcomes reduces from 10.04% to a non-significant 5.00% of the variance explained by the predictor alcohol consumption. The results from the regression analysis are summarised in Table 10.

The additional percentage of variance explained by consumption for target responses to the each of the dependent variables, once the predictors - age, age started to consume alcohol, gender and form are regressed is shown in Figure 10 The difference in the percentage of variance explained prior to the investigation and post investigation is shown in Figure 11.

Table 10. The results for the stepwise hierarchical multiple regression analysis test which investigated the amount of variance explained by form, gender, age started to consume alcohol (ASD) and consumption for each of the dependent variables (with emphasis on the result for the negative filler outcomes as the target responses to the negative alcohol-related filler outcomes have been removed).

	P1	P3	N1	N3	PF	NF
Form						
% inc	3.7	5.2	1.59	0. 69	0.63	0.06
P value	0.057	0.024	0.216	0.419	0.435	0.818
Beta value	0.18	0.21	0.10	0.06	0.07	-0.04
Gender						
% inc	0.11	1.24	3.99	3.87	0.74	4.16
P value	0.742	0.264	0.05	0.052	0.400	0.045
Beta value	0.00	-0.05	-0.14	-0.13	-0.04	-0.15
Age						
% inc	0.96	5.9	**6.73**	3.01	0.00	1.96
P value	0.332	0.014	**0.008***	0.084	0.966	0.165
Beta value	-0.04	-0.13	**-0.14**	-0.06	0.04	-0.06
ASD						
% inc	0.32	0.00	0.22	0.00	0.03	0.86
P value	0.579	0.834	0.633	0.985	0.848	0.355
Beta value	0.07	-0.11	-0.03	0.01	0.03	-0.09
Consumption						
% inc	**7.94**	**17.87**	**15.14**	**15.98**	4.44	5.00
P value	**0.005***	**0.000***	**0.000***	**0.000***	0.04	0.024
Beta value	**0.30**	**0.45**	**0.42**	**0.42**	0.22	0.24
Total variance	13.04%	**30.23%**	**27.6**	**23.56%**	5.86%	12.03%
P value	0.023	**0.000***	**0.000***	**0.000***	0.343	0.035

Figure 10. Additional percentage of the variance explained by the predictor alcohol consumption.

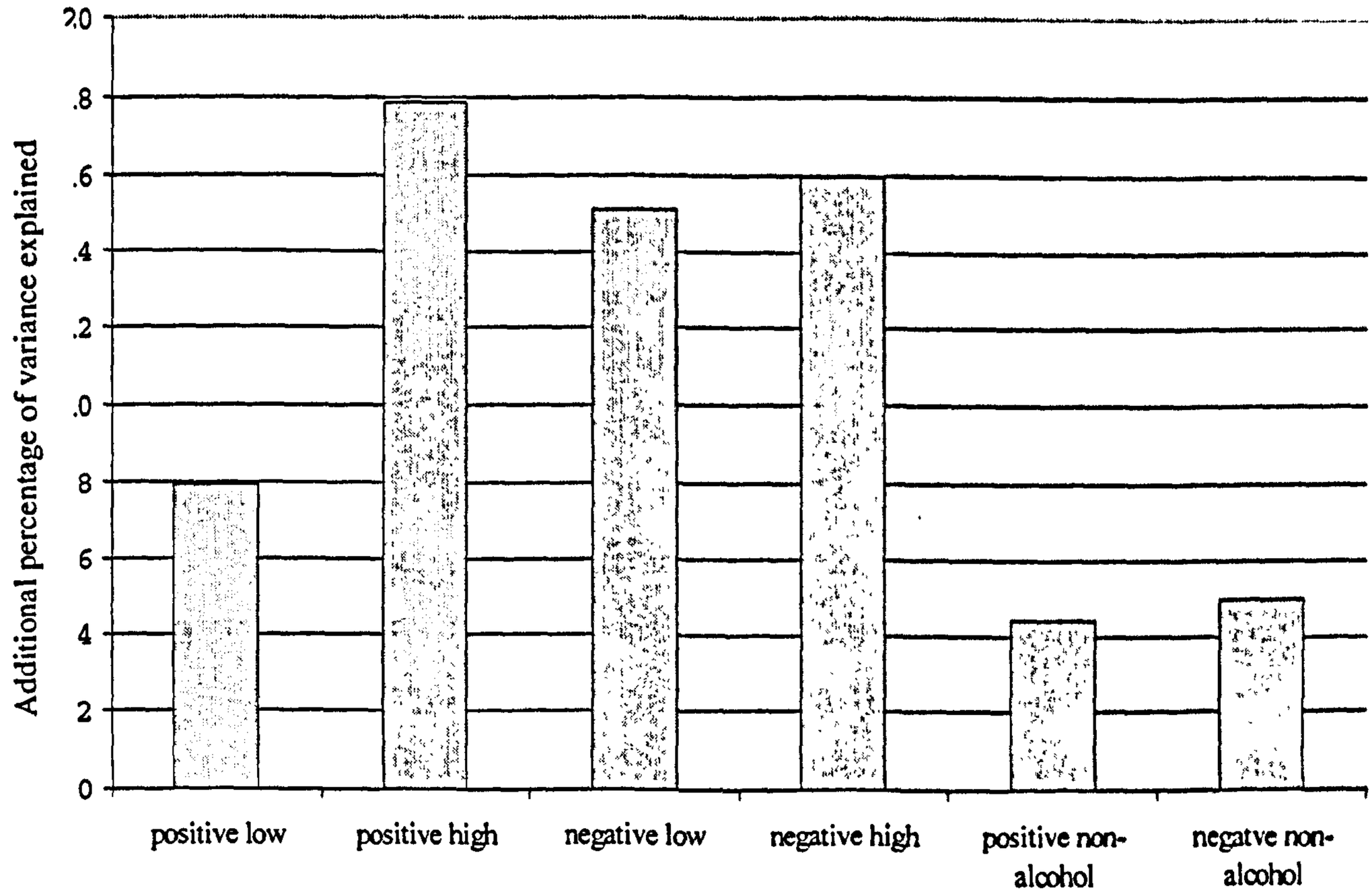
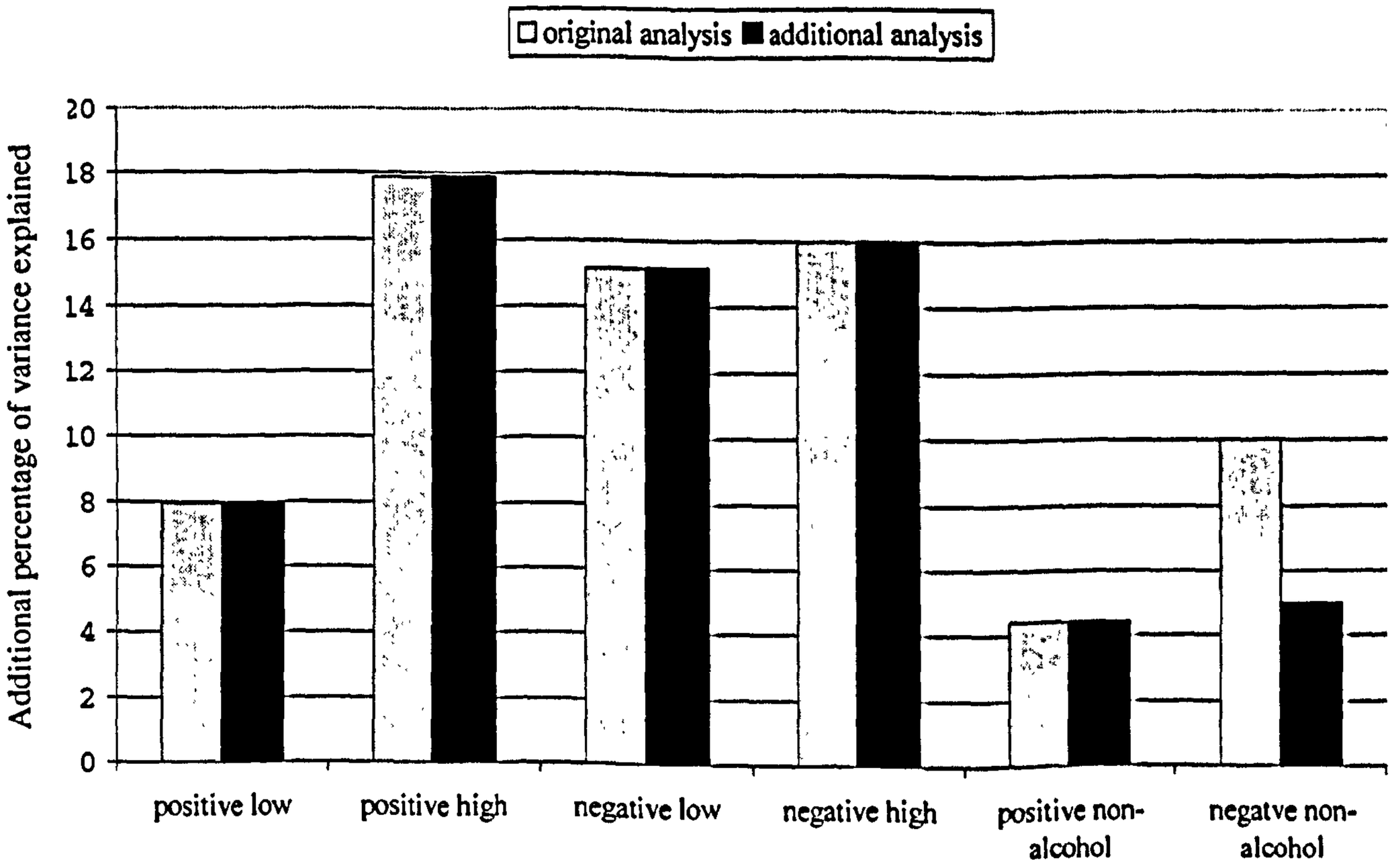


Figure 11. A comparison of the additional percentage of the variance explained before and after the identification of problematic negative non-alcohol-related behavioural outcomes.



6.15.4 Summary of Results

(i) Through a systematic procedure the unexpected positive significant association observed between alcohol consumption level and the negative non-alcohol-related behavioural outcomes was investigated.

(ii) Based on the information obtained from a three-part study a sub-group of the originally classified negative non-alcohol-related behavioural outcomes were now classed as additional negative alcohol-related outcomes as a result of information which indicated that a middle-aged to elderly age group were viewing these outcomes as being related to alcohol use.

(iii) Two separate stepwise hierarchical multiple regression analyses were conducted in order to examine the significant relationship between alcohol consumption and the negative non-alcohol-related behavioural outcomes. In the first analyses, a significant positive association was observed between alcohol consumption and target responses made in response to the newly classified negative alcohol-related outcomes. However, with reference to the remaining negative non-alcohol-related behavioural outcomes no significant association emerged.

(iv) In the second analysis, target responses made to the newly classified additional negative alcohol-related behavioural outcomes were removed from the analyses. Therefore only responses made to outcomes that the mature social drinkers viewed as **not** being related to alcohol use were included. The original significant effect that was observed (Study 3) disappears once target responses made to the non-alcohol-related behavioural outcomes that this older age group are viewing as being related to alcohol use are removed.

(v) The information obtained and derived from this study indicates that older individuals hold more negative associations of alcohol use than younger individuals. The results also indicate that the older age group view certain behavioural outcomes as being related to alcohol use that the younger age group view as being unrelated to alcohol use.

6.16 Discussion

Study 4 was designed to investigate the unexpected finding that emerged from Study 3; the significant positive association found between alcohol consumption and target responses given to the non-alcohol-related behavioural outcomes. The rationale for conducting the study related to the fact that the older age group had a significantly longer alcohol consumption history in comparison to the young social drinkers. It was assumed that a substantial alcohol consumption history would result in increased exposure to alcohol and related-outcomes of this behaviour, which could result in a larger array of outcomes of alcohol use being associated with this activity. This was purported in accordance with the Alcohol-Related Memory Association model of alcohol use which states that the more often a behaviour and an outcomes occur together the stronger they become associated in association memory. Hence it would appear that the mature social drinkers have had more opportunities to form associations between alcohol consumption and a greater variety of outcomes of alcohol use in comparison to the young social drinkers as:

(i) They have been consuming alcohol for a longer time period and have consequently experienced outcomes of alcohol use, which the younger social drinkers are yet to experience.

(ii) They have had more opportunities to form associations between alcohol use and outcomes of this behaviour.

The significant finding between alcohol consumption and target responses given to the negative and positive low-frequency behavioural outcomes initially provided support for this view as it showed that memory associations were formed between alcohol use and idiosyncratically available outcomes of this behaviour. In addition, this effect was not found for the young social drinkers in Study 2.

A systematic process was carried out to investigate if the mature social drinkers viewed the previously classified non-alcohol-related behavioural outcomes of alcohol use as being related to alcohol. The results from the study showed that

ten of the original thirty-three negative non-alcohol-related outcomes were indeed viewed as alcohol-related by this age group. To assess whether responses to these particular outcomes could explain the unexpected finding from Study 3 two new regression analysis were performed. The results from the additional analysis supported the hypothesis - a longer drinking history will result in a wider range of negative alcohol-related behavioural outcomes being learnt and associated with alcohol use.

To conclude the results from the present study aid in elucidating the unexpected association that was found between alcohol consumption and negative non-alcohol-related outcomes of alcohol use as it has been shown that mature social drinkers hold associations for a wider array of negative outcomes of alcohol use and alcohol use in comparison to younger social drinkers. This would appear to derive from the fact that the research sample have been consuming alcohol for a substantial time period and therefore have had more opportunities to experience a wider range of effects and more scope for forming strong associations between the effects and alcohol use.

Chapter 7 - Study 5 - An investigation into the effects of alcohol cues on alcohol memory associations.

Chapter Summary

The study presented in this chapter was designed to test whether alcohol memory associations could be activated by the presence of contextual alcohol cues. An additional goal of the study was to test this effect using an ecological approach. To test the effects of alcohol cues on alcohol memory associations, participants completed a condensed version of the MAQ in one of three contexts: neutral, prior to entering a pub and in a pub. The results indicated that negative not positive alcohol memory associations were primed by alcohol cues present in the pre-pub and pub contexts. The empirical findings are discussed with reference to the Alcohol-Related Association Memory model (e.g. Stacy et al., 1994) with emphasis on the role of positive and negative alcohol memory associations on decisions to consume alcohol.

7. Introduction

Earlier in this thesis (Chapter 3), a distinction was made between alcohol memory associations that are *available* from long term memory from those that are *accessible.* To recapitulate, *availability* was defined as the presence of information in memory storage, which is necessary but not sufficient for information to be remembered or used at a given moment. Whereas *accessibility* was defined as the extent to which information can be accessed from memory and is necessary in order for prior experiences to influence present situations. In Study 2 a significant relationship between alcohol use and accessibility of alcohol memory associations was found for young social drinkers. For mature social drinkers, the length of alcohol experience was also significantly related with accessibility of alcohol memory (Study 3). Hence, the empirical findings thus far demonstrate that the strength of alcohol memory associations is dependent on alcohol consumption experience.

Of interest in the present study was whether other aspects related with alcohol use play a role in activating the link between alcohol use and related outcomes, namely exteroceptive (e.g. pubs) and interoceptive (e.g. the taste of alcohol) cues that are associated with alcohol use activities. The rationale for this research derives from alcohol cue-reactivity research, specifically work conducted with non-dependent alcohol consumers. Prior to describing the experimental paradigm used in the present study, a summary of the core assumptions of the cue-reactivity phenomenon will be presented. Cue-reactivity research, which is relevant to the present research question, will then be reviewed.

7.1 Information on the alcohol cue-reactivity effect.

During the history of drug use, certain stimuli such as environmental contexts and cues become intricately associated with the alcohol use. A core assumption of cue-reactivity theory is that stimuli previously associated with drug taking will elicit distinctive patterns of responses because of the drug

users history or experiences with those stimuli (Glautier and Tiffany, 1995). This association occurs, as during alcohol use, certain stimuli (e.g. the smell of alcohol) become intricately associated with this behaviour. The level of association appears to be dependent on the amount of exposure and experience that an individual has had with alcohol use. Indeed, dependent individuals experience more cue-reactivity when presented with alcohol cues in comparison to non-dependent alcohol consumers (e.g. Streeter, Gulliver, Baker, et al., 2002).

To explain how the presentation of an object or cue, can elicit an alcohol response researchers turn to the original Classical Conditioning model. In terms of alcohol use, associated cues (for example, the smell of a pub) come to be associated with the act of drinking alcohol due to the repeated pairing of the UCS (the smell) and the UCR (consuming alcohol). Due to repeated experience with alcohol use coupled with exposure to the smell of alcohol, the smell of alcohol on its own can come to activate thoughts of alcohol use as this then acts as a prime. However, Drummond, Tiffany and Glautier (1995), assert that "one does not need to buy into classical conditioning theory or indeed any other specific theory to study cue exposure" (Ch. 1, p. 2). They claim that cue exposure is more useful when viewed as a procedure for examining the nature of addiction.

The strong association between alcohol cues and the act of drinking enables alcohol cues to elicit an anticipatory response before alcohol consumption is initiated. When a cue is presented, the response made is dependent on the previous experiences that an individual has had with the cue. A cue that has been repeatedly paired with alcohol can be viewed as a conditioned stimulus, as when an individual is exposed to the cue alcohol this can produce a conditioned response. The more often alcohol use and a cue are paired together the greater the likelihood of occurrence and strength of conditioned responses. It is this aspect of alcohol cue-reactivity, which shares similar properties with the formation of alcohol memory associations. In both these theories, level or amount of alcohol experience is intricately related to the strength of the relationship.

In line with this view, it is possible to establish a link between cue-reactivity models and alcohol memory associations, as there is a linear relationship between the amount an individual consumes and the level of effect (e.g. measured in terms of desire to consume alcohol). Conditioning models of cue-reactivity hypothesise that the response magnitude will be greatest in those whose alcohol use histories involve greater quantity and frequency of consumption. In alcohol memory association theories it is postulated that repeated alcohol experience strengthens the association between alcohol use and the related behavioural outcome that is experienced as a result of drinking. Cue exposure can result in autonomic (e.g. physiological effects such as increased pulse) and symbolic expressive behaviour and cognitive reactivity (e.g. reported craving or urges to take drugs, drug-related expectancies, self-efficacy beliefs and information processing measures). As it is the latter that is of interest in the present chapter, research that has investigated the effects of alcohol cues on subjective responses and automatic cognitive processes will now be discussed.

7.2 Relevant research

Evidence of cue-reactivity on automatic cognitive processes has been demonstrated using implicit approaches such as, semantic priming (e.g. Weingardt, Stacy and Leigh, 1996) and word association paradigms (Cox, Yeates and Regan, 1999) and attentional bias paradigms (Glautier and Spencer, 1999). A recent study conducted by Glautier and Spencer (1999) found an effect of alcohol cue-reactivity on a cognitive based tasks for both heavy and light social drinkers. In this study participants were asked to generate sentences for a list of words which were classed as being ambiguously alcohol-related (e.g. shot) or non alcohol-related (chair). The participants were placed into one of three groups: alcohol cue-prime, non-alcohol prime and no prime. Prior to completing the sentence generation task the participants in the alcohol cue prime condition were asked to sample the alcoholic and non-alcoholic beer to determine which one was the alcoholic drink In the non-alcohol prime group, participants were asked to proof read a prose passage for spelling mistakes. In the final condition- 'no prime' participants carried out sentence

generation task after completing a consent form for taking part in the experiment.

It was postulated that participants in the alcohol prime group would produce more alcohol-related sentences due to the activation of alcohol-related concepts resulting from the presentation of the explicit alcohol cues. The hypothesis was supported as participants in the alcohol prime condition produced more alcohol-related sentences than the other two groups. An effect of alcohol prime was found for light, moderate and heavy social drinkers, however the heavy alcohol consumers did generate significantly more alcohol-related sentences. The researchers stated that the results were due to the alcohol cues in the form of visual, olfactory and gustatory stimulation arising from tasting the alcoholic and non-alcoholic beers. It would appear that this type of explicit cueing increases the likelihood of alcohol cognitions being activated to ambiguous alcohol-related words, regardless of previous alcohol experience.

When presented with explicit alcohol cues in the form of an alcoholic beverage, social drinkers, regardless of level of alcohol experience exhibited cue-reactivity (Glautier and Spencer, 1999). Indeed, previous research has found that the most potent alcohol cues are the palatable and odorous properties of an actual alcoholic beverage (Newin, Hotchkiss, Cox and Rauscher, 1989). Whereas when alcohol cues are not explicit it would appear that activation between alcohol use and related concepts is dependent upon prior alcohol experience.

A study conducted by Cox et al. (1999) measured the impact of alcohol cues on social drinker's reaction times for words presented during a Stroop task. Participants in the alcohol cue condition completed the Stroop task in room which 20 posters depicting images associated with alcohol use on the walls. In the neutral, condition the posters contained images of guitars. The heavy social drinkers in the alcohol cue condition responded significantly slower to alcohol-related words when compared with light social drinkers. The results from this study show that alcohol-cue reactivity may be dependent on previous alcohol experience as only heavy drinkers in the alcohol cue condition

exhibited cue-reactivity. An alternative explanation for the low level of cue-reactivity evident amongst light social drinkers is that the alcohol-cue that was used was not attended to by this type of alcohol consumer.

Although these experiments demonstrate that cue-reactivity may be dependent upon the type of alcohol cue used and the participant's prior alcohol experience, the results do not show the effect that the activation of alcohol cognitions has on decision making processes. Studies, which test the effect of alcohol cues on motivation to consume alcohol, measure participant's desire to consume alcohol. It is consistently shown that non-dependent drinkers exhibit urges to consume alcohol when presented with alcohol-related cues (e.g. Greely, Swift, Prescott and Heather, 1993; Schulze and Jones, 2000; Streeter et al., 2002). This pattern of results has been found using a range of cue-reactivity measures (e.g. subjective and behavioural) and with the presentation of a range of alcohol cues (e.g. alcoholic beverages and alcohol images via videotapes).

Recently, Jones and Schulze (1999) conducted a lab-based experiment to investigate the effects of alcohol cues and concealed one-unit alcohol dose on desire to consume alcohol. By separately presenting interceptive and exteroceptive cues, they were able to measure the extent to which pharmacological properties of alcohol and alcohol cues contribute to motivation to consume alcohol. In this experiment, there was a prime phase and a cue phase. In the prime phase, one group received an alcohol prime in the form of an alcoholic beverage and the other group received a non-alcoholic beverage. During the prime phase, individuals consumed the drink while completing a drink diary and demographic information questionnaire. In the cue-exposure phase participants were asked to respond to questions regarding an alcoholic beverage (drink cue) or a canned soft drink (neutral cue). In particular the participants were asked to respond to questions designed to draw attention to taste cues. To measure the effect of an alcohol prime and alcohol cue on motivation to consume alcohol, subjective responses for desire to consume alcohol were measured using a multi-dimensional Desire for Alcohol Questionnaire (DAQ, Love, James and Willner, 1998).

The results showed that there was no effect of prime (alcohol beverage or non-alcohol beverage) on participants desire to consume alcohol. However, a significant effect of cue-exposure was found as participants who were in the alcohol-cue condition, showed a higher level of desire to consume alcohol. These results were replicated in a follow up study (Schulze and Jones, 2000). In this study an alcohol expectancy measure was included in order to assess the extent to which alcohol expectancies are alcohol cue reactive. Although alcohol expectancies, with particular emphasis on positive outcome expectancies are known to be related to alcohol consumption level (e.g. Goldman et al., 1999) the researchers concluded that there was no significant effect of alcohol prime or alcohol cueing on participant's responses to the items contained in the positive and negative expectancy questionnaires.

The results from this study showed that a single dose of alcohol does not appear to impact on desire to consume alcohol for social drinkers. However, explicit alcohol cues were found to increase participant's desires to consume alcohol. In the alcohol cue-reactivity condition, sensory properties associated with the consumption of alcohol were activated as participants were asked to open and pour the drink, hold it up, look at it, smell and taste it. Hence, key elements that are associated with the alcohol consumption were reproduced.

7.3 The importance of context in alcohol cue-reactivity research

The aforementioned studies demonstrate that social drinker's experience a level of alcohol cue-reactivity in the presence of explicit alcohol cues, for desire to consume alcohol (e.g. Jones and Schulze, 1999) and for activation of alcohol-related concepts (e.g. Glautier and Spencer, 1999). However, in these experiments, participants were asked to respond to alcohol cues in contexts, which are not normally associated with alcohol consumption. Although significant results were found using lab-based contexts, one must question if a bigger effect would be observed in cue-reactivity studies, which are conducted in an environment associated with alcohol consumption. In addition, one must consider whether the use of alcohol cues, which are typically associated with

pub environments, would increase the effect size observed in cue-reactivity research.

A recent meta-analysis of cue-reactivity research (McKay and Schare, 1999) concluded that experimental setting (e.g. lab or stimulated pub) was an important factor in alcohol cue-reactivity exhibited by dependent alcohol consumers. Experiments, which simulated natural pub environments, were found to have the greatest effect size. It was stated that in simulated pub settings the participants were likely to experience less tension and experimental reactivity than in experiments conducted in lab settings as this type of setting allowed for the greatest responsivity to alcohol cues as other experimental distracters were largely eradicated.

The importance of experimental context in alcohol cue-reactivity research has recently been addressed by Wall, and colleagues. To introduce an element of ecological validity the experimenters conducted two experiments in a campus bar. In the first experiment (Wall, McKee and Hinson, 2000) whether positive and negative alcohol expectancies would be more pronounced in a natural alcohol context was assessed using the Effects of Alcohol Scale (EAS, Southwick, Steele, Marlatt and Lindell, 1981). This measure of alcohol outcome expectancies contains 37 bipolar adjective pairs (representing positive and negative effects of alcohol use) divided into the following three subscales: stimulation/perceived dominance (e.g. loud/quiet), pleasurable disinhibition (e.g. outgoing- reserved) and behavioural impairment (e.g. clumsy/co-ordinated). When completing the EAS the participants were instructed to respond to the expectancy items on the basis that they had consumed alcohol. As the experiment was a between subjects design, half the participants completing the EAS in a lab context and the other half completed the questionnaire in a campus pub.

The results showed that participants in the pub environment endorsed a significantly greater number of alcohol expectancies for the stimulation/perceived dominance and the pleasurable/disinhibition scales in comparison to participants in the lab condition. The findings indicate that

positive alcohol outcome expectancies are more pronounced in the presence of alcohol cues present in pubs. The participants who were exposed to the on campus bar expected more pleasurable disinhibition and perceived dominance compared to participants tested in the lab. These results are in accordance with the Encoding Specificity theory which states that information is more readily retrieved from memory when individuals are exposed to cues that were present at time of encoding (Tulving, 1983). A follow up study (Wall, McKee, Hinson and Goldstein, 2001) which used a within subjects design replicated these findings.

Although, the experiments can be viewed as ecologically valid as alcohol cue-reactivity was assessed in a pub setting, there are methodological issues related to the recruitment process, which may detract from this core element of the experimental design. To recruit suitable participants a poster was placed around the university campus. Information on the poster stated that individuals would be required to complete a questionnaire that assessed drinking practices and beliefs about alcohol. Although the participants were not aware that they would be completing the questionnaire in a campus pub, they were aware that they would be completing a questionnaire about alcohol use. To a certain extent, the explicit recruitment procedure could be viewed as priming participants.

An additional problem involves the fact that the participants were in pub to take part in a study. As participants were not in the pub to consume alcohol it is likely that they did not attend to the alcohol cues in the same way that they would during a normal 'night out'. Consequently it is possible that the alcohol cues did not influence motivational processes in the same way that they would when participants are in a pub to consume alcohol. In addition it was not assessed if participants in the study had ever consumed alcohol in the testing location. Although there are alcohol cues, which are standard in all pubs (e.g. the smell of alcohol), the fact that some individuals may not have associated the particular test site with prior alcohol consumption may have influenced the results.

The procedure and assessment instruments that were used can also be viewed as problematic. When completing the EAS the participants were asked to imagine that they had consumed a certain amount of alcohol prior to completing the expectancy questionnaire. As participants did not actually consume alcohol, it is difficult to assess if the participants were responding to questionnaire items in the same way that they would if they had consumed alcohol. Also, as normal pub activities, were not taking place during the testing session, it is possible that participants were not attending to the alcohol cues present in the surroundings as they were not in the pub to consume alcohol.

An additional problem involved the fact that the written instructions and the content of the expectancy items contained explicit references to alcohol use. Hence, the explicit alcohol content of the questionnaire may have interacted with the alcohol cues present in the pub setting. Therefore it is not possible to assess if the alcohol cue-reactivity observed was due to the alcohol cues in the pub, the questionnaire that was used or a combination of the assessment tool and the experimental context.

7.4 The rationale for Study 5

Although the Wall et al. studies assess the effects of alcohol cues on alcohol outcome expectancies in a natural pub environment the methodological problems associated with the experimental procedure may diminish the ecological validity of the experiments. When conducting an ecologically valid experiment, aspects in addition to the context must be taken into consideration, namely the recruitment process and the assessment tools that are used. The present study was designed to address these issues.

In previous studies (Study 2 and 3), the Memory Association Questionnaire (MAQ) was used to assess the strength of association between alcohol-related behavioural outcomes and alcohol use. For the purposes of the present study, the MAQ will be used to assess the effects of alcohol cues on memory associations for alcohol use and related outcomes. In this questionnaire there

are no explicit references to alcohol use. Therefore participants can not be primed by the content of the questionnaire.

One criticism of the Wall et al. studies involved the fact that participants were recruited to take part in an alcohol study. To recruit participants in the present study individuals will be approached in neutral contexts, prior to entering a pub and in a pub. By approaching participants prior to entering a pub and in the pub an additional element of ecological validity is introduced as individuals were planning on having an alcoholic beverage.

The studies presented in the thesis have shown that alcohol memory associations are more accessible for participants who have a substantial alcohol consumption history or who can be viewed as heavy social drinkers. In the present study, the effect of prior alcohol consumption experience will not be assessed, as the effect that certain contexts have on the accessibility of alcohol cues is of primary interest.

Research that investigates whether alcohol cues can implicitly activate alcohol concepts in memory is useful as it aids in explaining what influences behavioural decisions regarding alcohol use. Hence, the findings from the present experiment will be considered in relation to the theoretical assumptions that derive from the Alcohol-Related Association Memory Model of Alcohol Use. In particular, the results will be discussed in relation to the existing research findings.

To conclude, the central research hypothesis in the present study is that participants in the pub context will exhibit higher levels of alcohol-cue reactivity due to the magnitude of alcohol cues associated with this context. In addition, it is hypothesised that the participants in the pre-pub condition will make more alcohol-related responses compared to the neutral group, as they will have encountered alcohol-related cues prior to entering the pub.

An additional hypothesis involves the type of alcohol-related behavioural outcomes that are represented in the MAQ. It is postulated that more target

responses will be made to the positive alcohol-related behavioural outcomes in comparison to the negative alcohol-related behavioural outcomes in both the pre-pub and pub context. The rationale for this prediction relates to the fact that the immediate affects of alcohol consumption, which are related to the start of a drinking session, are positive whereas the delayed effects are negative (Carter, McNair, Corbin and Black, 1998).

7.5 Methodology

7.5.1 Participant Recruitment

A key aspect that applied to each of the three experimental conditions was the covert assessment measure that was used to assess the participant's alcohol memory associations. In this study the implicit assessment tool, the MAQ was used. Consequently, during the recruitment and initial testing phase it was crucial that participants remained unaware of the main purpose of the experiment. As some of the participant recruitment took place outside and inside campus pubs it was possible that individuals would assume that the study was concerned with alcohol use.

To minimise this possibility the following scripted dialogue was created and given to all potential participants:

> *"I am interested in how different groups of people describe things. I am particularly interested in comparing descriptions given by individuals whose first language is English with individuals for who English is their second language. Today I am looking for people who are Native English speakers. The reason that I am recruiting participant's here [pub, outside a pub or neutral context] is because of the age and type of person whose responses I am interested in looking at. If you want to take part, you will have to fill in three questionnaires. On average, this takes about 30 minutes to complete. All your responses are anonymous. For your time you will be paid £5.00".*

By leading participants to believe that they were engaging in a study, which examined the use of descriptive words, attention was drawn away from the fact that participants were being recruited in and around campus pubs. Participant recruitment specific to each condition will now be discussed.

The neutral condition

How individuals in an alcohol free context responded to the behavioural outcome items in the MAQ was of interest in this condition. Therefore, individuals were approached in food canteens around the University of Glasgow campus in which alcohol-related activities did not take place. If participants indicated that they were interested in taking part in the study, they were given the standardised story.

The pre-pub condition

In this condition, the way in which participants, who were planning on going for an alcoholic beverage, responded to the association questionnaire was of interest. Therefore, pubs around the University of Glasgow campus were targeted in this condition. Prior to entering a pub individuals were approached by the researcher and asked if they were going into the pub for a drink. If they said that they were they were then given the standardised story. If they agreed to take part in the study, they were taken to a room beside the campus bar that was free from alcohol paraphernalia.

The alcohol-cue condition

In this condition, under investigation were the effects of completing the MAQ in a natural alcohol context. Therefore, pubs around Glasgow University campus were targeted in this condition. To ensure that potential participants were not heavily under the influence of alcohol, individuals were approached at the bar while ordering their first alcoholic beverage. As in the aforementioned conditions, if potential participants showed that they were interested in taking part in the study, the experimenter gave them the standardised cover story.

7.5.2 Participants Information

The following pre-requisites applied for participant suitability for the present study:

(i) Participants must be of legal drinking age

(ii) Participants must be students.

(iii) English is their first language.

(iv) Participants must have consumed (on self-estimated average) at least one alcoholic drink per week in the last six months.

As participants could not be informed that the study was concerned with alcohol use, until they had completed the MAQ, points (i) and (iv) were assessed once participants had completed the three questionnaires. Participants who did not fulfil this criterion were removed from the analysis. Two participants did not satisfy the above criterion.

Once the participants who did not fulfil the participant recruitment criteria were removed, the research sample consisted of 150 participants who were undergraduate university students. All of the volunteers were young social drinkers. Information concerning age, gender and alcohol consumption are presented in Table 1. Participant information is provided for the sample as a whole for each of the experimental conditions and for the male and female participants in each sample.

Table 1. Participants Information.

	Neutral Participants			Pre-Pub Participants			Pub Participants		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Median age	22	23	22	20.5	21	21	22	21	21.5
Age range	17-33	17-33	17-33	18-29	17-27	17-29	18-33	18-24	18-33
Total	27	23	50	34	16	50	30	20	50

7.5.3 Materials

Each participant completed the following three questionnaires; a condensed version of The Memory Association Questionnaire (Appendix G) (now referred to as the CMAQ), the Demographic Information Questionnaire (DIQ) and the Time-Line-Follow-Back Drinking Diary (TLFB, Sobell and Sobell, 1992). For information regarding the DIQ and TLFB, refer to Chapter 4 p. 68-

69. For a copy of the DIQ and TLFB refer to Appendix C and D. In addition to describing the CMAQ, reasons for adapting the original questionnaire will now be discussed.

7.5.3.1 The Condensed Memory Association Questionnaire (CMAQ).

On average, the 132-item MAQ took forty-five minutes to complete. As individuals in the pre-pub and pub conditions, in the present study, were approached whilst they were socialising, the original form of the questionnaire was deemed inappropriate due to the number or items included and the amount of time it took to complete the full questionnaire. With particular reference to the alcohol-cue condition, it was felt that the quality and number of the responses might be jeopardised due to the lengthy completion time. Therefore, the number of behavioural items in the questionnaire was reduced.

Originally, the moderate-frequency alcohol-related behavioural outcome categories were included in the MAQ, as a means of ensuring that the low and high behavioural outcome categories were distinct and not overlapping in terms of frequency. Consequently, the target responses given to these types of outcomes were not included in the planned analysis. In order to condense the MAQ the 22 moderate frequency alcohol-related behavioural outcomes were removed.

To maintain the original balance of alcohol-related and non-alcohol-related behavioural outcomes it was necessary to remove an equal number of non alcohol-related behavioural outcomes. Hence, a total number of 22 (11 positive and 11 negative) non-alcohol-related behavioural outcomes were removed. In Study 4, eleven of the negative non-alcohol-related behavioural outcomes were identified as being related to alcohol use by mature alcohol consumers. Consequently, this sub-group of behavioural outcomes were selected for removal. The remaining behavioural outcomes (11 positive) were randomly selected for removal from the MAQ.

The CMAQ consisted of 19-pages: an instruction page and 18 pages containing five behavioural outcome phrases. The adapted questionnaire contained 44

alcohol-related behavioural outcomes, 22 of which were negative outcomes and 22 were positive outcomes. There were 11 high-frequency and low-frequency alcohol-related behavioural outcomes for both positive and negative alcohol-related behavioural outcomes. In addition, the questionnaire included 44 non-alcohol-related behavioural outcomes, of which 22 depicted negative outcomes and 22 described positive outcomes of behaviours not related to alcohol use.

Refer to Appendix G for a copy of the CMAQ.

7.5.4 Design

The main objective in the present study was to investigate whether memory associations between alcohol use and related behavioural outcomes would become activated by alcohol cues present in pubs. Specifically, of interest was whether alcohol cues would make associations between alcohol use and related behavioural outcomes more accessible. To investigate these issues three independent groups of participants completed the CMAQ in three different contexts. Each context differed with regards to the type and number of alcohol cues that the participants encountered prior to or during the completion of the CMAQ. In the neutral condition no alcohol-cues were present, in the pre-pub condition participants encountered the alcohol-cues visible from the outside of the pub and in the alcohol-cue condition participants encountered both interoceptive and exteroceptive alcohol cues associated with the inside of a pub and with alcoholic beverages. Alcohol cue-reactivity was measured by comparing the number of alcohol-related responses given to each type of behavioural outcome in the CMAQ dependent on the experimental context.

The experiment was a between-subjects design with one-factor (three levels relating to the experimental context: neutral, pre-pub and alcohol cue conditions). In total 150 participants took part in this experiment with 50 participants in each group. All participants were viewed as young social drinkers.

To test for equivalency between the three experimental groups, statistical comparisons were made for the following demographic and alcohol-related variables: age, alcohol consumption and alcohol consumption history. Information for these comparisons was obtained through the administration of the DIQ and the TLFB.

7.6 Procedure

Participant recruitment and subsequent completion of the three questionnaires took place between the hours of 4:00 and 8:00 PM in each experimental context. In each condition, participants were instructed to complete the three questionnaires independently as individual not group responses were of interest. The experimenter remained present throughout the testing process to ensure that participants were not conversing with one another. The participants were continuously reminded (written instructions and by the experimenter) that all questionnaire responses were anonymous. To ensure that completed questionnaires could be matched, participants were asked to put their date of birth at the top of each questionnaire. Once the participants had completed and returned the three questionnaires the experimenter debriefed participants regarding the true nature of the study and answered any questions.

With reference to the three experimental conditions, measures were taken to ensure that participants were not made aware of the true nature of the experiment while completing the MAQ. To minimise any methodological threats, regarding the covert nature of the CMAQ, a scripted story was given to all potential participants. In addition, the recruitment process lasted for a maximum of four hours in each setting to reduce the possibility of the true nature of the study being revealed through word of mouth.

Procedural elements specific to each condition will now be discussed.

<u>The neutral condition</u>

In this condition, participants were approached in a university food canteen. Alcohol was not for sale in this establishment, nor could it be consumed on the premises. Potential participants were approached and asked if they would like

to take part in an experiment. If the individual showed interest in taking part, they were given the standardised cover story. All of the participants were asked to complete the CMAQ where they were sitting. After the MAQ was completed the final two questionnaires (DIQ and the TLFB) were then completed. On average, the testing process took 30 minutes to complete.

The pre-pub condition

There were two prerequisites for participant suitability in this condition; participants had to be going into the pub to consume alcohol and they could not have consumed any alcohol prior to entering the pub. Therefore individuals were approached outside pubs (around the University Campus) and were subtly asked if they were entering the pub to consume an alcoholic beverage and whether they had consumed alcohol that day. If the participant met the aforementioned criteria, they were given the stooge-cover story. Once an individual had agreed to take part, they were taken to a testing room beside the pub. To get to this room they did not enter the pub. The testing room contained a series of tables and chairs and was free from alcohol paraphernalia.

When the participants had entered the testing room, they were given the CMAQ to complete. They were instructed to respond to each behavioural outcome item in the questionnaire as quickly as possible. Once they had completed and returned the CMAQ to the experimenter they were then give the DIQ and the TLFB. On average, participants completed the three questionnaires in 30 minutes. The participants in this condition encountered alcohol-related cues associated with the outside of the pub.

The alcohol-cue condition

Potential participants were approached once they had entered the pub and were waiting at the bar to be served. If participants agreed to take part they were given the CMAQ and asked to complete it where they were sitting. If they where sitting with other individuals who were also completing the questionnaire they were asked not to confer on responses. The experimenter subtly watched each participant to ensure that people were not discussing

responses. They were also instructed to respond to questions as quickly as possible as of particular interest was the very first and second responses that comes to mind. After the CMAQ was completed, participants were then asked to complete the DIQ and TLFB. As before, on average participants took 30 minutes to complete the three questionnaires.

In the alcohol-cue condition, participants encountered a variety of interceptive and exteroceptive alcohol cues. Prior to entering the pub, they encountered the outside of the pub. Once in the pub they encountered the sight, smell and taste of alcohol in addition to pub music and the jovial, social atmosphere associated with this context.

7.7 Results

7.7.1 Strategy of analysis

Primary analysis

A between subjects analysis of variance was conducted with the experimental condition (3 - levels: neutral, pre-pub and alcohol-cue) as the independent variable and the number of target responses (explicit alcohol-related responses) given to each type of behaviour outcome item in the CMAQ (positive low and high-frequency alcohol-related behavioural outcomes, negative low and high alcohol-related behavioural outcomes and positive and negative non alcohol-related behavioural outcomes) as the dependent variables. Therefore, six independent one-way analysis of variance tests were carried out to determine if the context in which the CMAQ was completed effected the type of response given to each type MAQ behavioural outcome item.

Previous studies in this thesis have shown that there is a positive linear relationship between alcohol consumption for the number of target responses given to the behavioural items in the MAQ (Study 2 and 3). This finding indicates that individuals who have more experience with alcohol use hold stronger memory associations between alcohol use and alcohol-related behavioural outcomes. As it has been shown that alcohol consumption is positively associated with strength of alcohol memory association, it is necessary to control for the effects of this variable by including it in the

analysis as a covariate. By covarying for a variable " a regression analysis is performed within each cell to partition out the variance component due to covariate " (Statsoft, 2001). Therefore, the effect of alcohol consumption on the type of responses that are made to the CMAQ is removed, thereby enabling the effect of context to be measured.

Incorporating, a covariate in an analysis is only appropriate when the following conditions prevail:

(i) There is more than one extraneous source of variation believed to effect the dependent variable. Evidence in support of this prerequisite derives from the empirical findings from Study 2 and 3.

(ii) The functional form of the relationship between the dependent variable and the extraneous variable(s) is known (a linear relationship is usually assumed). This criterion is assessed by examining the covariate regression results (Wildt and Ahtola, 1985, p.15).

(iii) All of the regression equation slopes across the cells of the design are the same. This is assessed by performing the parallelism of regression-lines test for each of the dependent variables and the covariate alcohol consumption. (Statsoft, 2001).

Therefore, prior to carrying out the proposed statistical tests the data will be examined to ensure that the aforementioned assumptions are satisfied.

Supplementary analysis

To test whether more positive or negative alcohol-related behavioural outcomes were viewed as being related to alcohol use in each of the three contexts, dependent t-tests were carried out. In each context, comparisons were made between the number of target responses generated for the positive and negative low-frequency alcohol-related behavioural outcomes and the positive and negative high-frequency alcohol-related behavioural outcomes.

A series of between-subjects one-way analysis of variance tests were carried out to establish equivalency between the three experimental groups with

reference to age, alcohol consumption history and alcohol consumption. In each test, the independent variable was the experimental context. When the data did not fulfil the guidelines for use of a parametric test the non-parametric equivalent, the Kruskal Wallis test, was conducted.

7.7.2 Participants information

The data was analysed using the statistical program Statistica 4.1 for Macintosh. The α level for all tests was set at 0.05.

As the data for the participant's age was not normally distributed, the non-parametric Kruskal Wallis test was used. No significant between group differences were found with reference to age of participants as $\underline{H}$ (2,N=150) =3.078, $\underline{p}$ = .215 (Figure 1). Participant's alcohol consumption history was established by subtracting the age that participants began to consume alcohol on a regular basis with their current age. As this data was not normally distributed the Kruskal Wallis test was also used. No significant between group differences were found as $\underline{H}$ (2,N=150) = 2.416, $\underline{p}$ =.299 (Figure 2).

The participant's alcohol consumption was measured using the TLFB. The amount of alcohol consumed on the heaviest drinking day of the previous week was used as a measure of alcohol consumption. For information regarding the process used to obtain this measure and for the rationale for adopting this type of consumption measure refer to Ch. 4, p. 72, 73-74). A one-way analysis of variance was used to test for significant between group differences with regards to alcohol consumption. A significant difference was found as $\underline{F}$ (2,147) = 0.38, $\underline{p}$ = .000.

A post hoc Scheffe test showed that there were significant differences between the participants in the neutral and the alcohol-cue condition; the alcohol-cue and the pre-pub condition. The mean alcohol consumption level shows that the neutral group are consuming the least alcohol ($\underline{M}$ = 8.40, SE = .93), the pre-pub group are consuming the second least amount of alcohol ($\underline{M}$ = 13.77, SE = 1.00) and the pub group are consuming the most alcohol ($\underline{M}$ = 15.36, SE = 1.29) (Figure 3).

Descriptive information for these tests is summarised in Table 2.

Table 2. Descriptive information (mean and standard error) for the participant's age, alcohol consumption history and alcohol consumption levels.

	Experimental Condition		
	Neutral	**Pre-Pub**	**Pub**
Median Age	22.5	21	21.5
Median Alcohol History	5	4	5
Mean Alcohol Consumption	8.4(S.E. 0.93)	11.38(S.E. 1.00)	15.36(S.E. 1.29)

Figure 1. The participant's median age by condition.

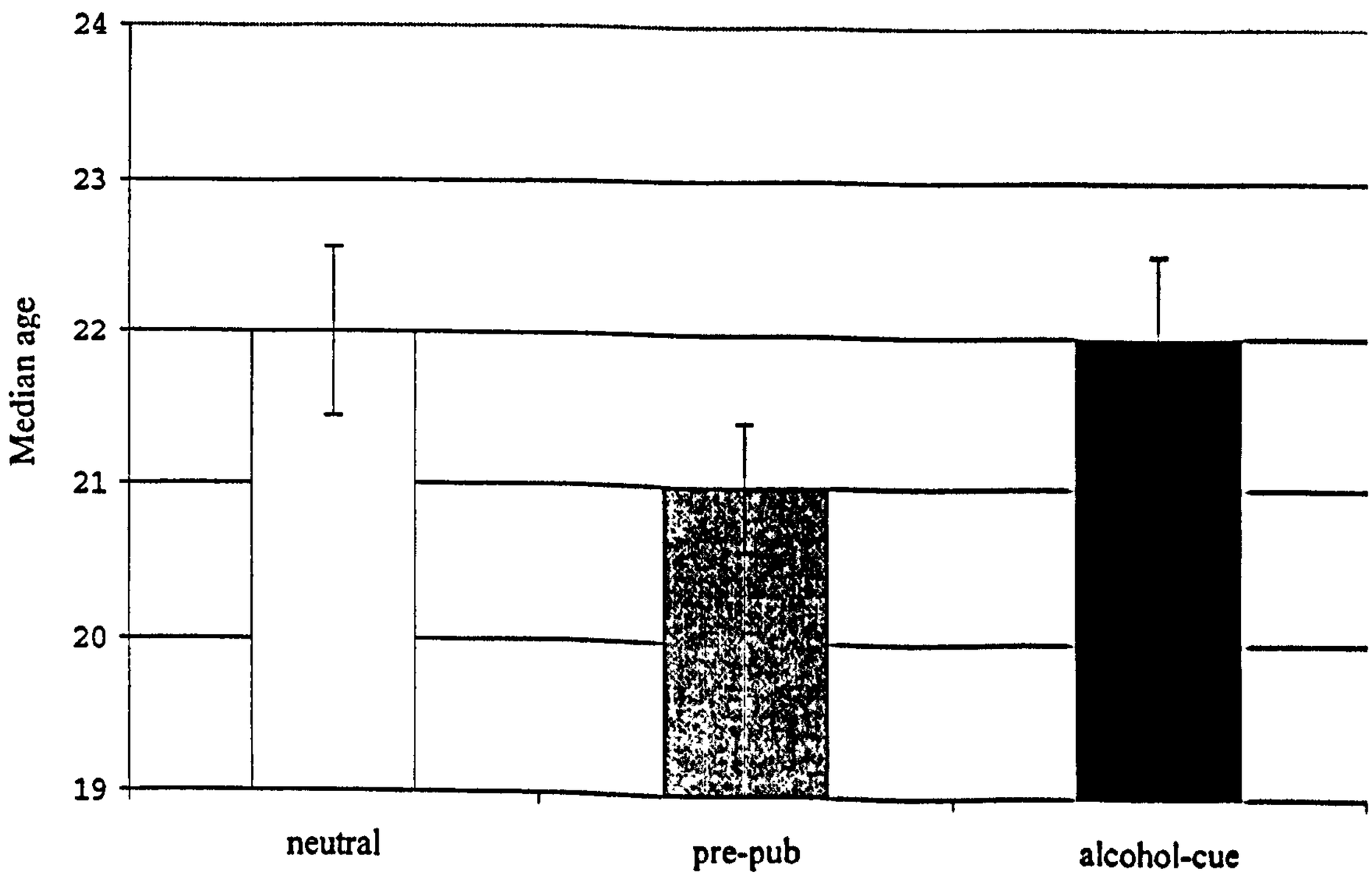


Figure 2. The participants' alcohol consumption history.

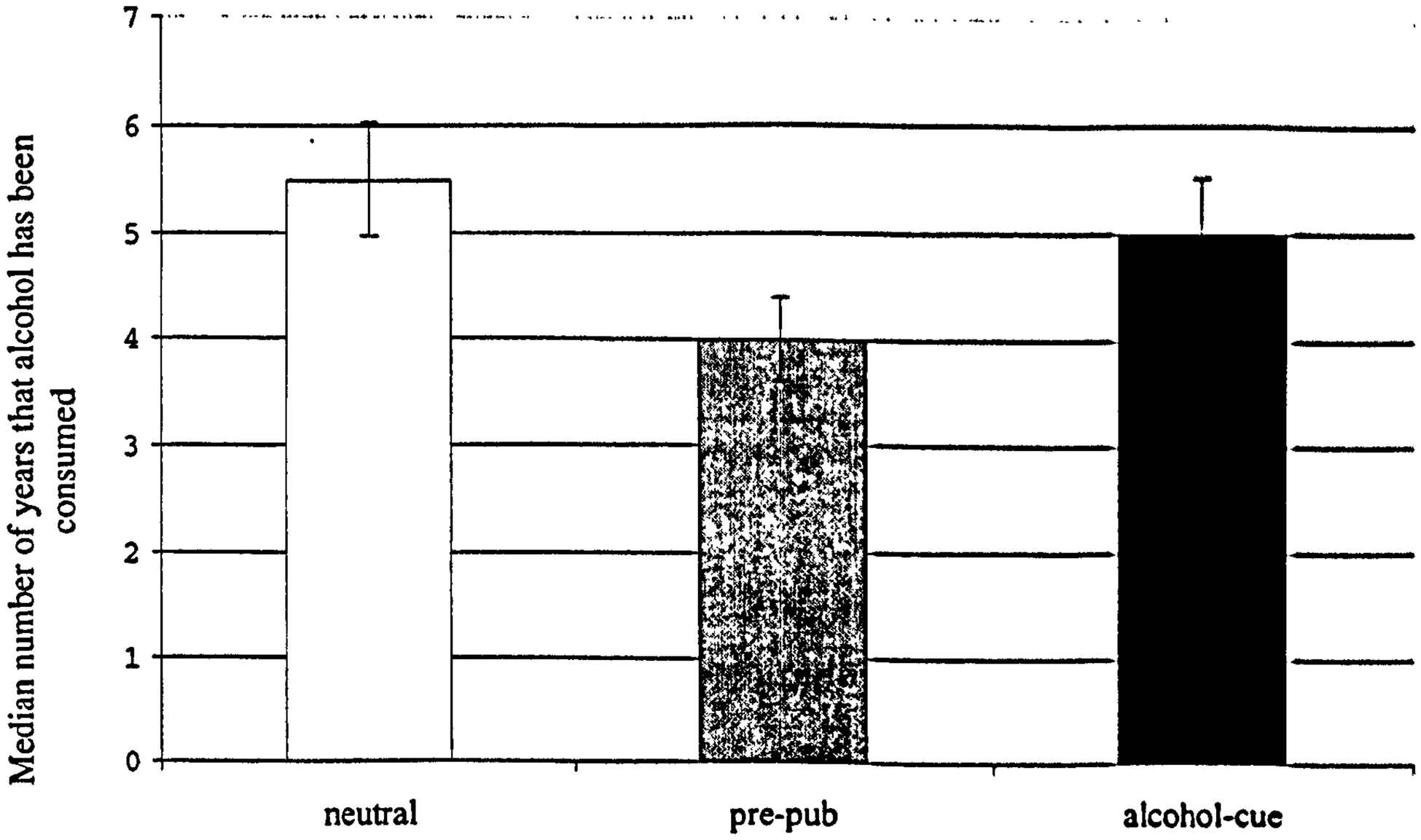
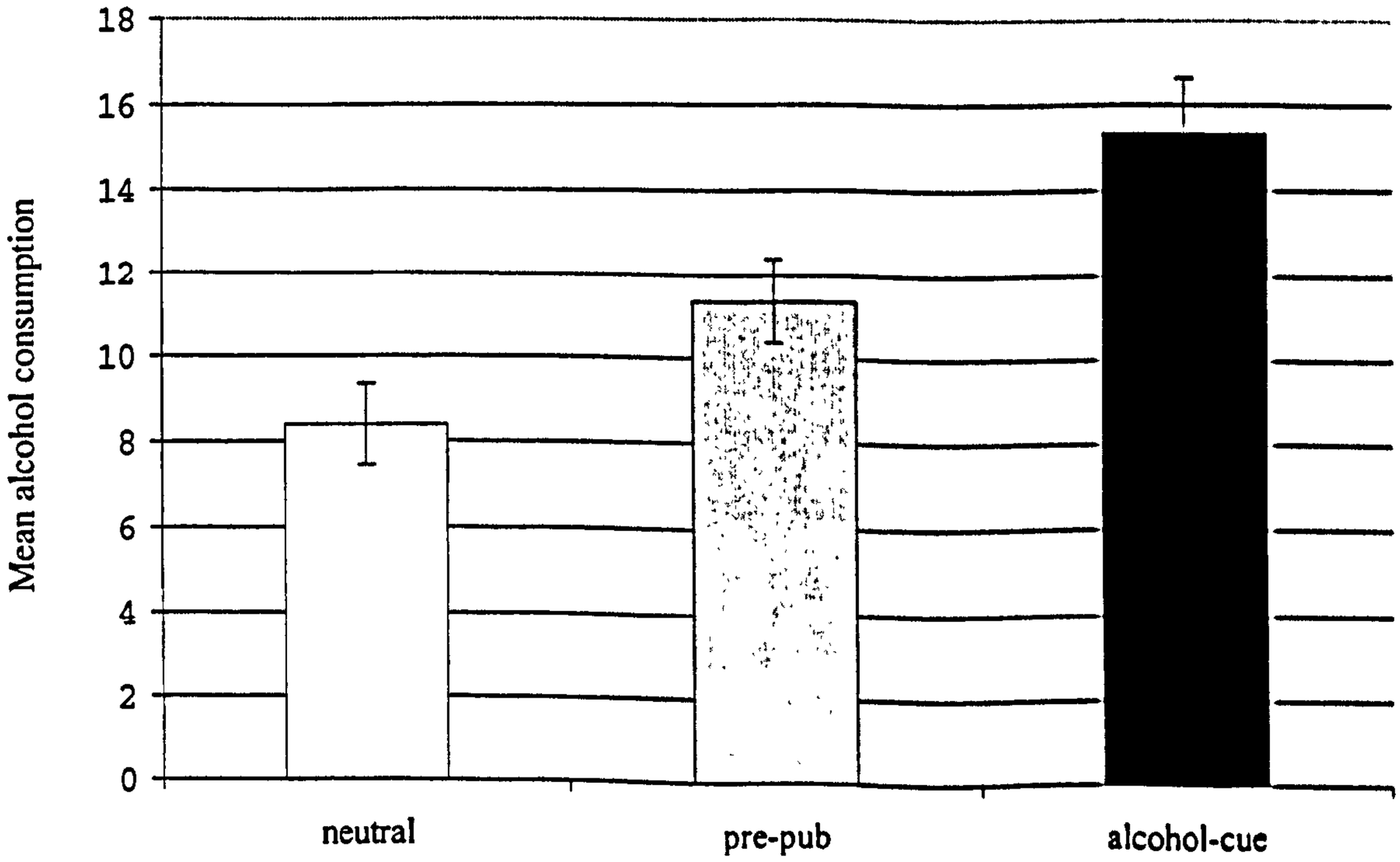


Figure 3. The participant's mean alcohol consumption level.



7.7.3 Primary analysis

As in the previous studies reported, all of the responses to the CMAQ behavioural outcome items were coded as being explicitly related to alcohol use (1) or as not related to alcohol use (0). In the CMAQ, there were six types of behavioural outcome items: positive high-and positive low-frequency alcohol-related, negative high-frequency and low-frequency alcohol related and positive and negative non alcohol-related behavioural outcomes. The total number of alcohol-related responses made for each type of behavioural outcome category was summed for each participant.

As alcohol consumption level is indicative of amount of experience related to alcohol use, which in turn is analogous with strength of association between alcohol use and related behavioural outcomes, hence it is necessary to include the variable in the subsequent analyses as a covariate. By doing this, it is possible to test the effect of context on responses to the CMAQ.

As the data satisfies all statistical assumptions for ANCOVA (p. 196), a one-way analysis of covariance test were performed for each of the six dependent variables (MAQ item categories). In each of the analyses the between-subject factor was the experimental condition (the context in which the questionnaire was completed) the dependent variable was the type of CMAQ behavioural outcome category (e.g. positive alcohol-related low frequency outcome) and the covariate was alcohol consumption level.

When the covariate is affected by the between group factor then it is appropriate to compute the means that one would get after removing all differences that can be accounted for by the covariate (Statsoft, 2001). Therefore the adjusted mean will be calculated and discussed in the results section where applicable.

No significant effect of context was found for target responses to the positive low alcohol-related behavioural outcomes as $F(2,146) = 0.35$, $p = .701$ (Figure 4). Nor was a significant effect of context found for target responses to the

positive high alcohol-related behavioural outcomes as F (2,146) = 1.06, p = .350. (Figure 5).

No significant effect of context was found for target responses to the negative low alcohol-related behavioural outcomes as F (2,146) = 2.55, p = 0.08 (Figure 6). However a significant between group difference was found for target responses to the negative high alcohol-related behavioural outcomes as F (2,146) = 3.45, p = .034. To investigate this effect planned comparisons rather than post hoc tests were computed as "general computational approach used in this program automatically takes into account the covariate" (Statsoft, 2001).

The following planned comparisons were carried out for the number of target responses made in response to the negative high alcohol-related behavioural outcomes in the:

(i) The alcohol-cue condition and the neutral context
(ii) The alcohol-cue condition and the pre-pub context
(iii) The pre-pub and the neutral context

A significant difference between the target responses in the alcohol-cue condition and the neutral condition was found as F (1,146) = 5.80, p = .02. Comparison of the mean number of target responses generated in each condition shows that more response were made in the alcohol-cue condition (M = 5.89, SE =.35) than in the neutral condition (M = 4.56, SE = .41). Planned comparison between the pre-pub context and the alcohol-cue context showed that there was no significant difference between target responses made in these two conditions as F (1,146) = 0.154, p = .695. Although not significant more responses were made in the alcohol-cue condition (M = 5.89, SE =.35) compared with the pre-pub condition (M= 5.68, SE = .34). Planned comparison between the pre-pub group and the neutral group showed a significant between-group difference with reference to the number of target responses generated by individuals as F (1,146) = 4.58, p =.03. Inspection of the adjusted means showed that more target responses were generated by

participants in the pre-pub group (M = 5.68, SE = .34) than in the neutral group (M = 4.56, SE = .41) (Figure 7).

No significant differences were found for the number of target responses given to the positive non-alcohol-related behavioural outcome items as F (1,146) = 1.25, p = .245 (Figure 8). However significant between group differences were found for number of target responses given in response to the negative non-alcohol-related behavioural outcomes as F (1,146) = 2.96, p = .054. As before, planned comparisons were used to investigate this effect. Significant differences were found between the neutral and pre-pub conditions as F (1,146) = 5.06, p = .026. It emerged that participants in the pre-pub condition (M = 1.84, SE = .25) generated more target responses compared to participants in the neutral condition (M=1.17, SE = .16). Significant differences were also found between the alcohol-cue condition and the neutral condition as F (1,146) = 3.85, p = .051. Significantly more target responses were given in the alcohol-cue condition (M = 1.79, SE = .23) than the neutral condition (M = 1.17, SE = .16). Although not significant, more target responses were given by participants in the pre-pub condition (M = 1.84, SE = .25) when compared with the alcohol-cue condition (M = 1.17, SE = .23) (Figure 9).

Although no significant between group differences were found for target responses made in response to the positive low alcohol-related, positive high alcohol-related, negative low alcohol-related and positive non-alcohol-related behavioural outcomes when comparisons are based on the adjusted mean results show that in each condition the most number of target responses are made in the alcohol-cue condition followed by the pre-pub condition (refer to Figures 4, 5, 6 and 8).

Figure 4. Mean number of target responses made for positive low alcohol-related behavioural outcome items in each condition.

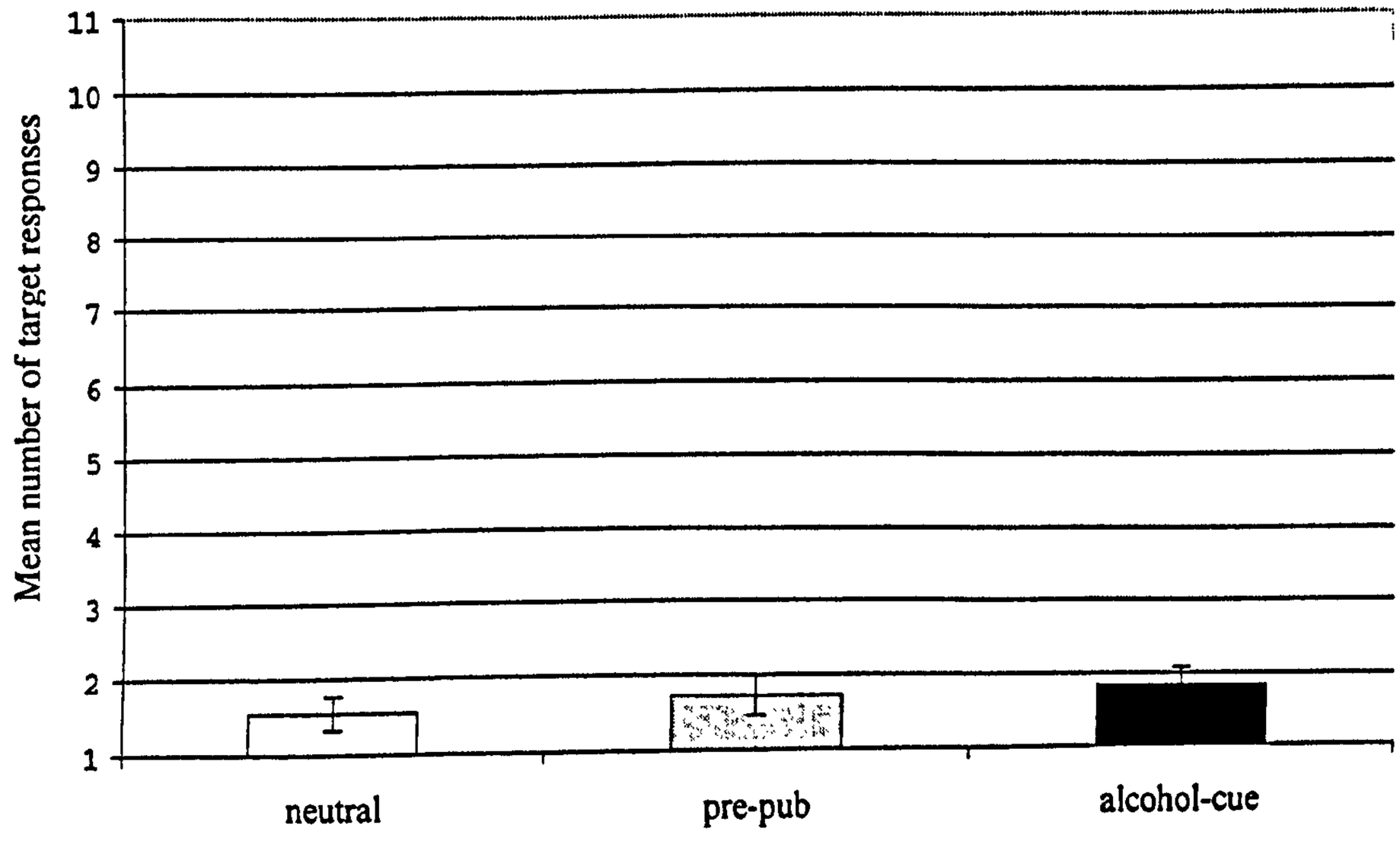


Figure 5. Mean number of target responses for positive high-frequency alcohol-related behavioural outcome items in each condition.

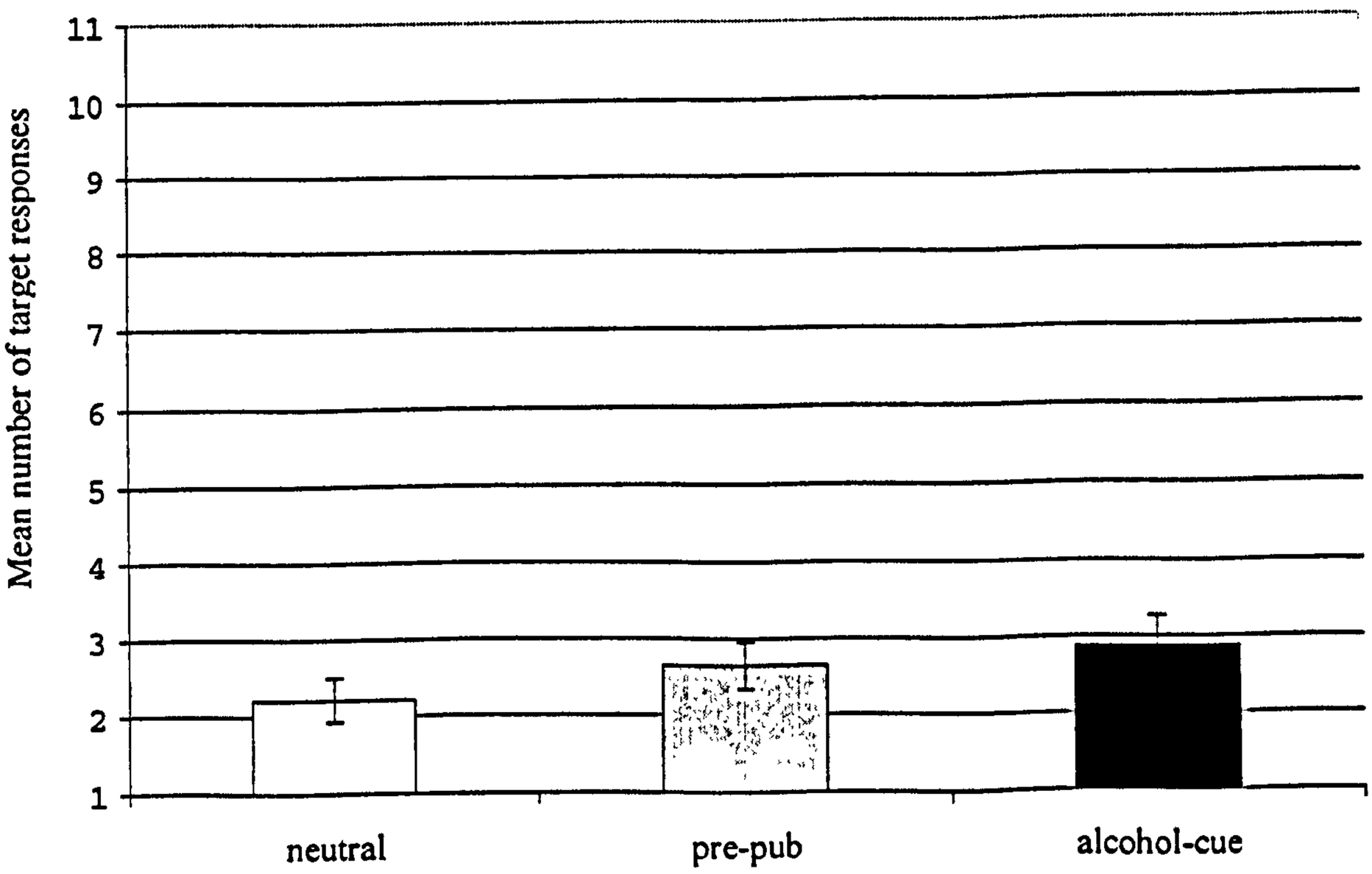


Figure 6. Mean number of target responses for negative low-frequency alcohol-related behavioural outcome items made in each condition

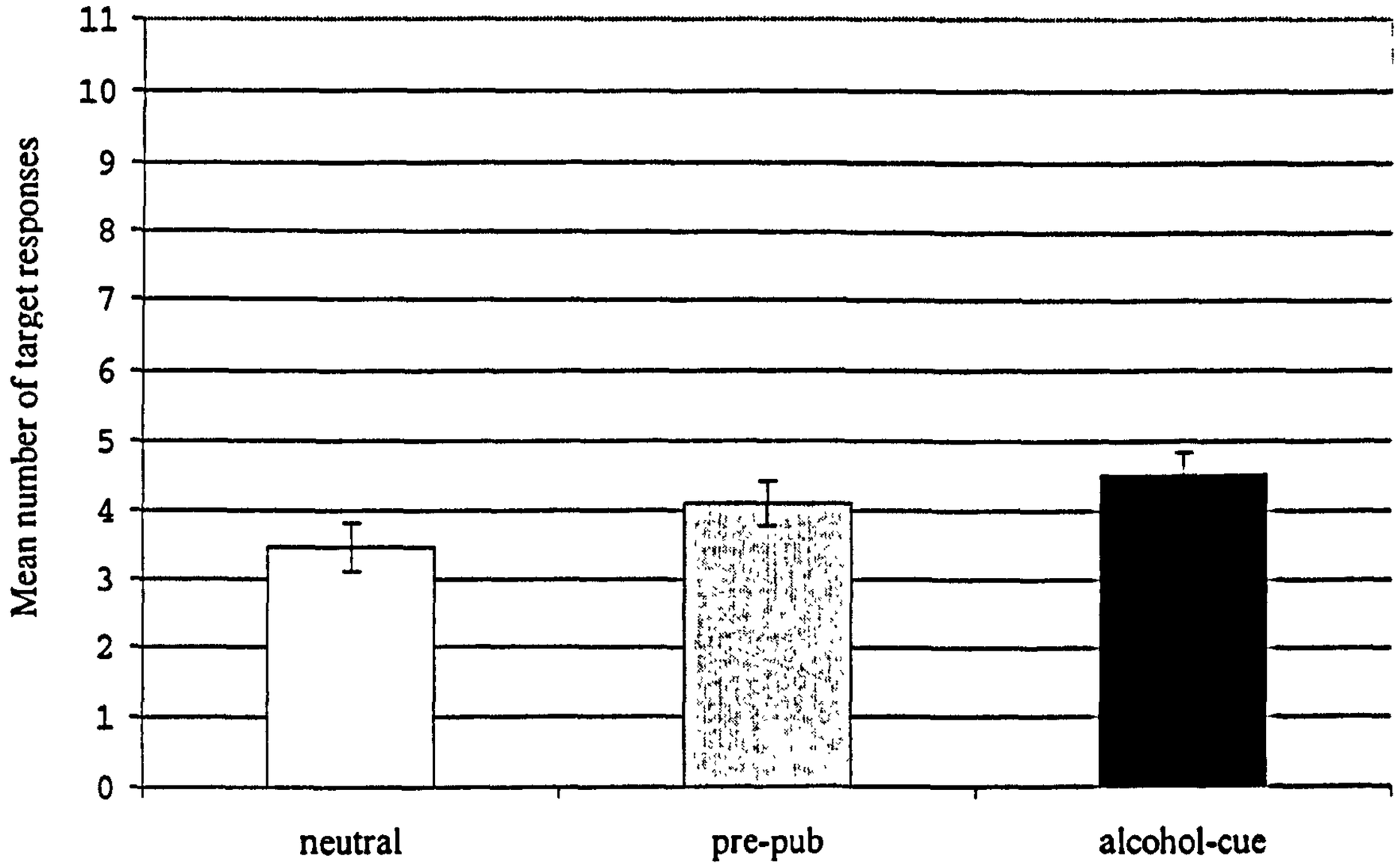


Figure 7. Mean number of target responses made in each condition for negative high-frequency alcohol-related behavioural outcome items.

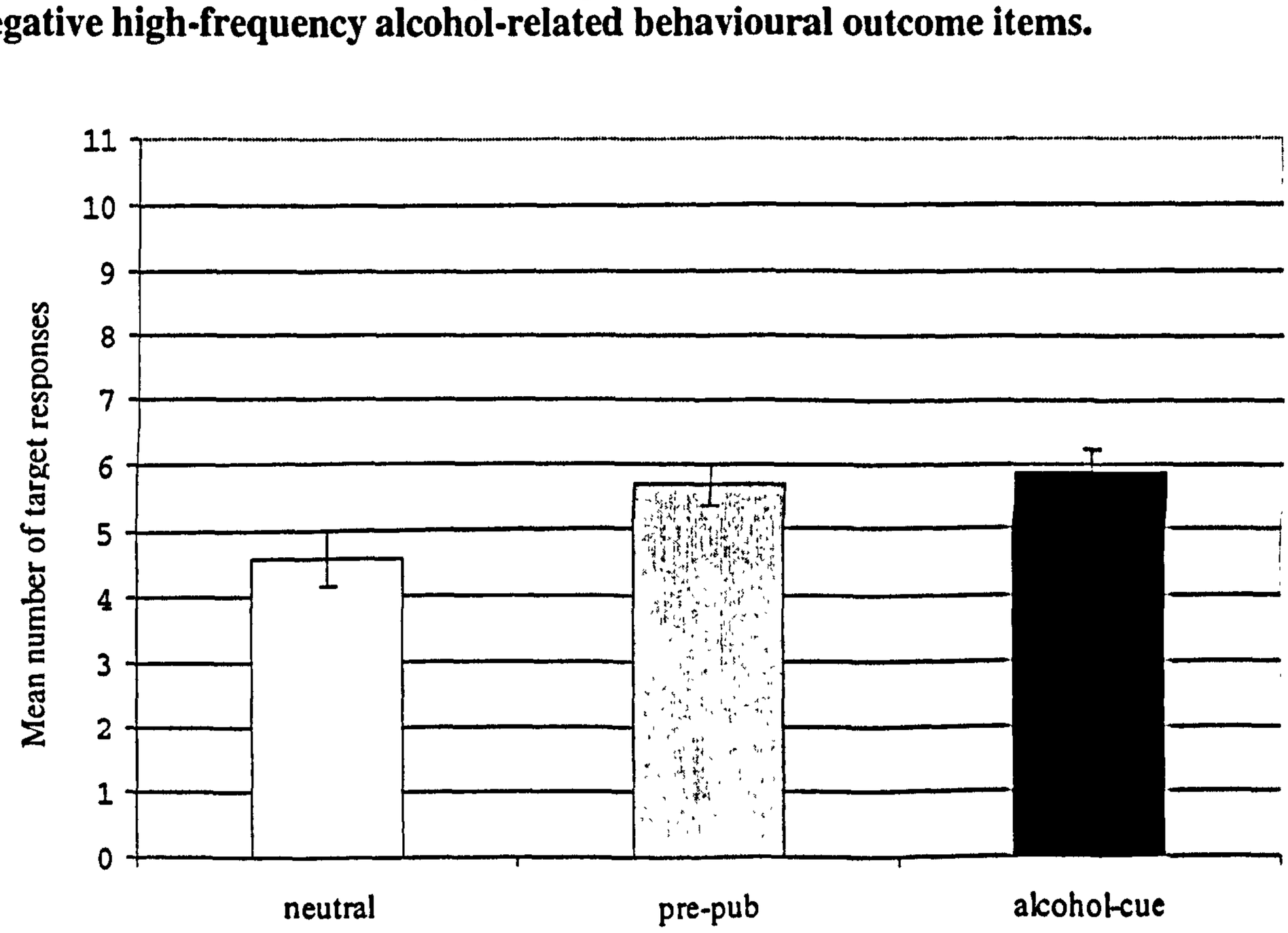


Figure 8. Mean number of target responses for the positive non alcohol-related behavioural outcome items made in each condition.

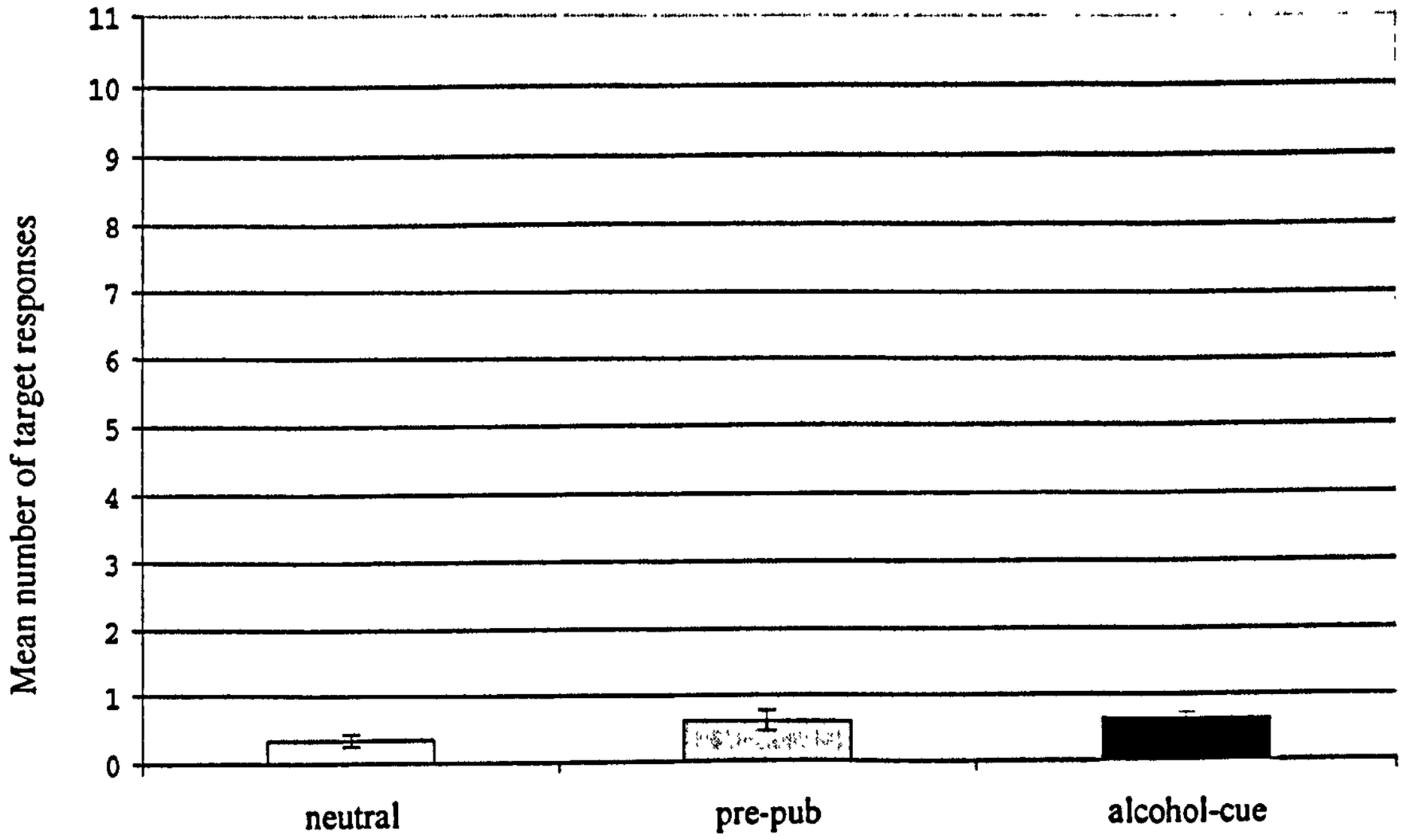
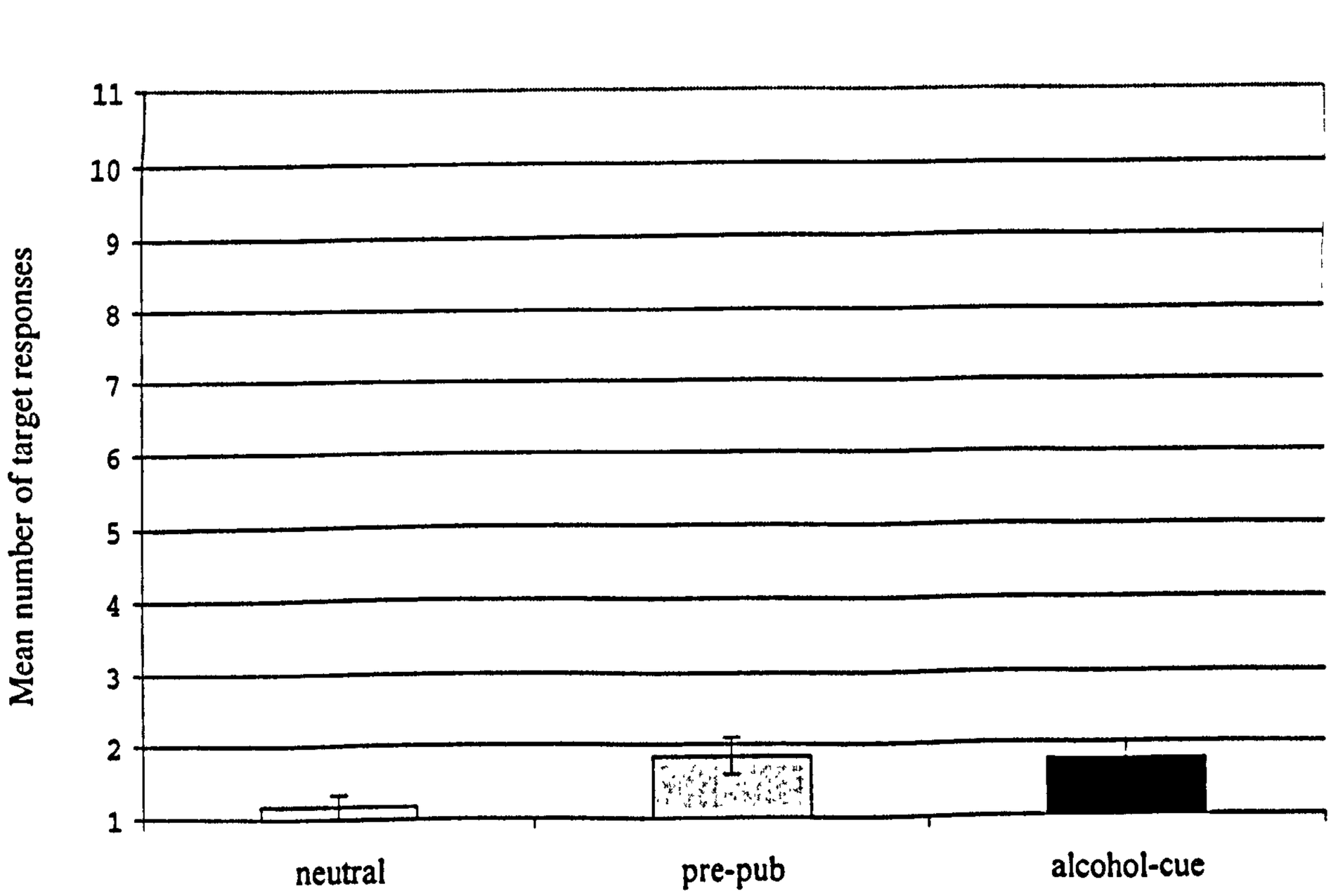


Figure 9. Mean number of target responses for the negative non alcohol-related behavioural outcome items made in each condition.



The results from the above series of analyses are summarised in Table 3.

Table 3. Results from the ANCOVA analyses.

Source of variance	Sum of squares	df	Mean square	F-ratio
Positive low-frequency				
Covariate (consumption)	27.03	1	27.03	10.25*
Main effect (target responses)	1.88	2	.94	0.36
Total explained	28.91	3		
Residual error	384.91	146	2.64	
Positive high-frequency				
Covariate (consumption)	69.45	1	69.45	14.23*
Main effect (target responses)	10.34	2	5.17	1.06
Total explained	79.79	3		
Residual error	710.60	146		
Negative low-frequency				
Covariate (consumption)	62.27	1	62.27	12.43*
Main effect (target responses)	25.53	2	12.76	2.55
Total explained	87.80	3		
Residual error	731.51	146		
Negative high-frequency				
Covariate (consumption)	40.80	1	40.80	6.19*
Main effect (target responses)	45.50	2	22.75	3.45*
Total explained	86.30	3		
Residual error	961.66	146		
Positive non alcohol-related				
Covariate (consumption)	1.89	1	1.89	2.14
Main effect (target responses)	2.50	2	1.25	1.41
Total explained	4.39	3		
Residual error	128.89	146		
Negative non-alcohol-related				
Covariate (consumption)	34.93	1	34.93	14.97*
Main effect (target responses)	12.84	2	6.42	2.97*
Total explained	47.77	3		
Residual error	315.35	146		

7.7.4 Additional analyses

A series of dependent t-tests were conducted to statistically compare the number of target responses given to the positive and negative low-frequency alcohol-related behavioural outcomes and the positive and negative high-frequency alcohol-related behavioural outcomes for participants in each

context. Within group comparisons were made as previous analysis has shown an effect of context.

Participants in the neutral condition made significantly more target responses for the negative low-frequency alcohol-related behavioural outcomes (M = 3.18, SE = .36) compared with the positive outcomes (M = 1.36, SE = .21) as t (49) = -7.631, p = .000. When the high-frequency alcohol-related behavioural outcomes were compared significantly more target responses were generated for the negative outcomes (M = 4.34, SE = .41) than the positive outcomes (M = 1.92, SE = .29) as t (49) = -6.960, p = .000 (Figure 10).

In the pre-pub condition participants made more target responses to the negative low-frequency outcomes (M = 4.08, SE = .32) when compared with target responses made to the positive outcomes (M = 1.70, SE = .26). This was statistically significant as t (1,49) = -7.199, p = .000. When statistical comparisons were made for the high-frequency outcomes it also emerged that significantly more target responses were given to the negative outcomes (M = 5.66, SE = .34) than the positive outcomes (M = 2.62, SE = .30). This difference was also significant as t (1,49) = -8.491, p = .000 (Figure 11).

For participants completing the CMAQ in the alcohol-cue condition significantly more target responses were given to the negative low-frequency alcohol-related outcomes (M = 4.84, SE = .31) in comparison to the positive low-frequency outcomes (M = 2.04, SE = .23) as t (1,49) = -10.693, p =.000. When comparisons were made between the number of target responses given to the positive and negative high-frequency outcomes it emerged that significantly more target responses were generated for the negative behavioural outcomes (M =6.14, SE = .35) in comparison to the positive outcomes (M = 4.84, SE = .31) as t (1,49) = -8.49, p = .000 (Figure 12).

Figure 10. The number of target responses generated by participants in the neutral condition in response to the positive and negative low and high-frequency alcohol-related behavioural outcomes.

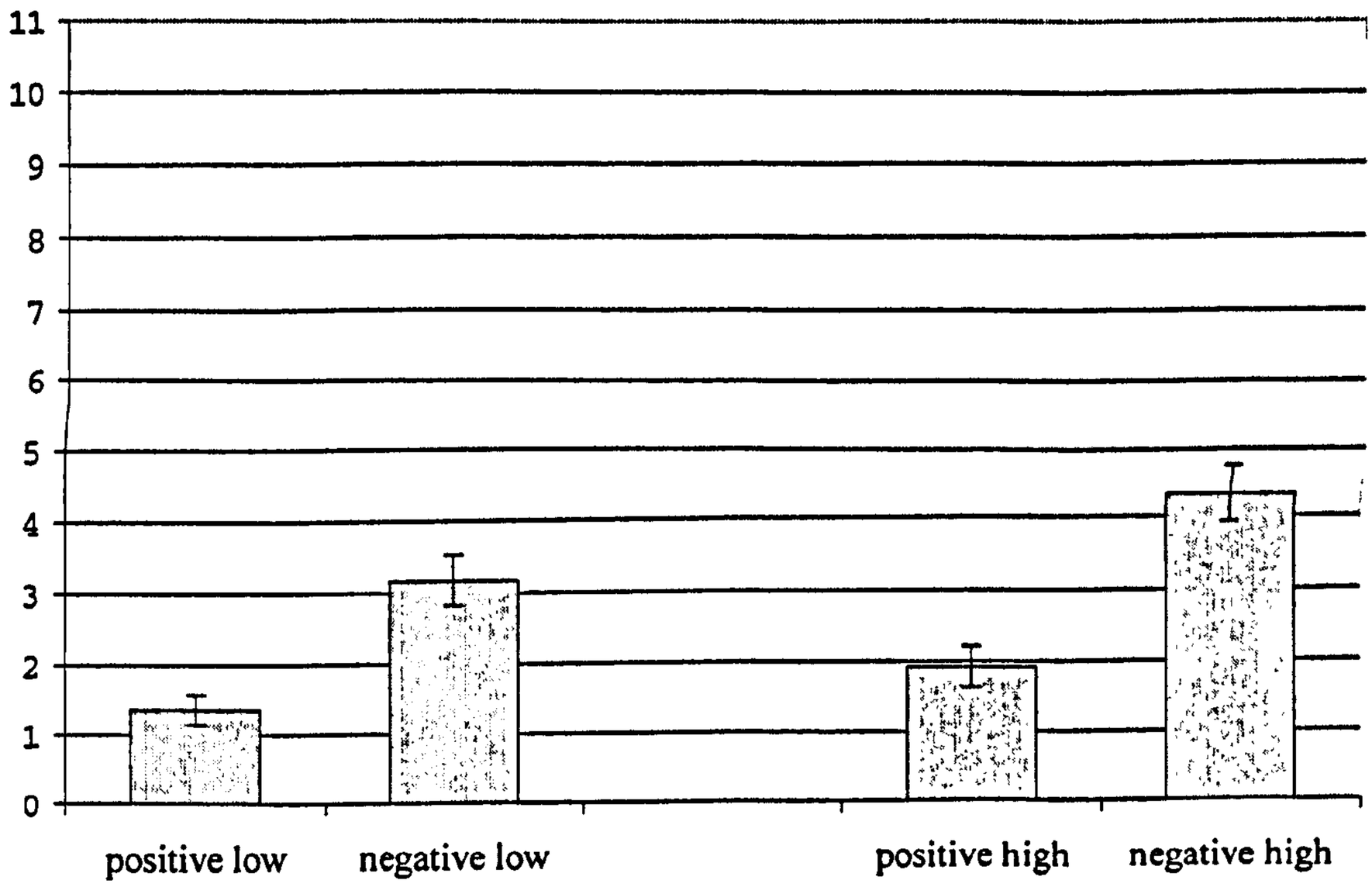


Figure 11. The number of target responses generated by participants in the pre-pub condition for the positive and negative low and high-frequency alcohol-related outcomes.

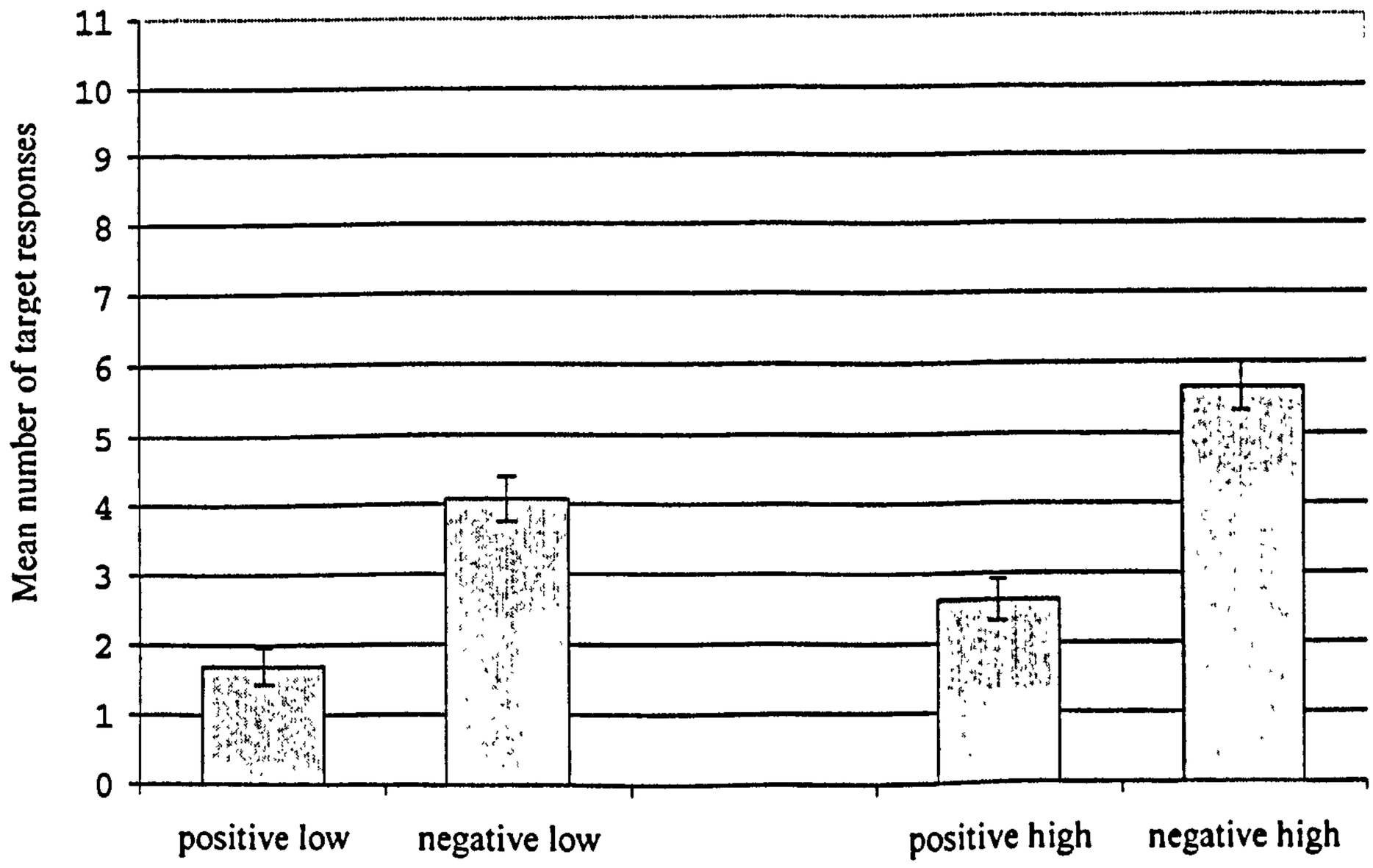
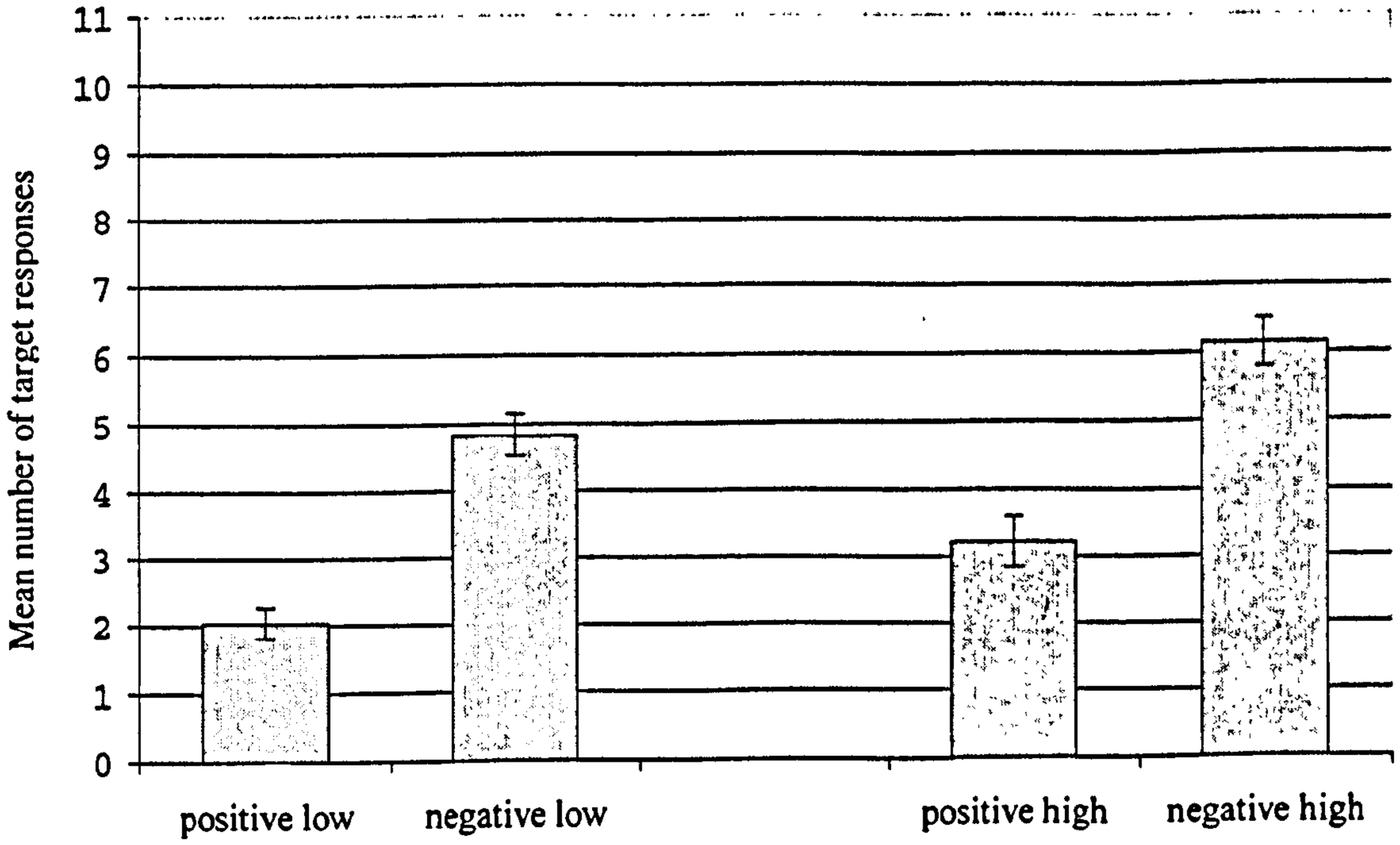


Figure 12. The number of target responses generated in the alcohol-cue condition in response to the positive and negative low and high-frequency alcohol-related outcomes.



7.7.5 Summary of results

(i) No significant between-group differences were found for age of participants or for the number of years that the participants in each group had been consuming alcohol.

(ii) A significant between group difference was found for alcohol consumption level. Post hoc Scheffe tests showed that the participants in the alcohol-cue condition where consuming significantly more alcohol units on their heaviest drinking day in comparison to participants in both the pre-pub and neutral group. To control for the effects of alcohol consumption on alcohol memory associations this variable was included in the planned primary analyses as a covariate

(iii) When the number of target responses to items in the CMAQ were analysed with regards to the context in which participants completed the questionnaire (neutral, pre-pub and pub) significant differences were found for responses to the negative alcohol-related high frequency behavioural outcomes items and for responses to the negative non-alcohol-related behavioural outcome items.

(iv) For the negative high-frequency alcohol-related behavioural outcomes, significantly more target responses were generated by the participants in the alcohol-cue condition when compared with target responses generated by the participants in the neutral condition. Participants in the pre-pub condition generated more responses compared to the participants in the neutral condition. There were no significant differences in the number of target responses generated by participants in the alcohol-cue and pre-pub *conditions.*

(v) For the negative non-alcohol-related behavioural outcome category planned comparisons showed that participants in the alcohol-cue condition generated significantly more target responses compared with the neutral condition. It was also found that participants in the pre-pub group generated more target responses than the neutral group. When comparisons were made between target responses generated in the pre-pub and alcohol-cue conditions no significant differences were found.

(vi) When within group comparisons were made regarding the number of target responses given to the positive and negative low-frequency alcohol-related behavioural outcomes participants in each context made more target responses to the negative outcomes when compared with the positive outcomes.

(vii) When the number of target responses made to the high-frequency alcohol-related behavioural outcomes were compared for participants in each context, significantly more target responses were made for the negative behavioural outcomes.

7.8 Discussion

The present study was designed to test the effects of alcohol cues on social drinkers' memory associations for alcohol use and related behavioural outcomes. Of particular interest was whether alcohol cues prompt or increase activation between these two concepts. An additional objective involved the design of the study, with emphasis on presenting the alcohol-cues to participants in an ecological manner. Recently, Wall et al. (2000, 2001) carried out alcohol cue-reactivity experiments, which were viewed as being

ecologically valid as they were conducted in a campus bars. However, methodological problems associated with the approach used by these researchers may detract from the fact that the experiment was conducted in a pub. A main flaw involved the reason that participants were in the pub. As individuals were in this context for the sole purpose of taking part in a study, it is questionable if participants attended to or were influenced by alcohol cues in the same way that they would be on a typical "night out". The present study addressed this issue as participants were approached prior to entering a pub and once they had entered a pub. An additional methodological limitation involved the assessment tool that was used to measure effect of alcohol cue-reactivity. As an explicit questionnaire was used the content may have acted as an alcohol prime. In the present study this possibility was minimised as an implicit assessment tool (The CMAQ) was used to assess accessibility of alcohol memory associations in three different contexts.

Previous cue-reactivity studies have shown that participants experience cue-reactivity when exposed to alcohol cues. This has been shown for desire to consume alcohol (e.g. Jones and Schulze, 1999) and for endorsement of positive alcohol expectancy outcomes (e.g. Wall et al., 2000). In addition exposure to alcohol cues has been shown to increase accessibility of alcohol associations for ambiguous alcohol-related words (e.g. Glautier and Spencer, 1999). Based on research findings in this area, it was hypothesised that participants in the alcohol-cue condition would exhibit higher levels of alcohol-cue reactivity due to the magnitude of alcohol cues present in this pub context. Therefore, it was postulated that participants in the alcohol-cue condition would form more alcohol-related responses to items in the CMAQ in comparison to participants in the pre-pub and neutral contexts. As participants in the pre-pub condition encountered alcohol-cues associated with the outside of a pub, but completed the CMAQ in an alcohol-free context, it was expected that participants in this context would generate more alcohol-related responses to items in the CMAQ in comparison to participants in the neutral context. This hypothesis was partially supported as participants in the alcohol-cue condition made significantly more alcohol-related responses to the high-frequency alcohol-related negative behavioural outcomes and the non alcohol-

related behavioural outcomes. Participants in the pre-pub context also generated significantly more associations to these outcomes in comparison to *individuals in the neutral context.* However, there was no significant difference in the number of target responses made by the participants *in the* alcohol-cue and pre-pub conditions.

An additional analysis was conducted to statistically tests whether more target responses would be made for positive alcohol-related outcomes of alcohol use when compared with number of alcohol-related responses made for the behavioural outcomes depicting negative consequences of this behaviour. With reference to the type of alcohol-related behavioural outcomes in the MAQ that participants would identify as being related to alcohol use, it was postulated that more target responses would be made to the positive alcohol-related behavioural outcomes in comparison to the negative alcohol-related behavioural outcomes in both the pre-pub and pub context.

The rationale for this hypothesis derived from the finding that more endorsements are made for positive consequences of alcohol use in pub settings (e.g. Wall et al., 2000). When with-in group comparisons were made between number of target responses generated for positive and negative alcohol-related behavioural outcomes, participants in each condition generated more target responses for the negative behavioural outcome items.

As the research hypotheses were not supported, the following questions must be addressed:

(i) Why are significant differences not observed between the pub and the pre-pub contexts, with reference to number of alcohol-related responses given to behavioural outcome items in the CMAQ?

(ii) Why are differences only observed for target responses generated for the negative high-frequency alcohol-related outcomes and the negative non-alcohol-related outcomes?

(iii) As negative consequences of alcohol use are viewed as being distal in nature, why do participants, in the three contexts, generate more

alcohol-related responses for this type of outcome than for proximal positive consequences?

The questions, which arise from the statistical analysis, will now be discussed. In addition, the limitations of the present study will be considered.

In explaining why the research hypothesis concerning the effect of context on activation of memories for alcohol use and related outcomes, was not upheld it is useful to look at aspects of the design such as the research sample and the procedure that was used. To ensure that null findings are not due to methodological problems aspects of the design of the study will be examined. Therefore issues related to the research sample, the CMAQ and the procedure that was used will be examined.

Previous experiments have shown that light, moderate and heavy social drinkers respond differently to cognitive processing tasks (e.g. Glautier and Spencer, 1999). It is generally shown that the degree of cue-reactivity exhibited varies with alcohol consumption. However, in a recent study, which used an attentional bias research paradigm to measure cue-reactivity, no effects were observed for the light alcohol consumers (Cox et al., 1999). This study indicates that prior alcohol consumption and type of cue can affect the level of alcohol cue-reactivity.

When considering the non-significant findings concerning memory associations for the positive alcohol-related behavioural outcomes and low-frequency negative outcomes, one possibility could be a low level of alcohol experience in the sample. If the participants had little alcohol experience this could explain why no effect of cue-reactivity was found for this type of outcome. However, based on the information obtained from the TLFB, it would appear that the sample consists of regular alcohol consumers, who have an average of 4.5 years drinking experience. In addition, prior to including alcohol consumption as a covariate in the primary analysis, the relationship between alcohol consumption level and number of target responses given to each type of behavioural outcome was tested. The results from this analysis

showed that there was a positive significant relationship between alcohol consumption and alcohol-related responses made in the MAQ (with the exception of the positive non-significant relationship between consumption and target responses to the positive non alcohol-related behavioural outcomes). As the tests showed that alcohol consumption was related to alcohol-related responses and as the participants have a considerable amount of alcohol experience, this would indicate that the non-significant findings are not due to lack of experience with alcohol use.

An alternative explanation for the results could involve the type of alcohol cues that were used. In the Cox et al. experiment, it is possible that the implicit cues used were too weak to elicit a cue-reactive response for light alcohol consumers. However, as an ecological approach was used in the present study, it is unlikely that the type of alcohol cue used contributed to null findings.

To assess the affects of contextual cues on alcohol memory associations the CMAQ was used. Glautier and Spencer (1999) state that having participants read phrases, which describe alcohol-related behavioural outcomes, can be viewed as priming participants. If one supports this view, it could be said that participants in all three conditions received alcohol primes. However, to prime individuals a cue that they associate with a particular behaviour or setting must be used. As the alcohol-related behavioural outcome items in the MAQ were ambiguously related to alcohol use and as behaviours apart from alcohol use can produce the outcomes depicted, the likelihood that the items were priming participants in minimised. In addition, as a cover story was used, it is unlikely that participants would consciously recognise that the MAQ was concerned with alcohol use.

As no significant effect of context on accessibility of memory associations was observed for participant's responses to the CMAQ in the pre-pub and alcohol-cue conditions this could indicate that thinking about going for a drink automatically activates memory associations between alcohol use and related outcomes. Previous research has shown that when positive outcomes of alcohol use are thought about cognitions related to alcohol become activated

and increase in their accessibility from memory amongst individuals with alcohol experience (Weingardt, Stacy and Leigh, 1996). The results from this study indicate that once a decision to consume alcohol is made activation between alcohol use and related outcomes of this behaviour occurs. As the behavioural decision to consume alcohol, may be due to the activation of alcohol memory associations, it would make sense that a level of activation between these two concepts has occurred prior to entering the pub.

The results from the present study showed that alcohol cues do not increase activation between alcohol use and positive outcomes of this behaviour. However, an alternative explanation is that exteroceptive cues associated with the outside of a pub and those associated with the inside of a pub may equally prime memory associations between alcohol use and related outcomes of this behaviour. It is not possible to determine which features of the contexts were influential due to the *design of the study. Problems exist* when testing participants in natural environments as it is not possible to control for extraneous variables. In the present study it was not possible to separate the effects of deciding to go to the pub for an alcoholic beverage from the alcohol cues associated with the inside and outside of a pubs. By asking participants to complete the CMAQ prior to entering a pub this can be viewed as assessing the effects of decisions to consume alcohol on the activation of alcohol memory associations. However, when participants were approached to take part in the study they had already seen the outside of the pub. Although participants completed the CMAQ in a room free from alcohol cues it is difficult to gauge if having seen the outside of the pub was equal to completing the CMAQ in the pub with reference to the effect of alcohol alcohol-cues.

If the non-significant differences observed between the pre-pub and alcohol-cue conditions are due to the activation of alcohol memory associations resulting from decisions to consume alcohol, one would expect to see significantly fewer alcohol-related responses generated in the neutral context. With the exception of the negative high-frequency alcohol-related behavioural outcomes and the non alcohol-related behavioural outcomes this was not found. A conceivable explanation for the null effect of context is that

participants in the neutral context were thinking about alcohol use or considering going for an alcoholic drink. As it was crucial that participants were not made aware of the true nature of the study prior to completing the CMAQ, it was not possible to assess whether participants in this context were considering alcohol use prior to completing the CMAQ. In addition, this context can be viewed as sharing some similar contextual aspects with the pub setting, as individuals sat together in groups and music was playing over a loud speaker. It is possible that the social aspects of the environment triggered *memory associations* between alcohol use and related outcomes. For example being in the company of friends may have triggered memories of *"nights out"*. In addition, it is conceivable that participants may have been discussing events from previous nights out, prior to being approached to take part in the study, hence conversational topics may have primed participants. Rather than approaching a combination of groups and single people, to control for the aforementioned extraneous variables, only individuals sitting alone should have been asked to take part in the study.

An additional problem related to the design of this study is the inability to control for lifestyle issues. It is possible that the participants in the alcohol cue and the pre-pub conditions differed from those in the neutral condition. As it was not possible to control for individualistic features associated with lifestyle, in order to reduce extraneous variables only students were asked to take part in the present study. Although this does not guarantee that similar people were being recruited to take part in the study in each condition, this prerequisite for participation enhanced the likelihood that individuals in the three conditions shared some similar attributes.

Although the central research hypothesis was not supported, a significant difference in the number of target responses generated in response to the negative alcohol-related behavioural outcomes was found. This result is curious as the immediate effects of alcohol consumption are positive whereas the delayed effects are negative (Carter, McNair, Corbin and Black, 1998). With reference to the normal time sequence of positive and negative alcohol effects and based on the Encoding Specificity Principle it was postulated that

activation between outcomes associated with the start of a drinking episode would be greater than those associated with distal effects of alcohol consumption. Therefore, it was expected that stronger associations between alcohol use and positive outcomes would be made by participants in the pre-pub and pub contexts. Research that has investigated the effects of alcohol cues on endorsement of negative and positive alcohol outcome expectancies is inconclusive due to inconsistent findings. Wall et al., (2000) found a significant effect for endorsement of positive expectancy outcome items but no effect for negative outcomes was found. Whereas, Schulze and Jones (2000) found no effect of alcohol cue-reactivity for endorsements of positive and negative alcohol outcome expectancies.

The other significant effect of context was found for negative non alcohol-related outcomes. This type of behavioural *outcome item was originally* included in the MAQ to reduce the possibility that participants would realise that the questionnaire was concerned with alcohol use (refer to Chapter 4). In addition, these outcomes were viewed as being related to activities or behaviours that do not related to alcohol use. Although this was an unexpected result, it is important to highlight a low number of alcohol-related responses were made to this type of outcome.

As no effect of context was observed for the other categories of alcohol-related outcomes in the CMAQ, it was previously suggested that participants in the neutral setting might have been considering alcohol use. This explanation appears to be flawed as significant differences were observed for the number of alcohol-related responses generated for two types of negative behavioural outcomes. However, it is possible that the alcohol cues present in the pre-pub and pub contexts served to activate memory associations related to negative consequences of alcohol use only. Within group comparisons of number of responses generated for positive and negative outcomes of alcohol use showed that for all contexts, significantly more alcohol-related responses were generated for the negative outcomes of alcohol use. This finding together with the significant effect of context for negative outcomes of alcohol use would indicate that associations between alcohol use and negative related outcomes

are stronger than associations for positive outcomes. If this is indeed the case one conclusion that can be reached from this study is that alcohol memory and negative outcomes do not impact on social drinker's decisions to consume alcohol.

If significant results were found for positive alcohol memory associations, this would indicate that the activation of association between these two concepts would act as a go signal for alcohol consumption. However, as increased accessibility for alcohol use and negative related outcomes was found it would appear that once a decision to consume alcohol has been made the type and number of activated associations does not influence subsequent behaviour, during the early stages of alcohol consumption. Lack of impact on decision making processes may relate to the fact that negative consequences of alcohol use tend to occur later on in drinking sessions and the day after alcohol has been consumed. In addition, the type of negative consequences that social drinker's experience may not be strong enough to act as a deterrent.

In the pre-pub and alcohol cue-conditions the participant's mood and their reason for going for an alcohol drink was not assessed. Reasons for choosing to consume alcohol may have influenced the way that people were responding to the MAQ. If for example, participants chose to go for a drink because they were feeling anxious; this may have triggered memories for previous drinking occasions when they consumed alcohol to deal with negative emotional states. In dependent alcohol consumers, negative mood states are more commonly reported as precipitants of drug use then are positive moods (Greely and Ryan, 1995). As the link between social anxiety and alcohol consumption is well established amongst college students (Burke and Stephens, 1999), it would have been beneficial to examine reasons for deciding to consume alcohol. It is possible that positive reasons such as celebrating exam results would trigger positive alcohol memory associations. Whereas in comparison negative motives, such as anxiety or high stress levels, may activate negative associations between alcohol use and related outcomes.

When investigating the effects of alcohol cues on activation of memory associations it would have been useful to assess memory associations during the course of a drinking episode. This would indicate what impact alcohol cues have on memory associations over a course of a drinking episode. In addition, this would enable one to assess the effects that activated memory associations have on actual alcohol consumption. As the amount of alcohol that participants consumed during the entire drinking episode was not measured in the present study, it is not possible to truly assess what impact activated alcohol memory associations had on amount of alcohol consumed.

A key variable of interest in studying cue-reactivity should be drug seeking behaviour as this enables one to assess the effects of cue-reactivity on subsequent alcohol consumption (Drummond et al., 1995). Research has been conducted in a lab context, which indicates that participants consume more alcohol after being exposed to alcohol cues (Roehrich and Goldman, 1995). This study indicated that alcohol cues may influence the amount of alcohol that is consumed. Whether the level of activation amongst alcohol memory associations serves to influence alcohol consumption has not yet been investigated. Therefore, it is not possible to state what input activated alcohol memory associations has on amount of alcohol consumed, once the decision to drink alcohol has been made.

To assess the effects of alcohol cues on memory associations as a result of increased exposure (the course of a drinking episode) and the effects of activated alcohol memory associations on amount of alcohol consumed the present experimental design could be adapted to a between subjects design. This would enable participants at varying stages of a drinking episode to be tested, thus enabling insight into the cumulative influence and effect of activated alcohol memory associations and alcohol cues on amount of alcohol consumed, to be tested.

To conclude, although the present study would have benefited from the inclusion of additional measures (e.g. questionnaires to assess desire to consume alcohol or assessments of participants mood) the results do enable

preliminary conclusions to be made. The findings from this study indicate that activation of memory associations between alcohol use and positive outcomes of this behaviour may not be dependent on exteroceptive and interoceptive alcohol cues. However, it would appear that memory associations between alcohol use and negative outcomes of this behaviour become more accessible when alcohol cues are presented. In addition, it would seem that memory association between alcohol use and positive outcomes of this behaviour become activated during the time that decisions to consume alcohol are made. The results also indicated that the activation of negative outcomes of alcohol use does not appear to deter influence decisions to consume alcohol. Although this study can be viewed as an ecological test of alcohol-cue reactivity, the conclusions that can be drawn from the results are limited as only aspects associated with the start of a drinking episode were assessed. However, the preliminary findings do provide support for the Alcohol-Related Association Memory Model of alcohol use with reference to the assumption that activated associations between alcohol use and related outcomes can influence decisions to consume alcohol.

Chapter 8 - General Discussion

This chapter begins by restating the central research issues raised in Chapter 1-3 and the main empirical findings from Studies 1-5. The implications of the research findings for the Alcohol-Related Association Model of alcohol use (e.g. Stacy et al. 1994) are then presented. As a new assessment tool was developed to measure the relationship between alcohol use and memory associations for both positive and negative outcomes of this behaviour (the MAQ) the procedure used to design, construct and administer the questionnaire is critiqued. Due to issues concerning the methodology used to measure alcohol outcome expectancies it was previously suggested that alcohol memory association research may provide a better understanding of the unconscious processes that contribute to decisions to consume alcohol. This issue will be addressed by discussing the similarities and differences between the two approaches. Next, possible clinical applications of the MAQ will be put forward. Lastly, the limitations of the current work and suggestions for future research are considered.

8. The main issues addressed in the thesis.

Chapter 1 began by introducing the view held by Marlatt and Gordon (1985), that all points along the continuum of alcohol consumption are influenced by the same principles of learning. This concept was introduced to demonstrate that research conducted with social drinkers can further the understanding of the cognitive processes involved in decisions to consume alcohol for all levels of alcohol users. The two key explanations of alcohol consumption variability - alcohol consumption outcome expectancies (e.g. Goldman et al., 1999) and alcohol-related associations (e.g. Stacy et al., 1994) central to the present thesis were then introduced.

Research concerned with alcohol consumption outcome expectancies was presented in **Chapter 2** with an emphasis on how they are formed how they influence decisions to consume alcohol. The studies reviewed showed that alcohol expectancies can be learnt through vicarious learning (e.g. Goldman et al., 1987) and through direct experience with alcohol use (e.g. Dunn and Goldman, 1998). A main issue addressed in this chapter, and of particular relevance to the present thesis, concerned the fact that the majority of research in this area measures positive alcohol expectancies (PAEs) held in relation to alcohol consumption whilst neglecting the role of negative alcohol expectancies (NAEs). An explanation for the minimal amount of research into the role of NAEs was presented which relates to the research findings in this area. On the whole, research concerning NAEs and alcohol consumption have been inconsistent whereas findings concerning PAEs have been consistent (for review see Jones et al., 2001). In addition to inconclusive research findings, the notion that the immediate positive consequences of alcohol use influences behaviour more strongly than delayed negative effects (Rohsenow, 1983) was considered as a means of explaining the apparent focus on PAEs in this research area.

An alternative explanation for the inconsistent findings regarding negative alcohol expectancies purported by Jones et al. (2001) was also introduced. These researchers implicate the assessment tools used in this area as a key reason for the inconclusive findings. This aspect is related to a larger issue presented in this

chapter - whether the methodology used in this area is appropriate for measuring unconscious memory processes that contribute to decisions to consume alcohol. As an explicit assessment tool is used to assess alcohol expectancies held (e.g. AEQ, Brown et al., 1987), it has recently been questioned whether this procedure reflects the cognitive processes and propositions which actually motivate ongoing behaviour (McCusker, 2001).

An alternative approach for identifying what motivates an individual to consume alcohol has been developed - The Alcohol-Related Association Memory Model of alcohol use (e.g. Stacy et al., 1994) in response to the recent issues raised concerning the methodology implemented in this area and questions concerning what the explicit approach actually measures. In **Chapter 3** how memory associations between alcohol use and related outcomes of this behaviour are formed and how the associations can bias behavioural decisions was discussed. This was followed by a review of relevant research in this area.

The types of instruments used to assess the relationship between alcohol use and memory associations were examined. In particular the point that the approach used in this area is implicit in nature was discussed. Therefore, problems related to explicit testing procedures, are largely eradicated. Research in this area consistently demonstrates that the strength of alcohol memory associations are in direct relation to individuals' alcohol consumption experience. The findings show that heavier social drinkers hold stronger memory associations between alcohol use and positive outcomes than moderate of light social drinkers (e.g. Stacy et al., 1994; Stacy, 1995; Stacy et al. 1996; Leigh and Stacy, 1998). These results indicate that thoughts about potentially positive alcohol-related outcomes may implicitly activate concepts and desires consistent with alcohol use (Weingardt, Stacy and Leigh, 1996).

Although these studies provide support for this model of alcohol use, methodological problems related to the research sample and procedure used in previous studies were noted. A general issue involved the low level of alcohol consumption of participants who took part in the studies. In the studies reviewed the percentage of participants who had consumed alcohol in the month prior to

taking part in the study ranged from 51-63%. As alcohol memory associations are formed through experience with alcohol use, it would appear redundant to use non-alcohol-consuming participants, as they are unlikely to hold **accessible** memory associations between alcohol use and related outcomes.

An additional methodological issue also involved the research samples used in the studies reviewed. Overall, research findings in this area have derived from studies with high school or college students. Although the research findings were conclusive, when the research sample consists solely of university students a degree of externality and generality may be jeopardised (Bordens and Abbott, *1993). A final methodological problem highlighted, involved the minimal* amount of research in to the associations held between *alcohol use and negative* outcomes of this behaviour. One study conducted (Leigh and Stacy, 1998) did measure this relationship, however, it was felt that the approach used did not give equal and substantial weighting to both positive and negative alcohol memory associations. The studies presented in this thesis were designed to address these issues.

In Chapter 3 the questionnaire approach used to measure alcohol memory associations developed by Stacy et al. (1994) was described and evaluated. Participants in this study were presented with positive ambiguous alcohol-related outcomes (previously elicited from a sample of undergraduate students) and non alcohol-related outcomes and asked to write down the first behaviours that come to mind that would cause the outcome depicted to occur. This method was adapted for use in the present to enable the measure of the accessibility of both positive and negative alcohol memory associations.

The construction of the association questionnaire used in subsequent studies (the MAQ) was described in **Chapter 4**. To develop a list of suitable alcohol-related behavioural outcomes for use in the questionnaire, a sample of regular alcohol consuming undergraduate students were recruited. This aspect ensured that participants with alcohol use experience were used to develop a list of suitable positive and negative outcomes of alcohol use. In addition, the construction of the questionnaire ensured that equal weighting was given to both positive and

negative aspects of alcohol use as an equal number of items were used to represent both types of outcomes.

In keeping with the format of the original AQ developed by Stacy et al. (1994) measures were taken to ensure that the MAQ did not contain explicit references to alcohol use, with regards to the standardised instructions that were used or in the title of the questionnaire. As in the AQ an equal number of non alcohol-related outcomes were incorporated into the questionnaire to ensure that the true nature of the questionnaire would not be revealed to participants. If participants were made aware of the true nature of the study this would jeopardise the covert procedure that is necessary to properly assess the relationship between alcohol *use and related outcomes* of this behaviour. In addition, an equal number of culturally (high-frequency) and idiosyncratically *(low-frequency) known* outcomes of alcohol use were used in the MAQ. This feature introduced an element of control into the MAQ. With reference to the assumptions postulated by the Alcohol-Related Association Model of alcohol use individuals should hold stronger associations between alcohol use and related outcomes of this behaviour for which they have repeatedly experienced. Therefore, associations between alcohol use and common consequences of this behaviour should be stronger than uncommon consequences.

In **Chapter 5** the first study in which a sample of young undergraduate students were recruited to complete the MAQ, was reported. The findings from this study showed that as alcohol consumption increases, as does the strength of association between alcohol use and related outcomes. This linear relationship was observed for both high-frequency positive and negative alcohol-related behavioural outcomes. The findings from this study replicated previous research conducted by Stacy et al. (1994). In addition, the results extended existing research as a significant relationship between alcohol use and negative alcohol-related outcomes was found. The relationship observed between alcohol consumption and negative alcohol memory associations was discussed with reference to the inconclusive research findings concerning the role of NAEs in relation to alcohol use. It was concluded that individuals do learn and hold associations concerning

negative effects of alcohol use. In addition it was purported that this relationship can be measured when appropriate research tools are used.

A criticism of previous alcohol memory association research concerned the type of research sample that is used. The study reported in **Chapter 6** was designed to address this issue as a group of mature alcohol consumers were recruited to take part in the study. As in Study 2, under investigation was the strength of association between alcohol use and positive and negative outcomes of this behaviour. In addition to testing the functionality of the MAQ with an older age group of alcohol consumers this study also enabled a key component of the Alcohol-Related Association model of alcohol use to be assessed - experience. In Study 2 the amount of alcohol consumed was viewed as an indication of alcohol experience for the young social drinkers. However, in Study 3 as this group had been consuming alcohol for a substantial number of years ($\underline{M}$ = 29 years), in comparison to the participants in Study 2 ($\underline{M}$ = 4 years), the effects of a long drinking history could be tested. Therefore in this study, the relationship between present alcohol consumption and alcohol memory associations was assessed, as was the relationship between alcohol memory associations and a substantial alcohol consumption history.

The results from this study showed that mature social drinkers hold strong associations between alcohol use and high-frequency positive and negative outcomes of alcohol use. This findings replicate the results from Study 2. In addition, a significant relationship was found for alcohol consumption and associations for low-frequency positive and negative outcomes of alcohol use. This result indicated that experience of alcohol use, defined as having habitually consumed alcohol for a number of years, results in stronger memory associations being made between alcohol use and both common and uncommon outcomes of this behaviour.

Although this study provided further support for the Alcohol-Related Association Memory model of alcohol use a curious finding emerged. *For this type of* alcohol consumer a significant relationship between alcohol use and behavioural outcomes previously viewed as negative non alcohol-related was found. As a

significant relationship between alcohol use and low-frequency positive and negative outcomes of alcohol use was also found this indicated that a lengthy alcohol consumption history might result in strong associations being formed between an array of outcomes that are negative in nature.

An additional study was carried out to assess this claim (Study 4). The procedure used to develop alcohol-related behavioural outcomes for use in the MAQ was followed (Chapter 4). This enabled a list of negative consequences of alcohol use, which represent mature alcohol consumers views, to be developed. The information obtained from this procedure was systematically analysed to test whether behavioural outcomes previously viewed as non alcohol-related (by *young social drinkers*) are viewed as alcohol-related by individuals who have been consuming alcohol for a substantial *number of years (mature social* drinkers). It was found that mature social drinkers did associate some of the items previously viewed as non alcohol-related as negative consequences of alcohol use. The results from Study 3 and 4 together indicated that increased alcohol experience (as measured by the number of years that an individual had been consuming alcohol), resulted in the formation of positive and negative alcohol memory associations. In addition the findings showed that increased experience appears to result in an array of negative outcomes being associated with this behaviour.

In the final study, **Chapter 7,** of interest was whether external alcohol cues could prime and consequently activate memory associations between alcohol use and related behavioural outcomes. To assess the influence of external alcohol cues on alcohol memory associations, participants were asked to complete a condensed version of the MAQ (CMAQ) in one of three locations: a food canteen, prior to entering a pub and in a pub. As each of these locations varied with regard to the level of alcohol cues present, this enabled the effects of alcohol cues on alcohol memory associations to be assessed.

The results from this study showed that positive alcohol memory associations are not affected by contextual cues. However negative alcohol memory associations are affected by alcohol cues evident in the pre-pub and pub contexts. As positive

outcomes of alcohol use are associated with the start of a drinking session it was expected that cues related with this stage of alcohol use would trigger and activate positive alcohol memory associations. However, as no effect of context was found for the activation of positive alcohol memory associations it was proposed that positive alcohol memory associations become activated prior to or during decisions to consume alcohol. It was suggested that this result might indicate that alcohol memory associations serve to prompt decisions to consume alcohol and once activated may not interact with ensuing behaviour. However, this explanation was based on the possibility that participants in the neutral group were also considering alcohol use. As it was not assessed if individuals in this group were, thinking of or considering going for a drink, this explanation was speculative at this stage.

With regards to the significant effect of context on associations for alcohol use and negative outcomes of this behaviour it would appear that alcohol cues do serve to prime this type of alcohol memory association. In addition it would seem that activated associations between alcohol use and negative consequences of this behaviour do not influence decisions to consume alcohol for young social drinkers as participants in the pre-pub and pub contexts, in which strong associations were shown, were entering the pub to consume alcohol.

The research findings provide further support for the Alcohol-Related Association Memory Model of alcohol use with regards to the manner in which memory associations are thought to influence behavioural decisions. As positive alcohol memory associations did not increase in activation when participants completed the CMAQ in the pre-pub and pub contexts this would indicate that activated memory associations influence behavioural decisions to consume alcohol. However it would appear that negative alcohol memory associations become activated in alcohol-related contexts but do not serve to influence decisions to consume alcohol. As previously stated the conclusions drawn from this study are hypothetical, as measures were not taken to test whether participants in the neutral context were considering alcohol use.

8.1 How the research findings relate to theoretical assumptions of the Alcohol-Related Association Model of alcohol use (e.g. Stacy et al., 1994).

How the cumulative research findings relate to the assumptions purported by that Alcohol-Related Association Memory Model of alcohol use will now be considered. However, prior to discussing the implications of the present research the main theoretical assumptions of this model (Chapter 3) will be restated.

Based on the fundamental principles of the Alcohol-Related Association Memory Model of alcohol use memory *associations are thought to develop* between a behaviour and an outcome of the behaviour when the two concepts are experienced together. The associations between alcohol use and related outcomes are strengthened through the continued encoding of cognitions that are activated or retrieved during drinking episodes. With increasing behavioural experience the association between the two concepts strengthens to the extent that thoughts about the behaviour can activate or prime thoughts about the outcome of the behaviour (Stacy et al., 1994). In addition thoughts about the outcome of the behaviour can also prime or activate thoughts about the behaviour.

Whether alcohol memory associations motivate or bias behavioural decisions is dependent upon the strength of the association between alcohol use and related concepts in memory and the process through which these concepts become activated (Leigh and Stacy, 1998). It is assumed that individuals are motivated or biased into behaving in a certain way as a result of the current pattern of activation of concepts in memory (Stacy et al., 1996). Hence the more accessible an outcome is due to the repeated experience and exposure) the more likely it is to mediate future behaviours as this is the behavioural choice that is likely to come to mind when associated outcomes are considered. In addition when a drug-consistent pattern of activation is evoked by thoughts of behavioural outcomes, it is unlikely that alternative behavioural options will be activated spontaneously (Stacy et al., 1994).

Resulting from the assumptions purported by this model a relationship between alcohol consumption and strength of memory associations between alcohol use and related outcomes of this behaviour should be evident. The results from

Studies 2 and 3 support the model as a significant relationship was found between alcohol use and the number of positive alcohol-related behavioural outcomes that were viewed as resulting from this behaviour. The results indicated that heavier social drinkers hold stronger associations between alcohol use and positive outcomes in comparison to lighter alcohol consumers. In addition the findings from the present research also showed that heavier social drinkers made more associations between alcohol use and negative behavioural outcomes related to this behaviour. Using a covert assessment tool it was found that the activation of both positive and negative memory associations is *dependent on experience* with alcohol use; be it in terms of amount consumed or the number of years that alcohol has been consumed on a *regular basis.*

With regards to the relationship between alcohol use and positive outcomes of this behaviour, previous research conducted by Stacy and colleagues has demonstrated that strength of association between these two concepts is related to level of alcohol consumption experience. In addition to the replication of previous research findings, and the conclusive results concerning negative outcomes of alcohol use, the fact that the same relationship was found using different outcome behaviours and a different research sample (mature social drinkers) provides further support for the model.

With reference to the research findings concerning the positive linear relationship between alcohol use and negative alcohol memory associations, recent research conducted by Wiers, van Woerden and Smulders (2002) provides further support for the view that this type of association can be measured using an implicit research approach. The researchers tested heavy and light drinkers memory associations with explicit positive and negative alcohol expectancies and associations with positive and negative implicit alcohol cognitions. To test the relationship between alcohol consumption and alcohol expectancies two explicit measures were used. To test the relationship between alcohol use and implicit alcohol-related cognitions an adapted version of the Implicit Association Task (IAT, Greenwald, McGhee and Schwartz, 1998) was developed. Using this approach enabled participant's alcohol memory associations for both positive and negative affects of alcohol use to be implicitly measured.

The results from this study showed that both heavy and light drinkers hold strong negative implicit associations with alcohol use. However, a similar result did not emerge when participant's explicit alcohol expectancies were measured in relation to alcohol consumption as only a positive significant relationship between positive alcohol expectancies and alcohol use was found. The authors stated that the results could be viewed as support for the view that implicit and explicit processes separately influence drug-related decision-making. With regards to the findings presented in this thesis, Weirs et al.'s findings provide further evidence that a positive relationship between alcohol use and negative alcohol associations exists and that it can be measured when an implicit, covert assessment tool is used. In Studies 2 and 3 of this thesis, a relationship between alcohol use and negative alcohol memory associations was found using a covert questionnaire. In the Weirs et al., 2002, with regards to implicit alcohol memory associations a similar result was obtained using an IAT test which measured reaction time.

In the Alcohol-Related Association model of alcohol use the level of alcohol experience an individual has is related to the strength of the memory association between alcohol use and related outcomes of this behaviour. Generally when discussing or measuring alcohol experience the amount of alcohol that an individual consumes is used as an indicator of alcohol experience. Therefore, heavier alcohol consumers are viewed as having more alcohol experience than light or non-alcohol consumers. Indeed, previous research (e.g. Stacy et al., 1994; Leigh and Stacy, 1998) and Study 2 from the present thesis have used the present alcohol consumption as a measure of alcohol experience. As the alcohol memory associations of mature alcohol consumers was assessed (Study 3) this enabled an alternative definition of the term experience to be measured and consequently tested.

As previously discussed, alcohol experience can also be defined by the number of years that an individual has been consuming alcohol. Therefore an individual who has been consuming alcohol for 40 years can be viewed as having more alcohol experience compared with an individual who has been consuming alcohol for 4 years. As the association between alcohol use and related outcomes

is strengthened due to repeated experience with alcohol use, one would expect that mature alcohol consumers would hold stronger associations between alcohol use in comparison to young social drinkers. As this was found for both positive and negative outcomes of alcohol use further support for the Alcohol-Related Association Memory Model of alcohol use is provided. In addition, as the younger research sample consumed significantly more alcohol on average, in comparison to the mature social drinkers, this would indicate that alcohol memory associations remain in memory, once formed. Consequently, accessibility may not be dependent on recent alcohol experience or current alcohol consumption.

Although the finding from Study 3 provided support for the Alcohol-Related Association Memory Model with regards to how alcohol memory associations are formed and strengthened, one aspect of the model needs to be questioned in light of this finding. Based on this model it is assumed that individuals who hold strong associations between alcohol use and related outcomes may be motivated to consume alcohol when thoughts of outcomes of alcohol use are considered. However, although stronger associations between alcohol use and related outcomes were found for the mature social drinkers they consumed significantly less alcohol, on average, than the young social drinkers. Initially it may appear that the manner in which alcohol memory associations are purported to influence behavioural decisions may be flawed. However, an alternative explanation may be that negative associations held between alcohol use and negative outcomes of this behaviour might be more influential for the mature alcohol consumers.

In Study 5 it was found that young social drinkers who have made the decision to consume alcohol made more alcohol-related responses to the negative outcomes of alcohol use in comparison to the positive outcomes. This would indicate that activated memory associations between alcohol use and negative outcomes do not appear to influence present behavioural decisions. For young social drinkers it is possible that the negative effects of alcohol use are not as influential as they may be for mature alcohol consumers as they may not be as disruptive. For example, a hangover for a mature alcohol consumer might interfere with work commitments whereas, for a young undergraduate social drinker a hangover may

not be as detrimental. It is possible that negative alcohol memory associations become influential when a certain an age or level of alcohol use is reached.

To conclude the research findings provide support for the Alcohol-Related Association Memory Model of alcohol use. The research findings also demonstrate that individuals do hold memory associations between alcohol use and negative outcomes of this behaviour. In addition the findings showed that when an appropriate assessment tools is used the relationship between alcohol consumption and negative memory associations can be measured. The results indicate that activation of negative outcomes of alcohol use do not influence young social drinkers' decisions to consume alcohol (Study 5). However the results from Study 3 and 4 indicate that activation of negative associations between alcohol use and related outcomes may play an influential role in mature social drinker's decisions to consume alcohol.

8.2 A critique of the Memory Association Questionnaire (MAQ).

Although the original Association Questionnaire (AQ) developed by Stacy et al. (1994) was adapted for the purposes of the present research the MAQ can be *viewed as unique as the* construction of the questionnaire enabled memory associations between both positive and negative alcohol *outcomes of alcohol use* to be measured in an equal, unbiased manner. This feature of the questionnaire enables one to gain a greater insight into the formation of alcohol memory associations that differ in valence. Furthermore, the inclusion of negative outcomes of alcohol use enables preliminary assumptions regarding the role of aversive consequences of alcohol use (alcohol memory associations for alcohol use and negative outcomes) on future decisions to consume alcohol to be made.

As previously discussed (Chapter 2 and Chapter 5), research which examines what motivates individuals to consume alcohol has generally concentrated on the role of PAEs and positive alcohol memory associations. The findings from Study 5 indicate that activated negative alcohol memory associations do not influence young social drinkers behavioural decisions, once a decision to consume alcohol has been made. However, the research findings from Study 3 provide preliminary evidence that negative associations between alcohol use and

related outcomes may play a more influential role for mature social drinkers than for young social drinkers. In addition, the research findings from Study 2 and Study 3 show that negative alcohol memory associations are available and accessible from long term memory.

As negative consequences of alcohol use are represented in association memory it is necessary to develop models of alcohol use which explain the role of negative alcohol memory associations in decisions to consume alcohol. The MAQ can be viewed as a starting point for research designed to elucidate the role of this memory structure in decisions to consume alcohol.

Previous research in this area has relied on samples of low levels of alcohol users for the production of a list of alcohol-related behavioural outcomes for use in testing instruments (e.g. Stacy et al.). As alcohol memory associations are formed through direct experience with alcohol use it is necessary that alcohol-related behavioural norms be elicited from individuals with a sufficient level of *alcohol use experience.* This aids in ensuring that behavioural outcomes of alcohol use that are known to alcohol users are *included in research tools. To* satisfy this prerequisite a sample of regular alcohol consumers (defined as individuals who had consumed at least one alcoholic drink per week in the last six months) were recruited to develop a list of suitable alcohol-related behavioural outcomes to be used as items in the MAQ. Therefore, the MAQ can be viewed as a suitable research tool for measuring the strength of alcohol user's memory associations for outcomes of alcohol use.

As the MAQ was designed to measure the relationship between alcohol use and alcohol memory associations for positive and negative outcomes of this behaviour, an implicit testing approach was developed to ensure that participant's responses were not primed or influenced by external cues (e.g. information on a recruitment poster). Consequently, no references were made to alcohol use during the participant recruitment procedure or during the completion of the MAQ. The method used to recruit participants in Study 2, 3 and 5 ensured that the true purpose of the study was not revealed until after the MAQ was completed.

Although measures were taken to reduce the possibility that participants were not made aware of the true purpose of the study whether participants realised that the study was concerned with alcohol use was not determined. Originally a question at the end of the MAQ, asking participants to state what they thought the study was about, was to be included as a means of addressing this issue. However, it was felt that answers to this type of question may be made based on the last few responses to the behavioural outcome items and therefore not reflect what the participants really thought the questionnaire was testing. On reflection, a measure of the participant's view of the content of the MAQ would aid in assessing whether the covert approach used in the studies aptly conceals what is under investigation. A subtle approach could be used to ascertain if participants realised the MAQ was measuring a feature of alcohol use. For example the researcher could ask the participants, in passing, what they thought the MAQ was measuring and note all responses, verbatim. This information could then be coded to establish which participants realised the study was concerned with alcohol use. This data could then be used as a predictor variable in a hierarchical multiple regression analysis to test if this knowledge resulted in more target responses being given to alcohol-related behavioural outcomes. In addition, whether the covert approach used in the construction and administration of the MAQ adequately disguised the true nature of the MAQ could be assessed.

8.3 Alcohol Memory Associations and Alcohol Consumption Outcome Expectancies.

Recently issues concerning the explicit assessment approach used in alcohol expectancy research and whether this procedure reflects the cognitive processes and propositions which actually motivate ongoing behaviour (McCusker, 2001) have been raised. Consequently, it was suggested that the Alcohol-Related Association model of alcohol use (e.g. Stacy et al., 1994) may be a more appropriate approach for identifying what motivates an individual to consume alcohol (Chapter 3). Whether these approaches should be viewed as separate entities or as approaches that have evolved from a common theoretical background, will now be considered.

In this area of research, it remains an open question whether explicit or implicit cognitive processes are best represented as a processing continuum or as separate processes. Some researchers state that the alcohol memory associations and alcohol outcome expectancies research should be viewed as separate approaches. In line with this view, it has recently been suggested that there may be two types of cognitive structures that influence decision-making:

(i) An implicit cognition component representing the effects of memory associations prompted relatively spontaneously by motivational and situational circumstances.

(ii) An explicit cognitive component representing cognitions amenable to introspection and deliberate decision making processes.

(Ames, cited in Weirs, Stacy and Ames, 2002)

An alternative view in this research area is also held. Other prominent researchers in this area state, the both alcohol memory associations and alcohol outcome expectancies should be included within the general framework of an expectancy system. Goldman et al. state that :

" The commonalties in the available findings serve as a basis for continuing advances that offer a new window on the problem of addiction".
(Goldman et al., 1999, p. 236).

However, by viewing these approaches as a uniform theory, aspects unique to each are lost. Consequently, it is beneficial to make a distinction between alcohol memory associations and alcohol outcome expectancies for the fundamental reason that they appear to be measuring different aspects of the memory representations, which derive from experience with alcohol use. Alcohol memory associations appear to represent unconscious memory structures that implicitly motivate alcohol use decisions. Whereas, alcohol expectancies can be viewed as representations of memory structures that can be verbalised by individuals as these structures represent the consciously held views of alcohol-

effects. In addition, it is likely that testing instruments and designs specific to each approach will yield different and/or additional findings, as the task demands are distinct. For example, the findings in the thesis concerning the linear relationship between alcohol use and memory associations for negative alcohol-related outcomes, indicates that the methodology utilised in association research may enable memory representations which are *not evident when measured* explicitly, to be measured.

Although these approaches differ, one similar feature does exist; this concerns the formation of these memory structures. Alcohol expectancies are formed through the process of learning, as is the initial stage of formation for memory associations. However the formation of alcohol memory associations is a two stage process as once initially formed (available in memory) they may become strengthened as a result of repeated experience with or exposure to alcohol use and related behavioural outcomes. It is this aspect of the formation of memory associations, which differs from that of expectancies. It is possible to view alcohol outcome expectancies as the starting point of alcohol memory associations - the knowledge that individuals possess concerning the effects of alcohol use.

The best approach to the investigation of the motivational properties that influence behavioural decisions concerning alcohol use might be one which assesses the role of both alcohol outcome expectancies and alcohol memory associations. Although alcohol memory associations may provide a deeper understanding, with reference to processes which unconsciously bias behavioural decisions, explicit measures may serve as indicators of the information that is available, but not necessarily accessible, in association memory.

8.4 Clinical applications of the MAQ.

In Cognitive Behavioural Coping Skills Therapy (CBST) for alcohol dependence the main goal is to treat the patient by improving his or hers cognitive and behavioural skills for changing problem behaviour. Although numerous treatment approaches have been developed in this area (e.g. Cognitive Model Worksheets, The Advantages-Disadvantages Analysis and the Three-Question

Technique) a recent review paper of CBST for alcohol dependence (Longabaugh and Morgenstern, 1999) highlighted two key principles that provide the fundamental basis for cognitive behavioural derived therapies. The two key components are summarised as:

(i) Cognitive behavioural treatment programs espouse the principles of social cognitive theory (Bandura, 1986). As applied to alcohol dependence these principles postulate a central role for coping skills. The guiding theory is that deficits in the ability to cope with life stress in general and with alcohol-related stimuli in particular help maintain excessive drinking and lead to a resumption of drinking following aborted attempts at abstinence.

(ii) Cognitive behavioural based therapies employ some form of individual coping skills training in order to address the patient's deficits. CBST teaches skills to help the patient identify specific situations in which coping inadequacies occur.

(Longabaugh and Morgenstern, 1999, p. 79.)

With reference to the above statements it would appear that two key components of this type of therapy involve the patient identifying what situations they relate with alcohol use and the development of coping strategies to avoid using alcohol in such situations.

As the treatment procedures used in this type of therapy focus on situations that cause alcohol use rather than on alcohol consumption itself, the MAQ could be used as an instrument that aids in identifying the situations and activities that the patient relates to alcohol use. In addition, the results from the MAQ could be used by the therapist to develop a personalised treatment profile with the emphasis on what type of coping skills need to be learnt in order to best avoid adverse behavioural choices.

With reference to the participants alcohol-related responses to the negative behavioural outcomes of alcohol use this information could be used by the therapist to make the negative consequences of alcohol use, that are specific to

the patient more salient. This would aid in reinforcing the need to change and unlearn adverse behaviour.

In this type of therapy a main aim is to free the patient to choose other ways of *interpreting and* reacting to their situation drawing from the fullest possible range of alternative options (Salkovskis, 1996, Ch. 3). *Although there is an element of* guided discovery in this type of treatment, whereby the therapist helps the patient explore alternative ways of looking at a situation, the alternative options arrived at need to be acceptable to the patient. By completing the MAQ, this would enable the participant to identify the situations that they relate with alcohol use. Hence, the results from the MAQ could act a starting point to the development of alternative coping strategies and skills for the patient as well as the therapist.

As the MAQ is implicit in nature this may enable associations to be made between alcohol use and behaviours and activities that the patient does not consciously relate with alcohol use. However, as the patient has sought help for problem drinking and as they are in a treatment setting, which is designed to address this issue, it is likely that they will realise that the MAQ is concerned with alcohol use. Whether this will affect the type of responses that are generated by the patient is questionable. As the patient wants to learn how to change their problematic behaviour it is possible that they will view the MAQ as a means learning about the situations that they associate with alcohol use. Alternatively, the alcohol connection with the MAQ could be minimised by presenting the questionnaire to patients as an association questionnaire designed to assess a range of behaviours and lifestyle choices.

Although there would appear to be a use for the MAQ in a clinical setting, the length of the questionnaire could be problematic. The original MAQ takes approximately 45 minutes to complete and the condensed version takes approximately 30 minutes to complete. However for the proposed role of the MAQ in a cognitive behavioural treatment setting, rather than reducing the completion time by removing certain behavioural outcomes, it may be more beneficial to administer the questionnaire over two sessions. The MAQ could be

divided into two questionnaires by separating the positive and the negative behavioural outcome items.

Although the implicit nature of the MAQ may not be maintained if it was used in a treatment setting it would appear that this type of questionnaire would aid the treatment process by helping the patient and the therapist identify specific situations that the patient relates to alcohol use. In addition, the questionnaire could be used to highlight the negative effects of alcohol use, which are already known to the individual. The MAQ may also be useful in other alcohol treatment settings, such as brief intervention, as the questionnaire could be used as a starting point to identify the situations that the individual associates with alcohol-related behaviour.

8.5 The limitations of the present research and suggestions for future research.

The present series of studies shows that there is a relationship between alcohol use and the strength of association between memories for positive and negative consequences of this behaviour. However, the work conducted thus far does not assess whether activated alcohol memory associations serve to influence drinking behaviour once a decision to consume alcohol has been made. The primary role of alcohol memory associations appears to be one that serves to prompt and motivate decisions to consume alcohol. However, research which investigates influential properties of activated alcohol memory associations, with regards to amount of alcohol consumed, would aid in understanding how underlying memory structures interact with drinking behaviour once a decision to consume alcohol has been made. To assess the role of activated alcohol memory associations with regards to amount of alcohol consumed, individuals who have consumed a range of alcohol could be tested using the MAQ. This would enable one to assess whether alcohol memory associations become more activated in relation to the amount of alcohol consumed.

The results from Studies 3 and 4 indicate that mature alcohol consumers hold alcohol memory associations between alcohol use and negative outcomes of this behaviour that are different to those held by young alcohol consumers. Although the research findings from this study provide support for the Alcohol-Related

Association Memory Model of alcohol use it may be beneficial to generate association questionnaires that are specific to certain age groups. The procedure used to generate suitable outcomes for use in the MAQ (Chapter 4) could be applied to different age groups. The results from this process would further the understanding of the formation of alcohol memory associations as one would be able to assess whether different age groups generate the same type of outcomes.

In line with the assumptions purported by the Alcohol-Related Association Memory Model of alcohol use (e.g. Stacy et al.) alcohol memory associations are formed through experience with alcohol use. Although it would appear that actual experience between behaviour and related outcomes is essential for an association to strengthen, it would be interesting to investigate whether certain external influences can result in the formation of associations. In addition, it would be useful to test whether such associations serve to bias behavioural options or if associations formed through direct use with alcohol are more influential. In considering what learning conditions result in the formation of alcohol-related memories, specific groups of individuals who are likely to have been exposed to negative adverse effects of alcohol use could be tested (e.g. children of alcoholics or spouses of alcoholics. This type of research would provide a starting point for establishing if external aspects, in addition to the effects of experience with alcohol, contribute to the formation of alcohol memory associations.

It has been suggested that negative alcohol memory associations do not impact on decisions to consume alcohol (Study 5) as negative consequences of alcohol use are mainly distal in nature. As the negative effects of consuming alcohol tend to occur the next day it would be interesting to measure alcohol memory associations of individuals with hangovers. As the negative effects of alcohol use are likely to be more salient and perhaps more intrusive and problematic the day after alcohol has been consumed it is possible that individuals with hangovers would generate more target responses for negative alcohol-related behavioural outcomes in the MAQ compared to individuals who are not experiencing a hangover. In order to test this assumption the same covert assessment approach utilised in Studies 2 and 3 could be used. As it would not

be possible to approach individuals and ask them if they were experiencing an hangover, this study would have to be part of a larger research project in order to ensure that an adequate number of individuals with hangovers were tested.

8.6 Conclusion

The research findings from this thesis show that there is a positive linear relationship between alcohol use and the strength of memory associations for both positive and negative alcohol memory associations. This result was found using a sample of young undergraduate social drinkers and mature social drinkers. It was also demonstrated that the concept experience can be measured in an alternative way, as the number of years that an individual has been consuming alcohol also can also be used as an indication of level of alcohol experience. The results from the studies reported in this thesis provide further support for the Alcohol-Related Association Memory Model of alcohol use. In *addition to discussing* the clinical applications of the MAQ, four areas of future research have been proposed to aid in a deeper *understanding of the influential* role of memory for previous alcohol experiences regarding processes involved in decisions to consume alcohol.

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APPENDIX A - Results of the comparisons, with regards to demographic information, made between participants in Studies 1-4

In Study 1, 2 and 3 a series of statistical analyses were conducted to test whether there were significant difference between participants on the following demographic variables:

(i) The age of the male and female participants.

(ii) The number of participants who had received treatment for an alcohol-related problem

(iii) The number of male and female participants who stated that they had an immediate family member who had experienced an alcohol-related problem.

To test whether the age of the participants significantly *differed, the Mann Whitney U-*test was used. This test was used as the data was not normally distributed (assessed using the Kolmogorov-Smirnov test) and therefore did not meet a key assumption of the parametric independent t-test. To test whether the number of participants who stated that they had been treated for an alcohol-related problem the chi-square test was used. This test was also used to test whether there was a significant difference regarding the number of male and female participants who stated that they had an immediate family member who had experienced an alcohol-related problem.

The reason for conducting these analyse has been discussed within the result sections of the appropriate chapters. However to summarise, the tests were conducted in order to establish equivalency or highlight differences, between participants in Studies 1-3. Therefore, comparisons were made between the following research samples:

(i) Study 1 and Study 2

(ii) Study 2 and Study 3.

In addition, statistical tests were carried out to highlight within group (male and female) similarities and differences. As before the variables of interest were the participant's age, the number who had received treatment for an alcohol-related problem and the

number who had an immediate family member who had experienced an alcohol-related problem. Male and female comparisons were carried out for the data obtained for Study 1, 2, 3 and 4.

Previously, in Chapters 4, 5 and 6 the results of the comparison tests were summarised. Information on the statistical findings will now be provided. The results for the within group comparison tests will firstly be presented by study. The results for the between group comparison tests will then be presented.

Study 1 comparisons between the male and female participants

There was no significant difference between the male (Mdn = 19 years) and female (Mdn = 19 years) participant's ages in this study as U = 8466.5, p =.80. With reference to the number of male and female participants who stated that they had received treatment for an alcohol-related problem there was no significant difference as χ^2=1.11, df = 1, = n.s. Likewise, there was no significant difference in the number of male and female participants who stated that an immediate family member had experienced an alcohol-related problem χ^2=0.51, df = 1, = n.s

Study 2 comparisons between the male and female participants.

No significant differences were found between the age of the male and female male participants U = 1096.0, p = .96 or the age (Mdn age for males and females = 16 years) when they began to consume alcohol U = 1077.5, p = .85. With regards to the number of male and female participants in the present sample who stated that they had received treatment for an alcohol-related problem, there were no significant proportional differences between the male and female participants as χ^2 = 1.29, df = 1, n.s. With reference to the number of participants in each sample who stated that they had an immediate family member with an alcohol-related problem, there were also no significant differences as χ^2 = 1.19, df = 1, n.s.

Study 3 comparison of the male and female participants.

A significant difference in the male (Mdn = 47.5) and female (Mdn = 42) participants age was found as U = 922.5, p = 0.05. The chi-square test was used to examine if there

was a significant difference in the number of male and female participants who stated that they had received *treatment for an alcohol-related problem.* A significantly greater number of male participants compared with the female participants stated that they had received treatment as $\chi^2 = 4.70$, df = 1, p =.003. When the number of male and female participants who stated that an immediate family member had an alcohol-related problem was statistically compared no significant difference was found as $\chi^2 = 1.99$, df = 1, n.s.

Study 4 comparisons between the male and female participants.

There was no significant difference between the male and female participants age as U = 8357.0, p = 0.09. However the male participants were consumed significantly more alcohol (M= 5.31, SE = .65).on the heaviest drinking day of the previous week in comparison to the female participants (M=3.03, SE = .23) as t (298) = 4.14, p =.000. With reference to the number of male and female participants who stated that they had received treatment for an alcohol-related problem there was no significant difference as $\chi^2 = 0.04$, df = 1, n.s. No significant differences were found when statistical comparisons were made for the number of male and female participants who stated that they had an immediate family member who had an alcohol-related problem as $\chi^2 = 0.737$, df = 1, n.s.

The results from the between group comparisons.

Comparisons between the participants from Study 1 and Study 2.

No significant differences were found between the two samples with reference to age U = 14430.00, p = .78 (Study 1 Mdn age = 20.1, Study 2 Mdn age = 19). With reference to the number of participants who stated that they had received treatment for an alcohol-related problem, there was no significant difference as. $\chi^2=0.49$, df = 1, n.s. In addition no significant difference between the samples with reference to the number of participants who had an immediate family member with an alcohol-related problem as $\chi^2 = 1.63$, df = 1, n.s.

Further analyses were carried out which examined the information obtained from the DIQ for male participants and female participants. No significant differences were found between the age of the male participants in the two studies U = 1759.5, n.s. (Study

1 Mdn age = 20.1 and Study 2 Mdn age = 19 years). With reference to the female participants, no significant differences were found between the age of the two samples U = 5696.0, p =.65 (Study 1 Mdn age = 20.6 and Study 2 Mdn age = 19 years).

There were no significant differences regarding the number of male participants in Study 1 and 2 who reported that they had received treatment for an alcohol-related problem as $\chi^2 = 1.02$, df = 1, n.s. Likewise there was no significant difference between the female participants in the two samples who have received treatment in the two samples as $\chi^2 = 0.62$ df = 1, n.s.

With reference to the number of participants who stated that they had an immediate family member who had an alcohol-related problem there were no significant differences between the male participants in the two samples $\chi^2 = 0.6$ df=1, n.s. or between the female participants in the two samples as $\chi^2 = 0.58$, df = 1, n.s.

Comparisons between the samples from Study 2 and Study 3

A significant difference was found with regards to the number of participants in each research sample who had received treatment for an alcohol-related problem as $\chi^2 = 3.94$, df = 1, p =.05. In Study 3, 11.22% of the participants stated that they had received treatment for an alcohol-related problem, whereas 2.04% of the participants in Study 2 had stated that they had received treatment.

With reference to the number of participants in each of the samples who stated that an immediate family member had an alcohol-related problem there was no significant difference $\chi^2 = 0.50$, df = 1, n.s.

Comparisons between the male and female participants from Study 2 and Study 3.

With reference to the number of the male participants who stated that they had received treatment for an alcohol-related problem there was a significant difference between the males in Study 2 and Study 3 $\chi^2 = 4.38$, df = 1, p =.03. A greater number of males in Study 3 (18.00%) compared to the males in Study 2 (2.04%) stated that they had received treatment for an alcohol-related problem. With reference to the females, there

was no significant difference between the participants in Study 2 and 3 who had received treatment for an alcohol-related problem as $\chi^2 = 1.97$, df = 1, n.s.

There was no significant difference with regards to the number of male participants who stated that an immediate family member had experienced an alcohol-related problem as $\chi^2 = 0.26$, df = 1, n.s. Likewise, there was no significant difference for the number of female participants in each sample who stated that they had an immediate family member who had an alcohol-related as $\chi^2 = 0.46$, df = 1, n.s.

APPENDIX B - The Consumption Outcome Questionnaire (COQ)

Thank you for taking time to complete the following questionnaire. Please remember that all information provided is **anonymous**.

Please write down 10 pleasant or good things that can happen to you when you drink alcohol. You should only spend a few minutes on this.

Please write down 10 unpleasant or bad things that can happen to you when you drink alcohol. You should only spend a few minutes on this.

APPENDIX C - Demographic Information Questionnaire

In this section we would like to find out a bit about you. Again all information provided is anonymous. Please circle/tick the appropriate answer.

Gender? Male/female

Your age? _____

At what age did you start drinking regularly? _____

Have you ever been treated for a drink problem? *YES/NO*

Please circle any member of your family who has had a drink problem:

Mother	Father	Sister	Brother	Grandmother
Grandfather	Aunt	Uncle	Cousin	

APPENDIX D - An Adapted Version of the Time-Line-Follow-Back Drinking Diary (Sobell and Sobell, 1992).

Please indicate in the table below how much alcohol you consumed on each day of the **immediately previous week** by stating **where** you consumed the drink (for example, pub/home), the **type** of drink (for example, lager, wine or beer) and **how much** of that particular drink you consumed (e.g. 1 pint, 1/2 pint or 2 glasses).

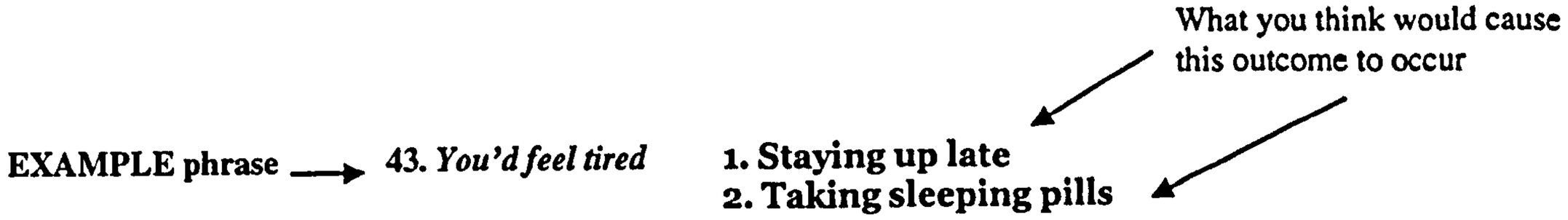
	Where consumed?	What type of drink?	How many drinks?	What size of drink?
Yesterday				
The day before yesterday				
.....				
.....				
.....				
.....				

Is this a typical drinking week? YES/NO
If not would you normally drink more or less? YES/NO
If you have answered that it is not a typical drinking week (e.g. you would normally drink more or less) please fill in another drinking diary to show what a typical week would be like. Please follow the previous instructions.

APPENDIX E -The Memory Association Questionnaire (MAQ) instruction page and a list of the behavioural outcome items used in the questionnaire.

This booklet contains a list of phrases that are potential results of carrying out some behaviour or activity. What you have to do is read each phrase and write down next to it the <u>first</u> and <u>second</u> behaviour or activity that immediately comes to mind.

For example one phrase in the list might be *You'd feel tired.* You might think that *staying up late* and *taking sleeping pills* causes this behaviour.



So, we give you a result or consequence and you give us two behaviours/activities that you think might cause it.

Don't spend too long on each phrase just do it as quickly as you can and don't leave any out. It will probably take you about 45 minutes to complete. Any questions? If not please wait for the experimenter to tell you to start.

Below is the list of the behavioural outcome items used in the MAQ. They are presented in the order the appeared in form 1 of the MAQ. (In form 2 they were presented in reverse order). In the original questionnaire format, five behavioural outcomes appeared on each page. At the top of each page the phrase "What behaviour or activity would make it likely that....." appeared in bold.

	Response 1	**Response 2**
1. You'd have fun	.....	.....
2. You'd feel healthier	.....	.....
3. You'd have a headache	.....	.....
4. You'd have better skin	.....	.....
5. You'd feel confident	.....	.....
6. You'd feel under pressure	.....	.....
7. You'd be sick	.....	.....
8. You'd breathe better	.....	.....
9. You'd feel in a good mood	.....	.....
10. You'd feel toned	.....	.....
11. You'd become too emotional	.....	.....
12. You'd feel delighted	.....	.....
13. You'd be more talkative	.....	.....
14. You'd feel exhilarated	.....	.....
15. You couldn't see properly	.....	.....
16. You'd wasted your time	.....	.....
17. You'd feel relaxed	.....	.....
18. You'd feel sweaty	.....	.....
19. You'd feel sick	.....	.....
20. You'd feel exhausted	.....	.....
21. You'd feel good about yourself	.....	.....
22. You'd feel sore	.....	.....
23. You'd pass out	.....	.....
24. You'd feel lifeless	.....	.....
25. You'd feel warmer	.....	.....
26. You'd feel wheezy	.....	.....
27. You'd become horrible	.....	.....
28. You'd be interested	.....	.....
29. You'd feel happy	.....	.....
30. You'd feel like a scholar	.....	.....
31. You'd throw up	.....	.....
32. You'd have a better future	.....	.....
33. You'd feel more at ease	.....	.....
34. You get more respect	.....	.....
35. You'd lose your possessions	.....	.....
36. You'd get lost	.....	.....
37. You'd sleep better	.....	.....
38. You'd get a good job	.....	.....
39. You'd feel paranoid	.....	.....
40. You'd feel ashamed	.....	.....
41. You'd feel more sociable	.....	.....
42. You'd have more money	.....	.....
43. You'd fall down	.....	.....
44. You'd be in danger	.....	.....
45. You'd dance better	.....	.....
46. You'd feel contented	.....	.....
47. You'd have poor co-ordination	.....	.....
48. You'd take risks	.....	.....

49. Things would seem funnier	.....	.....
50. You'd feel disgusted	.....	.....
51. You'd lose sense of responsibility	.....	.....
52. You'd feel pleased	.....	.....
53. You'd have a good time	.....	.....
54. You'd feel frightened	.....	.....
55. You'd make a fool of your-self	.....	.....
56. You'd be in debt	.....	.....
57. You'd feel hyper	.....	.....
58. You'd feel peaceful	.....	.....
59. Your reactions would slow down	.....	.....
60. You'd feel bitter	.....	.....
61. You'd be out going	.....	.....
62. You'd feel important	.....	.....
63. You'd have poor judgement	.....	.....
64. You'd feel *resentful*	.....	.....
65. You'd find it easier to pull someone	.....	.....
66. You'd feel fulfilled	.....	.....
67. You'd experience memory loss	.....	.....
68. You'd feel drained	.....	.....
69. You'd feel amorous	.....	.....
70. You'd feel like a scapegoat	.....	.....
71. You'd have an accident	.....	.....
72. You'd feel poor	.....	.....
73. You'd have a sense of well being	.....	.....
74. You'd experience new things	.....	.....
75. Your thought processes would be slowed	.....	.....
76. You'd broaden your horizons	.....	.....
77. You'd laugh more	.....	.....
78. You'd feel weak	.....	.....
79. You'd become violent	.....	.....
80. You'd feel anxious	.....	.....
81. You'd feel elated	.....	.....
82. You'd feel frustrated	.....	.....
83. You'd feel dizzy	.....	.....
84. You'd feel it was endless	.....	.....
85. You'd feel sexier	.....	.....
86. You'd have a sense of purpose	.....	.....
87. You'd lose respect for people	.....	.....
88. You'd feel stressed	.....	.....
89. You'd have a laugh	.....	.....
90. You'd earn money	.....	.....
91. You'd lose control	.....	.....
92. You'd feel humbled	.....	.....
93. You'd feel great	.....	.....
94. You'd feel hated	.....	.....
95. You'd feel ill	.....	.....
96. You'd feel self-satisfied	.....	.....
97. You'd feel closer to people	.....	.....
98. You'd feel enlightened	.....	.....
99. You'd act impulsively	.....	.....
100. You'd be bored	.....	.....
101. You'd meet new people	.....	.....
102. You'd be best at it	.....	.....
103. You'd have sexual encounter with someone unattractive	.....	.....
104. You'd feel proud	.....	.....
105. You'd feel high	.....	.....

106. You'd feel bloated	.....	.....
107. You'd drop your defences	.....	.....
108. You'd feel superior	.....	.....
109. You'd find people more attractive	.....	.....
110. You'd feel glum	.....	.....
111. You'd feel drowsy	.....	.....
112. You'd feel self-righteous	.....	.....
113. You'd feel good	.....	.....
114. You'd reduce your debt	.....	.....
115. You'd feel regret the next day	.....	.....
116. You'd feel moody	.....	.....
117. You'd sing better	.....	.....
118. You'd feel like a hero	.....	.....
119. You'd fall out with friends	.....	.....
120. You'd feel lonely	.....	.....
121. You'd be able to chat up someone you fancy	.....	.....
122. You'd feel fit	.....	.....
123. You'd experience problems with sex	.....	.....
124. You'd feel nervous	.....	.....
125. You'd find it easier to talk to people	.....	.....
126. You'd feel secure	.....	.....
127. You'd annoy people	.....	.....
128. You'd feel independent	.....	.....
129. You'd have more energy	.....	.....
130. You'd feel restricted	.....	.....
131. You'd spend a lot of money	.....	.....
132. You'd feel more knowledgeable .	.....	.....

Appendix F - The Similarity Questionnaire (SQ) - The instructions page.

Below are thirty-one pairs of phrases. What you need to do is rate how similar in meaning you think the two phrases are on the scale provided underneath each pair of phrases.

The rating system is as follows:

1= extremely similar
2= *fairly similar*
3= slightly similar
4= slightly different
5= fairly different
6= extremely different

For example you might think that *feel lonely* and *feel sad* are extremely similar in meaning then-

1. Feel lonely Feel sad

2 3 4 5 6

extremely similar.....extremely different

(1)

In total this should only take you about 5 minutes to complete. Thank you for your time.

In total, there were 20 pairs of phrases presented in the SQ. Participants were asked to look at the phrases and rate on a scale of 1-6 how similar they were in meaning:

1 2 3 4 5 6
extremely similar.....extremely different

Below is a list of the phrase pairs in the order in which they appeared in the SQ.

1. To feel frustrated	To feel confused
2. To feel stressed	To feel anxious
3. To get lost	To forget things
4. To feel sore	To hurt yourself
5. To feel poor	To spend too much money
6. To feel lonely	To feel depressed
7. To feel bloated	To feel sick
8. To feel sweaty	Face goes all red
9. To be in debt	To spend too much
10. To feel ashamed	To make a fool of yourself
11. To feel exhausted	To feel tired
12. To feel frightened	To be attacked
13. To feel lifeless	To get sick
14. To be in danger	To have an accident
15. To take risks	To have an accident
16. To feel glum	To feel sad
17. To feel nervous	To feel anxious
18. To feel weak	To feel tired
19. To feel moody	To feel depressed
20. To feel drained	To feel tired

APPENDIX G - The Condensed Memory Association Questionnaire (CMAQ)

Below is the list of the behavioural outcome items used in the CMAQ. They are presented in the order the appeared in form 1 of the CMAQ. (In form 2 they were presented in reverse order). In the original questionnaire format, five behavioural outcomes appeared on each page. At the top of each page the phrase "What behaviour or activity would make it likely that....." appeared in bold. The instruction page used in the MAQ (p.) was also used in the CMAQ.

		Response 1	**Response 2**
1.	You'd have a headache	.....	.....
2.	You'd feel healthier	.....	.....
3.	You'd feel confident	.....	.....
4.	You'd have better skin	.....	.....
5.	You'd feel sick	.....	.....
6.	You'd feel under pressure	.....	.....
7.	You'd feel in a good mood	.....	.....
8.	You'd breathe better	.....	.....
9.	You couldn't see properly	.....	.....
10.	You'd feel toned	.....	.....
11.	You'd feel relaxed	.....	.....
12.	You'd feel delighted	.....	.....
13.	You'd be sick	.....	.....
14.	You'd feel exhilarated	.....	.....
15.	You'd feel good about yourself	.....	.....
16.	You'd wasted your time	.....	.....
17.	You'd become horrible	.....	.....
18.	You'd feel sweaty	.....	.....
19.	You'd feel happy	.....	.....
20.	You'd feel sore	.....	.....
21.	You'd throw up	.....	.....
22.	You'd feel warmer	.....	.....
23.	You'd feel more at ease	.....	.....
24.	You'd feel wheezy	.....	.....
25.	You'd feel paranoid	.....	.....
26.	You'd be interested	.....	.....
27.	You'd feel more sociable	.....	.....
28.	You'd feel like a scholar	.....	.....
29.	You'd fall down	.....	.....
30.	You'd have a better future	.....	.....
31.	You'd dance better	.....	.....
32.	You'd get more respect	.....	.....
33.	You'd lost your sense of responsibility	.....	.....
34.	You'd get lost	.....	.....
35.	You'd have a good time	.....	.....
36.	You'd have more money	.....	.....
37.	You'd make a fool of yourself	.....	.....
38.	You'd be in danger	.....	.....
39.	You'd feel hyper	.....	.....
40.	You'd feel contented	.....	.....
41.	You'd lose your judgement	.....	.....
42.	You'd take risks	.....	.....
43.	You'd find it easier to pull people	.....	.....
44.	You'd feel disgusted	.....	.....
45.	You'd experience memory loss	.....	.....
46.	You'd feel pleased	.....	.....
47.	You'd feel amorous	.....	.....
48.	You'd feel frightened	.....	.....
49.	Your thought processes would be slowed	.....	.....
50.	You'd be in debt	.....	.....

51. You'd laugh more	.....	.....
52. You'd feel peaceful	.....	.....
53. You'd become more violent	.....	.....
54. You'd feel bitter	.....	.....
55. You'd feel elated	.....	.....
56. You'd feel important	.....	.....
57. You'd lose respect for people	.....	.....
58. You'd feel resentful	.....	.....
59. You'd have a laugh	.....	.....
60. You'd feel fulfilled	.....	.....
61. You'd lose control	.....	.....
62. You'd feel like a scapegoat	.....	.....
63. You'd feel great	.....	.....
64. You'd feel poor	.....	.....
65. You'd act impulsively	.....	.....
66. You'd experience new things	.....	.....
67. You'd broaden your horizons	.....	.....
68. You'd meet new people	.....	.....
69. You'd have sexual encounters with someone unattractive	.....	.....
70. You'd feel anxious	.....	.....
71. You'd feel high	.....	.....
72. You'd feel frustrated	.....	.....
73. You'd feel drowsy	.....	.....
74. You'd feel it was endless	.....	.....
75. You'd feel good	.....	.....
76. You'd have a sense of purpose	.....	.....
77. You'd feel regret the next day	.....	.....
78. You'd earn money	.....	.....
79. You'd sing better	.....	.....
80. You'd feel humbled	.....	.....
81. You'd experience problems with sex	.....	.....
82. You'd feel hated	.....	.....
83. You'd find it easier to talk to people	.....	.....
84. You'd be bored	.....	.....
85. You'd annoy people	.....	.....
86. You'd feel bloated	.....	.....
87. You'd have more energy	.....	.....
88. You'd feel restricted	.....	.....

Appendix