Efficacy of Brief Alcohol Interventions in an Australian Tertiary Education Setting

Thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Psychology

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Declaration

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

.....................

Peter James McPherson

15th February 2012
Abstract

Published alcohol intervention research with Australian university populations is limited, despite data indicating high levels of harmful consumption in this population. This two-stage study sought to describe the prevalence of harmful alcohol behaviours and attitudes towards various alcohol treatment modalities amongst a large Australian university sample, and compare the efficacy of a brief face-to-face and online intervention in influencing alcohol related variables.

In Study One, 1046 participants, comprising 580 females ($M = 23.42$ years, $SD = 6.11$) and 466 males ($M = 23.47$ years, $SD = 6.69$) completed questionnaires assessing harmful alcohol use and attitudes toward a range of various alcohol treatment modalities. Data showed a high proportion of harmful alcohol use, and an overwhelming endorsement of brief face-to-face and anonymous online treatment approaches. Participants, who volunteered for Study Two and recorded a total AUDIT score $\geq 8$, were then contacted for involvement in Study Two.

In line with international intervention research, and participant modality preferences noted in Study One, Study Two utilised an RCT design to compare the efficacy of two brief alcohol interventions. Eligible participants ($n = 90$) were randomised to receive the brief face-to-face intervention (BASICS), brief online intervention (e-CHUG) or to a wait list control condition. All participants completed the Alcohol Use Disorder Identification Test (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), Readiness to Change Questionnaire (RTCQ; Heather, Gold, & Rollick, 1991) and Rutgers Alcohol Problems Inventory (RAPI; White & Labouvie, 1989). Intervention groups completed additional measures of peak alcohol consumption, weekly alcohol consumption and estimated BAC. Assessments were conducted at baseline, 1-month and 3-month follow up.

 Neither the BASICS nor e-CHUG group demonstrated a significant change in total AUDIT across the three assessment periods. Conversely, the control group demonstrated significant reduction in total AUDIT score from baseline to 3-month follow up. The BASICS group demonstrated significant reductions in peak alcohol consumption and mean weekly consumption from baseline to 3-month follow up, whilst the e-CHUG group did not evidence any significant change in these variables across the same period. Neither group demonstrated significant changes in peak BAC across the assessment period.

Explanations for the reduction in harmful drinking behaviours demonstrated by the control group are proposed, along with a detailed discussion of the apparent superiority of BASICS over e-CHUG in influencing alcohol variables in this study. The author proposes the utilisation of the stepped care model, incorporating both online and face-to-face intervention, in Australian universities.
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Chapter 1. Introduction and Overview

1.1 Alcohol and Its Impact

As stated by the Australian Institute of Health and Welfare (AIHW), “Alcohol is the most widely used psychoactive, or mood-changing, recreational drug in Australia” (2005, p.10). Contemporary Australian drinking statistics indicate that 84% of the population aged 14 years and over have consumed one full serve of alcohol in the past 12 months, while 9% of Australians identify as daily drinkers (AIWH, 2005a). Indeed, empirical and anecdotal research suggests that drinking is an intrinsic aspect of Australia culture and is widely considered to be both liberating and empowering (Shanahan, Wilkins & Hurt, 2002). Unfortunately, dangerous drinking behaviours are also commonplace in Australia; approximately 35% of Australians aged 14 years and over drink in a fashion that puts them at risk for short term harm, while 10% consume alcohol in a manner that puts them at risk for long term harm (AIWH, 2005a).

The need to deal with harmful alcohol consumption in Australia, at both state and federal levels, has been highlighted by recent inquiries such as the Drugs and Crime Prevention Committee in 2006 and has resulted in coordinated action plans such as Victoria’s Alcohol Action Plan, 2008-2013 (Victorian Government, Department of Health, 2008). The health and social benefits of reducing the morbidity and mortality related to alcohol misuse are significant, with alcohol risk accounting for 4.9% of disease burden (World Health Organisation, 2000). The economic costs of alcohol misuse are also considerable with recent estimates of the total annual costs to Australia from alcohol and other drugs estimated as at least $6.7 billion. Nationally in 2003, health care costs related to alcohol and drugs were estimated at $74 million. Production losses, including absenteeism,
sickness and injury attributable to alcohol and other drugs were estimated at $1.5 billion, and crime associated with illicit drugs and alcohol estimated at $649 million (Colins, Lapsley, & Mark, 2007).

One group shown to be at particular risk for alcohol-related harm are university students. Due to unique situational, environmental, cultural and age-related factors, university students drink at higher rates than non-university peers and report higher levels of alcohol-related harm (Kypri, Cronin & Wright, 2005; Polizzotto, Saw, Tjhung, Chua & Stockwell, 2007). Recent research by Roche and Watt (1999) found that 69% of Australian university students in their sample reported drinking at harmful levels and 32% reported suffering from an alcohol-related accident or injury in the past year. Survey data indicates that drink-driving, violence, ‘blacking out’, vomiting, unprotected sex, missed classes and lowered academic achievement are all commonly reported consequences of excessive drinking amongst Australian university students (McGee & Kypri, 2004; NSW Health, 2001). In spite of these observations, alcohol-focused presentations to Australian university counselling services are minimal (Urbis, 2007). Current trends in drinking behaviours amongst Australian tertiary students necessitate a thorough investigation of effective, evidence-based alcohol interventions that are appropriate to the university setting.

1.2 Rationale and Aims of the Study

In light of these data, it is clear that Australian tertiary educational institutions face significant challenges in addressing problematic alcohol consumption amongst students. Firstly, accessible, cost effective and evidence-based harm minimisation strategies must be identified and, secondly, comprehensive health promotions frameworks must be developed to facilitate effective delivery of these strategies. At present, however, there are very few
published studies examining the efficacy of alcohol interventions with Australian university student. Many Australian universities currently employ educational and awareness based interventions, yet evidence from both Australian and international studies suggest that while these approaches often demonstrate increases in alcohol-related knowledge, they are largely ineffective in influencing alcohol related behaviours or attitudes (Larimer & Cronce, 2002; Moskowitz, 1989; Ricciardelli & McCabe, 2008; Walters, Bennett & Noto, 2000). The current research aims to extend the knowledge base and research evidence related to the efficacy of online and brief interventions with an Australian tertiary education student population.
Chapter 2. Alcohol and University

Prior to any discussion of interventions for problematic alcohol use, it is important to establish the prevalence of problematic alcohol behaviors in the target population. The aim of the current chapter is to provide a snapshot of current alcohol consumption behaviors in Australian university populations. Initially, current definitional issues in the alcohol literature and the implications of definitional inconsistencies on the evaluation of research will be discussed. In the context of this discussion, research relating to short and long term harm associated with alcohol misuse will be explored. Then, current literature regarding alcohol use amongst Australian university students will be considered including prevalence and frequency data and research related to alcohol-related harm amongst this population, augmented by data pertaining to young Australian adults. Finally, the consumption patterns of university and non-university populations will be compared and features of the university populations discussed.

2.1. Definitional Issues and Alcohol Related Harm

Alcohol research has been plagued by inconsistent definitions of problematic drinking behaviours, particularly when focussing on university populations (Ham & Hope, 2003). Variation in definitions among published studies makes comparison of descriptive and outcome data challenging. Commentators have highlighted that the literature tends to conceptualise problematic drinking in one of two ways: first, problematic drinking defined by alcohol consumption rates and levels, or second, problematic drinking defined by negative outcomes or consequences (Baer, 2002; Ham & Hope, 2003). For example, a common drinking pattern of this group, associated with rapid consumption and intoxication, is often described in the literature as ‘binge drinking'; however, there is no international or
local consensus about what constitutes a ‘binge’ or how, in qualitative or quantitative
terms, it should be defined (Read, Beattie, Chamberlain, & Merrill, 2008; Roche, 1999).
Definitions of ‘binge drinking’ differ widely, with some definitions focussing on blood alcohol
concentration (USA), drinks per session (Australia), bottles of alcohol per session (Finland
and Sweden) or percentage of the weekly recommended intake in one session (Canada)
(McCarthy, 2006). Confusing the issue further, terms such as ‘heavy drinking’, ‘harmful
drinking’ and ‘binge drinking’ are used interchangeably with apparently little regard for
definitional consistency.

In the current research consistency and clarity of terms is essential. In considering
alcohol related harm and individual risk in Australian tertiary populations, it is important to
make reference to the National Health and Medical Research Council’s (NHMRC) guidelines
for reducing health risks from alcohol consumption, as these guidelines set research-
informed levels of low risk drinking for the general population (NHMRC, 2001). Whilst the
guidelines made recommendations relating to a range of alcohol related behaviors and
practices, Guideline 1, relating to consumption rates and harm, is most relevant to the
current research. Guideline 1 sets upper limits for consumption, and distinguishes between
alcohol related short term risk (immediate harm, specifically injury or death, associated with
alcohol consumption on any given day) and long term risk (harm associated with regular
alcohol consumption). In essence, this guideline encompasses both categories relating to
definitions of problematic drinking described earlier; it addresses both consumption levels
and negative alcohol related consequences (short and long term risk). The particulars of
Guideline 1, including specifications by gender, are set out in Table 1 below.
Table 1.

**Summary of NHMRC Guidelines for Low Risk Drinking.**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Short term harm</th>
<th>Long term harm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Risk</td>
<td>Risky</td>
</tr>
<tr>
<td>Males</td>
<td>Up to 6</td>
<td>7 - 10</td>
</tr>
<tr>
<td></td>
<td>Per week</td>
<td>Up to 28</td>
</tr>
<tr>
<td>Females</td>
<td>Up to 4</td>
<td>5 - 6</td>
</tr>
<tr>
<td></td>
<td>Per week</td>
<td>Up to 14</td>
</tr>
</tbody>
</table>

*Note. Consumption guidelines relate to Australian standard drinks.*

Although the guidelines were updated in mid-2009 to reflect advances in the measurement and conceptualization of alcohol related risk and harm, any discussion of harm in this research paper will utilize the 2001 NHMRC guidelines. Due to the recency of the revisions, the majority of published Australian research use the 2001 guidelines as a reference point when discussing alcohol related harm. Therefore, to enable straightforward comparison of outcome data (where possible) and maintain consistency of interpretation with regard to earlier publications, the 2001 guidelines, and the categories ‘Low Risk’, ‘Risky’, and ‘High Risk’, are used here. It must be noted however that when describing studies where data is reported using non-NHMRC guidelines for risk, the measurement threshold or measurement tool identified by the authors of the study will be used and, for clarity, reported, (e.g. “5+ drinks in one session” or “hazardous consumption, according to AUDIT categorisation”). As the guidelines differentiate between short and long term risk, it is important to describe the exact harm that alcohol consumption, beyond the guidelines limits, actually poses.
2.2. Short Term Harm

The effects of alcohol consumption on the brain and body systems are evident minutes after intake; most relevant to a discussion of short term harm is the impact of alcohol on brain function. In the immediate term, alcohol serves to inhibit the overall functioning of the brain. Initially, an individual may feel relaxed and more sociable; however as the concentration of alcohol increases in the blood, the inhibiting effect of alcohol becomes more pronounced (NHMRC, 2009). Motor, sensory and overall cognitive functioning is impaired, with reaction times and motor coordination reduced, speech capacity inhibited and executive control and problem solving abilities also diminished (Edenberg, 2007; NHMRC, 2009). Due to alcohol’s effect on the central nervous system, at high levels unconsciousness may result and, eventually, breathing may also become slowed. Suppression of hormone production in the pituitary gland leads to an imbalance in water secretion and absorption and results in dehydration and headaches (Hiller-Sturmhöfel, & Swartzwelder, 2005). Although the extent of the physiological effects of alcohol on an individual differ according to variations in tolerance, body mass, age, gender and so on, the severity of the impact increases with the amount of alcohol consumed (NHMRC, 2009).

Due to the immediate physiological effects of alcohol, individuals consuming at high levels increase their risk of experiencing and inflicting a range of negative behavioural consequences. A number of common consequences, or short term harms, associated with alcohol consumption for university students are provided in Table 2. Recent Australian research indicates that young people are at particular risk of these short term consequences; “Alcohol-related harm during or immediately after drinking is experienced
disproportionately by younger people” (NHMRC, 2009, p. 28). The proposed reasons for this phenomena will be explored in depth in Section 2.10.

Table 2.

*Common Short Term Consequences Associated with Alcohol Consumption in University Populations.*

<table>
<thead>
<tr>
<th>Nature of harm</th>
<th>Short term consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harm to self</td>
<td>Academic impairment and absenteeism</td>
</tr>
<tr>
<td></td>
<td>Blackouts</td>
</tr>
<tr>
<td></td>
<td>Personal injuries and death</td>
</tr>
<tr>
<td></td>
<td>Unintended and unprotected sexual activity</td>
</tr>
<tr>
<td></td>
<td>Suicide</td>
</tr>
<tr>
<td></td>
<td>Sexual coercion/rape victimization</td>
</tr>
<tr>
<td></td>
<td>Impaired driving</td>
</tr>
<tr>
<td></td>
<td>Legal repercussions</td>
</tr>
<tr>
<td></td>
<td>Spontaneous abortion</td>
</tr>
<tr>
<td>Harm to others</td>
<td>Property damage and vandalism</td>
</tr>
<tr>
<td></td>
<td>Fights and interpersonal violence</td>
</tr>
<tr>
<td></td>
<td>Sexual violence</td>
</tr>
<tr>
<td></td>
<td>Hate-related incidents</td>
</tr>
<tr>
<td></td>
<td>Theft</td>
</tr>
</tbody>
</table>

*Note. Table adapted from Perkins (2002)*

2.3. Long Term Harm

Alcohol is the second largest cause of drug-related deaths and hospitalisations in Australia, after tobacco (AIHW, 2005). Indeed, the long term harm associated with regular alcohol consumption is significant; recent research suggest that alcohol consumption has a
cumulative effect on lifetime risk of alcohol related disease and is associated with a range of chronic and acute illnesses (Rehm, Gmel, Sempos, & Trevisan, 2002). Although an exhaustive list is not possible in the current review, a selection of relevant negative health outcomes causally related and associated with long term alcohol consumption are presented in Table 3.

Table 3.

Chronic Disease and Long Term Consequences Associated with Alcohol Use.

<table>
<thead>
<tr>
<th>Category</th>
<th>Long term consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver disease</td>
<td>Fatty liver</td>
</tr>
<tr>
<td></td>
<td>Alcoholic hepatitis</td>
</tr>
<tr>
<td></td>
<td>Cirrhosis</td>
</tr>
<tr>
<td>Pancreatic disease</td>
<td>Acute pancreatitis</td>
</tr>
<tr>
<td></td>
<td>Chronic pancreatitis</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>Cardiomyopathy</td>
</tr>
<tr>
<td></td>
<td>Arrhythmias</td>
</tr>
<tr>
<td></td>
<td>Stroke</td>
</tr>
<tr>
<td></td>
<td>Hypertension</td>
</tr>
<tr>
<td>Gastrointestinal problems</td>
<td>Esophageal varices</td>
</tr>
<tr>
<td></td>
<td>Mallory-Weiss tears</td>
</tr>
<tr>
<td></td>
<td>Gastroesophageal reflux disease</td>
</tr>
<tr>
<td></td>
<td>Peptic ulcer disease</td>
</tr>
<tr>
<td>Neurologic disorders</td>
<td>Alcohol withdrawal syndrome</td>
</tr>
<tr>
<td></td>
<td>Seizures</td>
</tr>
<tr>
<td></td>
<td>Wernicke's encephalopathy</td>
</tr>
<tr>
<td></td>
<td>Dementia</td>
</tr>
<tr>
<td></td>
<td>Cerebral atrophy</td>
</tr>
</tbody>
</table>
Table 3. (Cont.)

<table>
<thead>
<tr>
<th>Reproductive system disorders</th>
<th>Sexual dysfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amenorrhea</td>
</tr>
<tr>
<td></td>
<td>Anovulation</td>
</tr>
<tr>
<td></td>
<td>Early menopause</td>
</tr>
<tr>
<td></td>
<td>Spontaneous abortion</td>
</tr>
<tr>
<td></td>
<td>Fetal alcohol effects</td>
</tr>
<tr>
<td></td>
<td>Fetal alcohol syndrome</td>
</tr>
<tr>
<td>Cancers</td>
<td>Neoplasm of the liver</td>
</tr>
<tr>
<td></td>
<td>Neoplasm of the head and neck</td>
</tr>
<tr>
<td></td>
<td>Neoplasm of the pancreas</td>
</tr>
<tr>
<td></td>
<td>Neoplasm of the esophagus</td>
</tr>
<tr>
<td>Psychiatric comorbidities</td>
<td>Affective disorders</td>
</tr>
<tr>
<td></td>
<td>Anxiety disorders</td>
</tr>
<tr>
<td></td>
<td>Antisocial personality</td>
</tr>
</tbody>
</table>

*Note.* Table adapted from Burge and Schneider (1999)

Comprehensive reviews discussing the exact mechanisms through which regular alcohol consumption leads to illness and the statistical evidence supporting the causal and relational effects can be found in the following articles: Rehm, Gmel, Sempos, and Trevisan (2002), Rehm, Bondy, Sempos, and Vuong (1997), Rehm, Room, Graham, Monteiro, Gmel, and Sempos (2003), Corrao, Bagnardi, Zambon and La Vecchia (2004), and Baan, Straif, and Grosse (2007).

### 2.4 Assessing Problematic Alcohol Use

Assessment of problematic alcohol consumption is an essential part of treatment planning; as stated by Allen (1991) “...while better assessment of alcoholic patients does not ensure more specific or more effective treatment, chances for successful rehabilitation are
clearly enhanced if specific patient needs can be more accurately identified and if treatment can be tailored accordingly” (Allen, 1991, p. 183). A wide variety of formal psychometric measures are currently available, including tools that provide for screening, diagnosis, assessment of current and past alcohol consumption behaviours, treatment planning, treatment and process assessment, and outcome evaluation (Allen, 2003). The most relevant of these for the current research, screening and consumption measures, are discussed in detail below.

2.4.1 Screening Instruments.

Alcohol screening is designed to provide researchers and clinicians with an indication of the likely presence of problematic alcohol consumption. Connors and Volk (2003) define screening as “the skilful use of empirically based procedures for identifying individuals with alcohol-related problems or consequences or those who are at risk for such difficulties” (p. 21). Screening is not assessment; the process is not designed to elicit specific details regarding consumption patterns, history or diagnostic criteria. Although screening commonly assesses an individual’s pattern of alcohol consumption, the assessment itself is generally brief and broad in scope. As stated, it aims simply to identify the presence of alcohol problems. Screening may be conceptualised as the first step in the identification-assessment-treatment process for alcohol problems. It is only beneficial, therefore, if it accurately identifies an individual who is drinking in a maladaptive fashion, and if that individual subsequently receives effective treatment or addresses the problem behaviour (Connors & Volk, 2003).

Screening measures are widely available; however they vary significantly in their relative strengths and weaknesses. The utility of screening measures will depend on the
purpose and target population, however all measures must be evaluated based on their sensitivity to accurately identify individuals with an alcohol disorder, the specificity in identifying individuals without an alcohol use disorder and the diagnostic predictive value of the instrument, in addition to standard psychometric properties (reliability, validity etc). An extensive collection of literature evaluating alcohol screening instruments is available (e.g., Connors & Volk, 2003; Dawe et al., 2003; Deady, 2009).

2.4.11 The Alcohol Use Disorders Identification Test.

The Alcohol Use Disorders Identification Test (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), commonly identified as the ‘gold standard’ screening instrument (Reinhert & Allen, 2002), was designed as a brief, effective screening tool to identify the presence of excessive alcohol consumption and associated alcohol related consequences, and assist in the assessment of alcohol use disorders (consistent with ICD-10 definitions of alcohol dependence and harmful alcohol use). The AUDIT was developed over the course of two decades and consists of 10 questions relating to three underlying factors: current alcohol consumption patterns over the previous two weeks (questions 1-3), symptoms of alcohol dependence (questions 4-6) and alcohol use problems (questions 7-10). Despite the stated dimensionality of the measure, a growing body of research challenges the three-factor structure of the AUDIT; recent research has identified one, two and three factor solutions, leading to some contention as to the exact factor structure of the measure (Conley & O’Hare, 2006; Doyle, Donovan, & Kivlahan, 2007; Shields, Guttmannova, & Caruso, 2004). In spite of these observations, the psychometric properties of the AUDIT are generally considered to be excellent; a recent literature review of the studies on the AUDIT found the measure displayed strong reliability and validity (Reinhert & Allen, 2007).
Overall, commentators have suggested that “…the AUDIT demonstrates sensitivities and specificities comparable, and typically superior, to those of other self-report screening measures” (Reinhert & Allen, 2002, p. 272).

It should be noted here that the AUDIT has been used extensively in research with university cohorts, being utilised as both alcohol screening tool and as a measure of change in drinking behaviours over time. When used in this setting, the psychometric properties are comparable to those quoted above. Data from research using the AUDIT with Australian university populations are presented in section 2.4.11.

2.4.2 Assessment Instruments.

While the screening process is essential for identifying problem drinkers, it lacks the ability to fully articulate the extent of the problematic behaviour. By nature of its purpose and structure, screening cannot adequately assess quantity and frequency of consumption, negative alcohol related consequences or inform diagnostic criteria. This information is essential for case formulation, treatment planning and outcome monitoring in alcohol intervention and, as such is a necessary target for additional data collection.

2.4.21 Consumption Measures.

Measures of alcohol consumption can be grouped broadly into two categories, quantity-frequency and daily drinking (Sobell & Sobell, 2003). Quantity-frequency (QF) methods of consumption assessment generally require an individual to report on how many occasions over a given time period they consumed alcohol and, on each occasion, what their average or typical level of consumption was. The assessor will usually ask the same questions regarding different types of alcohol beverages. Although QF methods allow for quick assessment and an approximation of an individual’s consumption rates, this approach
has a number of inherent limitations. Most importantly, QF methods do not capture variability in consumption; atypical drinking episodes (‘binges’) are not identified by the QF method, which is problematic due to the relationship between binge drinking and significant health risks and behavioural consequences (Litten & Allen, 1992). The QF method, therefore, may misclassify or overlook potentially harmful drinking behaviors; this point is particularly salient for young people, who tend to engage in heavy episodic drinking, rather than consistent consumption (Terlecki, Larimer & Copeland, 2010). In addition, research has demonstrated that, compared with retrospective daily drinking assessment methods, the QF method tends to be less sensitive in assessing overall consumption and episodic heavy drinking and in identifying heavy and high risk drinkers (O’Hare, 1991; Shakeshaft, Bowman & Sanson-Fisher, 1999). As such, commentators have recommended that the QF method be used only in settings where time is limited and little or general information about an individual’s drinking behaviour is required (Litten & Allen, 1992; Sobell & Sobell, 2003). In light of this critique, however, it must be acknowledged that a range of QF measures are available and some do address these issues. Despite this, improvements in sensitivity in QF assessments come at the expense of brevity, a key strength of this approach (Sobell & Sobell, 2003).

As opposed to QF methods, daily drinking measures utilize a targeted retrospective approach to establish estimates of daily alcohol consumption over a given time period. Individuals are asked to recall the amount, and type, of alcohol consumed on each day of a pre-determined interval. This approach is flexible in designated time period (generally, between 30 days and 12 months), administration method (e.g., self-administered or structured interview) and mode (computerized and paper-pencil). Memory aids, such as
calendars, personal diaries and significant events, are often used to assist accurate recall. This method of alcohol assessment is preferred if the individuals’ drinking behaviours are variable or if precise drinking data is required, as is the case in alcohol intervention. The specific nature of the data collected can serve as a useful baseline for pre-treatment and, when utilised as an ongoing or episodic data collection method post-treatment, can be used to monitor treatment effectiveness. This method has also been used concurrently as a feedback tool to improve motivation to change alcohol behaviour. An additional assessment approach is daily monitoring. Individuals are asked to monitor their current drinking behaviours over a given time period.

2.5 Prevalence and Frequency of Alcohol Consumption amongst Young Australian Adults

As data relating exclusively to Australian tertiary students is relatively scarce, our understanding of this group’s drinking patterns can be augmented by examining studies of Australian young adults. Data indicate a relatively high proportion of young adults drink alcohol. For example, Reid and colleagues (2007) utilised a large sample of young Australian adults (aged 20-24) to examine the prevalence of alcohol use amongst this group. In a sample of 1936, only 14% identified themselves as non-drinkers. Research also indicates that this population consumes alcohol frequently. The Australian Institute of Health and Welfare’s (AIHW) large scale study entitled the 2004 National Drug Strategy Household Survey examined the drug and alcohol behaviours of over 30,000 Australians aged 12 and older (AIHW, 2005). Data indicated that, of the individuals in the 20-29 year old age bracket, 94.3% report having consumed at least one full serve of alcohol in their lifetime, and of this group 2.9% report being daily drinkers, and 47.6% report being weekly drinkers. Similar findings were reported in the 2007 National Drug Strategy Survey, also published by the
AIHW (AIHH, 2008). Data indicated that in the 20-29 age group, 91.4% report having consumed at least one full serve of alcohol in their lifetime, and of this group, 2.3% report being daily drinkers, while 47.8 described themselves as ‘weekly’ drinkers.

As demonstrated, high proportions of young adults in Australia drink, and drink regularly. Data also demonstrates a high level of ‘risky’ drinking amongst this population. In large scale, national surveys, individuals 20-29 years of age have repeatedly been found to be most at risk of both short and long term harm due to their consumption patterns, and are the least likely to abstain from alcohol use (AIHW, 2002; AIHW, 2005; AIHW, 2008). Negative alcohol related events are also common, with some data suggesting, for example, that 7.7% of individuals in this cohort experience alcohol related memory lapses at least monthly and 30.6% at least once in the last 12 months (AIHW, 2002). In a sample of young Australian adults, aged 17-34 years ($M = 22.01$, $SD = 3.40$), Lyvers and colleagues (2010) found that 68.6% of participants reported high risk drinking (based on total AUDIT scores), and 77.8% reported alcohol-related problems. Similar patterns of high level consumption and resultant negative consequences are commonly reported in the Australian literature (e.g. Davey, 1997; Reid, Ukoumunne, Coffey, Teesson, Carlin, & Patton, 2007).

2.6 Prevalence and Frequency of Alcohol Consumption amongst Australian Tertiary Students

Data clearly indicate that a majority of young Australian adults self-identify as ‘drinkers’ and that a large proportion of these individuals consume alcohol frequently and in a manner that puts them at risk of both short and long term harm. In light of this observation and the nature of the current study, it is important to identify whether the
consumption patterns of Australian tertiary students differ from those of young adults in general.

Although the number of published studies is small, Australian researchers have been examining the drinking patterns of tertiary students for some time. An overview of older research (1967-1986) highlights a relatively consistent pattern of drinkers vs. non-drinkers amongst this population. With samples sizes ranging from 232 to 2345, data indicate that 85-93% of male students and 79-96% of female students identified as current drinkers (Adams, 1979; Engs, 1982; Neil, 1978; Sargent, 1979; Wilks, 1986). The trends highlighted in this historical data are supported by contemporary studies. The University Drug and Alcohol Survey (2001), conducted by NSW Health, is one of the most comprehensive surveys of its type. In total, 1667 undergraduate students, aged 18-24, responded to the survey. Results indicated that 90.5% of the students had consumed alcohol in the past year, while 79.1% of students had consumed alcohol in the past 30 days. Similar prevalence rates have been demonstrated by other Australian research. The EXPOSED project, conducted by the University of Sydney, surveyed 300 undergraduate students \((M = 20.6\) years) about drug and alcohol usage. Data indicated that 91.4% of students had drunk alcohol in their lifetime, while 45.9% used alcohol on a weekly basis (University of Sydney, 2005). Davey and colleagues (2002) surveyed alcohol and drug behaviour amongst 275 students from the Queensland University of Technology \((M = 24.6\) years) and found 88% of students had drank alcohol in their lifetime, and 40% drank alcohol one to three times a week (Davey, Davey & Obst, 2002). Similar prevalence rates were reported by Roche and Watt (1999); in a sample of 300 Australian university students, with 94% identifying themselves as “drinkers”. These consumption data broadly match data pertaining to young Australian adults, in that drinking
appears to be commonplace amongst university students; however, from non-specific consumption data such as these, researchers cannot infer levels of harm or risk of harm.

2.7 Harmful Alcohol Behaviours amongst Australian Tertiary Students

As described, peak levels of high-risk drinking in Australia occur between the ages of 20-29; 65% of males and 57% of females reported drinking at high-risk levels (in terms of short term) at least once in the past 12 months (AIHW, 2005). This age bracket encapsulates the majority of Australian university students, and indeed Australian university student’s exhibit similar risky drinking behaviours. While the harm shown by university students reflects a similar pattern to that of the wider community, researchers have noted that it differs in its frequency and severity (Roche & Watt, 2000). Although data pertaining strictly to Australian university students is limited, the following section provides a summary of research on harmful alcohol behaviours amongst this cohort.

The NSW Health University Drug and Alcohol Survey found that 49.2% of students reported ‘binge drinking’ (defined as more than 5 standard drinks in one sitting) in the previous two weeks (NSW Health, 2001). Data also indicated that 26.3% of the sample had engaged in some form of public misconduct at least once during the past year as a result of drinking or drug use. Examples included trouble with the police, vandalism, fighting and arguments and driving while drunk. Similarly, as a result of drinking or drug use, 28.1% reported experiencing some kind of significant personal issue. Examples included suicidality, injuries and sexual assault.

The EXPOSED project, a research study conducted by the University of Sydney to assist in the implementation of appropriate drug and alcohol treatment programs, found that 20.6% of their university sample ($N = 300$) reported drinking, on average, 6 or more
standard drinks in one session (UoS, 2005). Davey and colleagues (2002) also indicated that
‘binge drinking’ (defined as 5+ drinks per session for females and 7+ drinks per session for
males) was quite common amongst their sample of 275 university students; 49% reported
binge drinking monthly or less, while a further 20% reported binge drinking weekly. It
should be noted that this level of consumption places these individuals in the ‘risky’
category for short term harm, according to 2001 NHMRC guidelines

Ball and colleagues (2000) surveyed health-related behaviours of 2729 tertiary
students across two metropolitan universities and two rural TAFE campuses. The authors
defined ‘unsafe alcohol consumption’ as an average intake of 5-8 drinks (or above) per
session for men and 4 drinks (or above) per session for women. Of the male cohort, 42.4%
of university students and 61.0% of TAFE students were found to be drinking at unsafe
levels. Similarly, in the female cohort, 37.1% of university students and 34.8% of TAFE
students were drinking at unsafe levels.

Roche and Watt (1999) found similar results: 49% of the male students and 21% of
female students reported drinking to intoxication once or more per week, and 54% of
students reported drinking, on average, five or more standard drinks in a single session.
Based on AUDIT scores, 69% of students were currently drinking at hazardous or harmful
levels, while 32% had experienced an alcohol-related accident or injury within the last 12
months. Despite these findings, 62% of students did not believe that a reduction in student
drinking was necessary.

In an examination of harmful alcohol consumption amongst 139 Australian female
university students (mean age = 19.57 years, SD = 2.0), Johnston and White (2004) found
that 48% of the sample had engaged in ‘binge drinking’ (defined as 5+ standard drinks in
one session) in the past two weeks. This data places this group in the ‘risky’ category for short term harm, according to 2001 NHMRC guidelines. A more recent study by Reavley and colleagues (2011) revealed similar findings. In their large sample of Australian university students ($N = 774$), 33% consumed more than 6 drinks in a session at least monthly, and 26% were drinking in excess of NHMRC ‘low risk’ guidelines.

Jones (2003) also utilised the 2001 NHMRC guidelines to examine alcohol use in a sample of 317 Australian university students (41% male, 59% female) with a mean age of 19.9 years (SD=4.2). Data indicated that, on an average Friday or Saturday night, 44.1% of females drank in a manner that put them at risk of short term harm (20.4% drank at ‘risky’ levels; 23.7% at ‘high risk’ levels). Similarly, 43% of males drank in a manner that put them at risk of short term harm (19.5% drank at ‘risky’ levels; 23.5% at high risk levels) on an average Friday or Saturday night.

Lyvers, Czerczyky, Follent and Lodge (2009) administered the Alcohol Use Disorder Identification Test (AUDIT) to 60 Australian undergraduate university students. The sample included 39 females ($M = 20.97$ yr, $SD = 1.98$) and 21 males ($M = 21.38$ yr, $SD = 2.09$). Analysis of total scores on the AUDIT revealed that 31.6% of the sample were drinking in a ‘hazardous’ manner (AUDIT score 8-15) and 35.0% were drinking in a ‘harmful’ manner (AUDIT score 16+). Kelly, Masterman and Marlatt (2005) also administered the AUDIT to an Australian university sample of 168 students (52 male, 116 female; mean age = 22 years, $SD = 6.26$). Data showed the mean total AUDIT score of the sample was above the ‘hazardous’ threshold of 8 ($M = 8.37$, $SD = 6.15$).

While not a comprehensive summary, the data presented here clearly indicate that Australian university students, of both genders, frequently drink in a manner that puts them
2.8 Natural Maturation

It must be acknowledged here that excessive drinking behaviors exhibited by university students have a tendency to diminish over time without intervention (Vik, Cellucci, & Ivers, 2003). Generally, frequency and level of alcohol consumption peaks at approximately 22 years and decreases thereafter; a process known as natural maturation (Bewick, Mulhern, Barkham, Trusler, Hill, & Stiles, 2008; Larimer, Cronce, Lee & Kilmer, 2005). This observation is supported by data from large scale Australian surveys such as the National Drug Strategy Household Survey 2004 (AIHW, 2005), which highlights a peak in drinking behaviors associated with short and long term harm in the 20-29 age group, which then diminishes over the course of a lifetime. Research suggests that as an individual transitions from adolescence into young adulthood, they adopt adult roles and responsibilities, such as full time work, marriage, parenthood and financial obligations, which are incompatible with excessive alcohol consumption and, as such, lead to a decrease in harmful alcohol behaviours (Ham & Hope, 2003, Littlefield, Sher & Wood, 2009). Quantitative analysis of this process has been supported by additional qualitative research; Lindsay and colleagues (2009) examined the past, current and imagined future drinking behaviours of 60 young Australian adults, aged 20-24. Based on a synthesis of interview data, the authors concluded “A time of heavy drinking and socialising is a stage that young people expect to go through on their way to a more stable, less intoxicated future” (p. 48). In addition to lifestyle changes, changes in personality structure across time may also influence alcohol consumption (e.g., Johnson et al., 2007). For example, Roberts, Walton
and Viechtbaur (2006) conducted a meta-analytic exploration of personality change over time. Utilising 92 studies, with a total sample size of 50,120 participants, data indicated that as individuals move toward adulthood, they demonstrate increases in personality factors such as conscientiousness and emotional stability (Roberts, Walton & Viechtbaur, 2006). These personality variables have been shown to be associated with reduced harmful consumption patterns (Bogg & Roberts, 2004).

While the natural maturation process may raise questions as to the utility of alcohol interventions for this group, research indicates that for some individuals harmful drinking behaviours exhibited as a young adult persist into later life (Ham & Hope, 2003). This may be particularly true for university students. In a longitudinal study, Jennison (2004) found ‘binge drinking’ behaviours in college (defined as 5+ and 4+ drinks on the same occasion one or more times in the past month for males and females respectively) were significant risk factors for alcohol dependence and abuse ten years after initial assessment. Similar findings have been reported with Australian populations; the 2001 National Drug Strategy Household Survey (AIHW, 2002) reported “Those with post-school qualifications were more likely than those without to drink at risky or high-risk levels for both short term and long term alcohol-related harm” (p.58). Data indicated that 37.1% of individuals with post-school qualifications, irrespective of age, drank alcohol in a manner classified as risky or high risk, in relation to short term harm, and 10.0% in relation to long term harm. Similar findings were reported in the 2007 National Drug Strategy Household Survey (AIHW, 2008); of the individuals with post-school qualifications, 20.9% and 10.6% consume alcohol in a way that is classified as risky or high risk for short and long term harm respectively. Even if the temporal changes in drinking behaviours are acknowledged (e.g., natural maturation), the
current harmful patterns of consumption commonly seen in this population still place them at significant risk of short term harm.

2.9 Comparison of University and Non-University Consumption Patterns

As demonstrated, high levels of alcohol consumption amongst university students is common; interestingly, alcohol consumption amongst this group, relative to non-university peers, is also high. Research suggests that level of education is positively associated with alcohol consumption (Ham & Hope, 2003; NSW Health, 2001). Data from the New South Wales Health University Drug and Alcohol Survey indicated that males and females with university qualifications are 1.6 times more likely and 3.8 times more likely, respectively, to report being regular drinkers than those with no formal schooling (NSW Health, 2001). New Zealand research has generated similar findings; Kypri, Cronin and Wright (2005) found that, based on scores on the Alcohol Use Disorders Identification Test (AUDIT), hazardous drinking was almost twice as high amongst university students ($n = 1424$) than in non-university peers ($n = 1406$). Similarly, harmful drinking was three times as prevalent amongst this group (Kypri, Cronin & Wright, 2005).

Interestingly, some research has also suggested that university students with drug and alcohol problems are also less likely to seek help for these problems than non-university peers (Blanco et al., 2008). Wu and colleagues (2006) found that university students were less likely than non-student peers to receive treatment for alcohol use disorders. Taken together, these data place an increased urgency on the development and provision of evidence-based interventions for this group. A full discussion of help-seeking and barriers to help seeking amongst this population is presented in Section 2.11.
2.10 Why Are Harmful Alcohol Related Behaviors So Common Amongst University Populations?

Researchers suggest that university students exhibit high levels of drinking behaviours and related harm due to a range of converging factors. How these drinking behaviours are conceptualized directly influences the structure and nature of alcohol interventions for this group. Theoretical explanations for excessive consumption will be presented later in this thesis along with a discussion of related interventions; as such, the current section describing factors influencing alcohol use will be kept relatively brief.

Anthropological and psychological researchers have suggested that excessive alcohol consumption and intoxication in university students represent a ‘rite of passage’ for young people making the transition from adolescence to adulthood (Roche & Watt, 2000). Both qualitative and quantitative research have supported this position, with data indicating that many university students believe that frequent alcohol misuse is simply part of being a student and feel entitled to drink heavily and frequently due to their student status (Crawford & Novak, 2006).

Indeed, alcohol plays a central role in the socialization processes of university students; it is used as a way to connect and integrate with other students with whom they are not familiar (Polizzotto et al., 2007). Alcohol is a central feature of many university functions, such as orientation events, balls, formals, and cruises, and serves to connect participants (Lyvers et al., 2009). Qualitative research with Australian tertiary students indicates that ‘enhancement of socialising’, and ‘way of meeting new people’ are commonly endorsed perceived benefits of alcohol consumption (Crundall, 1995). In a comprehensive qualitative study of drinking practices amongst this population, Grace and colleagues (2009)
identified ‘the centrality of drinking’ (to the social lives of the participants) as the key theme to emerge from participant data; participants reported that alcohol was seen as enabling “…conversation, enhancing pleasurable activities, increasing confidence and creating a friendly atmosphere” (p.23). In light of these data, it is clear to see how the interaction of a sense of entitlement to drink and the emphasis on alcohol as a social enhancer may lead to excess consumption.

While some students use alcohol to facilitate social interactions, research suggests that a proportion of university students may also use excessive alcohol use as a tool to cope with negative affective states, particularly stress. Recent Australian research has indicated that levels of psychological distress and mental health problems are significantly higher amongst university samples than in the general population and some commentators have suggested that a stressful university lifestyle may contribute to high levels of alcohol consumption (Roche & Watt, 2000; Stallman, 2010). Indeed, students commonly report coping and escape motives to explain excessive drinking behaviours (Neff, 1997). Supporting this assertion, recent quantitative research examining predictive variables in excessive alcohol consumption amongst university students, found that ‘Escape Drinking’ was the “…sole positive direct predictor of binge drinking” in a university sample (Williams & Clark, 1998, p.371). Similarly, Kassel, Jackson and Unrod (2000) identified negative mood regulation expectancies and ‘drinking-to-cope’ as significant predictors of problem drinking in a university sample ($N = 136$). Although the exact nature of the pathways are complex (see Park, Armeli, & Tennen, 2004), the relationship between stress, coping and excessive alcohol consumption in university populations are well documented in the literature.
Peer influence also appears to play a pivotal role in high levels of alcohol consumption amongst this group. Social norming theories suggest that excessive alcohol consumption is the result of an overestimation of peer drinking behaviours; university students incorrectly believe their peers drink at high levels and thus engage in heavy drinking to match their own drinking behaviours to others (Doumas, Workman, Smith, & Navarro, 2011; Perkins, 2002). Research indirectly supports this position; a large body of evidence indicates that university students frequently overestimate the drinking behaviours of their peers, and intervention studies, based on the provision of accurate normative data, have demonstrated improvements in the accuracy of participants perceptions of peer drinking and reductions in actual drinking behaviours (Carey, Scott-Sheldon, Carey, & DeMartini, 2007; Larimer & Cronce, 2007; Martens et al., 2007; Pedersen, Neighbors, & LaBrie, 2010). Social norming theory and feedback interventions will be discussed in more detail later in the thesis.

2.11 Help-Seeking and Barriers to Help-Seeking

As reported, tertiary students commonly drink in a manner that places them at high risk of both short and long term harm, yet help-seeking behaviours for problematic alcohol use are rare. In a research study assessing college students willingness to access self-help groups, Meissen, Warren and Kendall (1996) found that of 16 listed psychological problems, including relationship difficulties, sexual assaults and AIDS, students were least likely to access support for alcohol problems. Indeed, research by Knight and colleagues (2002) indicated that, in a sample of 14,009 U.S. college students, 31% met diagnostic criteria for alcohol abuse and 6% for alcohol dependence, however only 1% had sought help for alcohol-related problems. Unfortunately, findings such as these are common in the
literature. Student’s unwillingness to access help for problematic alcohol use, particularly in the context of high levels of harm, necessitates an examination of help-seeking and barriers to help-seeking behaviour.

Help-seeking may be defined as “the process of actively seeking out and utilising social relationships, either formal or informal, to help with personal problems” (Rickwood, Deane, Wilson & Ciarrochi, 2005, p.7). Although a range of theories of help-seeking behaviour have been proposed, commentators acknowledge that these are generally descriptive in nature and are predominately concerned with structural, economic, social or other macro-level factors that influence help-seeking behaviours. As such, no unifying theory of help-seeking exists. At an individual-level, help-seeking is reliant on four related processes: an awareness that a problem exists, an expression of the need for help, the availability and accessibility of formal or informal sources of help, and the willingness to seek and engage appropriate sources of help (Rickwood, Deane, Wilson & Ciarrochi, 2005). Help-seeking is regarded as an adaptive coping strategy, and is associated with improved outcomes in university populations (Cellucci, Krogh, & Vik, 2006). In spite of the clear benefits of help-seeking, research indicates that generally college students, university students and adolescents are unlikely to seek help from professional sources.

In the general population, two key factors are the most commonly identified barriers to seeking behaviour for alcohol problems, a lack of awareness that a problem exists and the desire to manage the problem independently without external support (Cellucci, Krogh, & Vik, 2006; Cunningham et al., 1993). These findings have been supported throughout the literature, including large scale national surveys (Edlund, Booth, & Feldman, 2009; Rapp et al., 2006; Tucker, Vuchinich & Rippens, 2004). It is necessary, however, to examine data
relating specifically to university populations in order to establish whether this group experiences unique factors that inhibit help-seeking.

Although the data pertaining to tertiary students shares similarities with that relating to the general population, research suggests that other factors also serve as obstacles to help-seeking for alcohol problems. Problem awareness and lack of perceived need for help, as with the general population, are key barriers to this population accessing support or treatment for harmful alcohol use (Hunt & Eisenberg, 2010). Research by Wu et al. (2007) found that, in a sample of 4307 full time college students, 21% suffered from a diagnosable alcohol use disorder, but only 2% of those perceived a need for treatment. Similar data has been reported by Caldeira and colleagues (2009) who found 46.8% of university students in their sample met DSM-IV criteria for a substance use disorder, but only 3.6% of this group perceived a need for assistance. High levels of consumption are common for this group, and university students tend to overestimate the consumption levels of other students (as described previously), which may lead to a normalization of risky alcohol behaviours, thus inhibiting problem recognition (Pedersen, Neighbors, & LaBrie, 2010; Walter, Bennett & Noto, 2000). Problem awareness may be in part informed by negative alcohol related alcohol consequences. Buscemi et al. (2010) found that alcohol related consequences were positively associated with help-seeking in a college sample. Similarly, Cramer (1999) found that help-seeking in university students was related to high levels of distress. Analogous findings have been reported elsewhere in the literature (e.g., Cellucci, Krogh, & Vik, 2006).

Stigma associated with treatment and attitudes toward-help-seeking have also been found to influence help-seeking behaviours in this population. In developing a model to predict help-seeking behaviour for problematic alcohol use amongst university students,
Cellucci, Krogh and Vik (2006) found that problem recognition, current symptoms and perceived stigma were the strongest predictors of help-seeking intention. Indeed, the perceived stigma associated with admitting one has a problem with alcohol and receiving help is one of the most commonly reported reasons for delaying or avoiding alcohol treatment (Fortney et al., 2004). Most students do not believe they fit the stigmatized ‘alcoholic’ stereotype, and may fear the perceived social consequences of seeking treatment for problematic alcohol use, and, as such, do not seek treatment (Walter, Bennett & Noto, 2000). Unfortunately, the impact of perceived stigma may have a greater impact on help-seeking for males than for females. A large body of theoretical and research literature has highlighted the role of gender role socialization on male help-seeking behaviour; broadly, the literature suggests that, for males, masculinity is associated with characteristics such as independence, resilience and stoicism, a relationship that actively disrupts help-seeking behaviours (see articles such as Kane, 2006, Mahalik, Good & Englar-Carlson, 2003, Mahalik, Levi-Minzi, & Walker, 2007, and Watts & Borders, 2005). Research by Davies et al. (2000) found that alcohol and drug use was identified as the greatest health issue by male university students; however the need to conceal vulnerability and maintain independence was reported as the main reason for not accessing help. Additional barriers to treatment seeking proposed in the research are knowledge of available services (Schweitzer, 1996), impulsivity and impulse control (Codd & Cohen, 2003), anxiety, depression and insufficient social support (Schober & Annis, 1996).

Willingness to seek and engage in treatment is often conceptualized as readiness to change. Based on Prochaska and Clemente’s (1983) Transtheoretical Model of Behaviour Change (TTM), readiness to change is an indicator of an individual’s motivation to alter
current problematic behaviours. Readiness to change is impacted directly by the aforementioned barriers to help-seeking, such as problem recognition and stigma. Readiness to change will be discussed in more detail later in this thesis.

2.12 Summary

Misuse of alcohol has been linked to a range of negative physical, psychiatric and social consequences. Excessive, single session consumption has been associated with a range of short term harms such as physical assault, sexual assault and personal injuries, and regular consumption, above recommended levels, has been associated with a range of chronic diseases, psychiatric morbidities and neurological impairment. In spite of the consequences associated with alcohol misuse, data indicates that high risk consumption is common amongst the Australian population.

As highlighted by the reviewed data, Australian university students also commonly engage in hazardous alcohol consumption. Prevalence rates are high, with recent statistics suggesting that 88-94% of surveyed students identify as current drinkers, and, of this group, up to 69% report drinking at hazardous or harmful levels (Davey, Davey & Obst, 2002; NSW Health, 2001; Roche & Watt, 1999; University of Sydney, 2005). Negative alcohol related consequences are also frequently reported by this group, with public misconduct and significant personal issues resulting from excessive alcohol consumption being commonplace (NSW Health, 2001). Strikingly, research also suggests that hazardous consumption behaviours amongst this group are more frequent than in non-university cohorts and, further compounding this risk, this group is also less likely to seek treatment for alcohol misuse than non-university peers (Wu et al., 2006). Factors such as problem recognition, perceived stigma associated with treatment and lack of knowledge of available
services have been highlighted by the research as significant barriers to help-seeking in university populations. Although the literature suggests that, for the majority of individuals, hazardous drinking behaviours in young adulthood have a tendency to diminish over time, hazardous consumption in university has been identified as a significant risk factor for later alcohol dependence.

Despite the high level of risk displayed by this group, research describing current drinking behaviours and prevalence of risky consumption amongst Australian university students is scarce. Very few recent published studies examining alcohol use amongst this group exist and often the survey based research that has been published is limited in its generalizability by small sample sizes or the use of convenience samples. These limitations hinder a full and complete understanding of the current behaviours of this group. It is clear that additional Australian research is required to better articulate these variables. The apparent reluctance of Australian university students to access alcohol treatment services highlights another gap in the knowledge base; very little is known of what alcohol treatments Australian university students find acceptable, and what services they would be likely to use if they experienced an alcohol problem. This gap in the literature is significant; as this group presents with elevated levels of risk, providing services that are, not only efficacious but, individually appealing may increase treatment access and, in turn, reduce levels of harm. Research linking hazardous alcohol use during university to later alcohol dependence further emphasises the need for better understanding Australian university student views on available treatments.

Study One attempts to address these gaps in the literature by conducting a survey of current drinking behaviours amongst a large sample of Australian university students. In
addition, the research attempts to better understand students’ attitudes toward various treatment modalities, and to assess the acceptability of these different approaches. A full description of Study One is provided in Chapter 3.
3.1 Study Description, Aims and Hypotheses

Study One was initially designed as a screening and recruitment tool to enable the implementation of a randomised controlled trial examining the efficacy of two brief alcohol interventions, as set out in Study Two. However, due to the large number of respondents, data collected in Study One is also used here to augment previous research in the area by providing a broad description of alcohol related behaviours and beliefs amongst a large Australian university sample. Analyses in Study One are deliberately kept simple and brief, in order to provide an overall account of current alcohol behaviours evidenced by this cohort, and to allow emphasis on the RCT presented in Study Two. In Study One, drinking behaviours, as measured by the AUDIT, and attitudes toward various alcohol treatment modalities were the main variable of interest. In addition to descriptive analyses, a series of inferential analyses were conducted to examine the relationships among these variables. Based on a review of the literature presented in Chapters 1 and 2, the following hypotheses were made:

*Hypothesis 1:* It was predicted that there would be no significant difference in total mean AUDIT score of the between the current sample and other comparable Australian university samples reported in the literature.

*Hypothesis 2:* It was predicted that male participants would record significantly higher AUDIT scores than female participants.

*Hypothesis 3:* It was predicted that there would be a significant, negative correlation between age and total AUDIT scores.
Hypothesis 4: It was predicted that individuals volunteering to take part in treatment (Study Two) would report significantly higher AUDIT scores than individuals who did not volunteer.

Hypothesis 5: It was hypothesised that an online alcohol intervention would be the most highly endorsed intervention modality, for use by the individual and for general availability, for both the entire sample and specifically for participants scoring above 8 on the AUDIT.

3.2 Method

3.2.1 Participants.

The sample comprised of 1046 current tertiary students at RMIT University, undertaking either higher education or TAFE programs. Full descriptive statistics for the cohort are presented in Section 3.3.2.

3.2.2 Procedure.

A questionnaire package was created by the researcher and hosted online by SurveyMonkey. The package consisted of items relating to demographic variables, such as age, sex and years of tertiary study completed, in addition to the Alcohol Use Disorders Identification Test (AUDIT: Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), attitudinal questions relating to alcohol treatment services (taken from Kypri, Saunders and Gallagher, 2003) and an item on whether the respondent had ever sought professional help for alcohol problems (see below for full description of items). The items of the questionnaire package were preceded by a front page informing potential participants of the purpose of the study, the voluntary nature of their participation and the name and contact details of the principal researcher and research supervisor.
To host the link to the online questionnaire package, a secure RMIT web page was created. The page consisted of information regarding the purpose and structure of the study, the approved plain language statement, contact details for the principal investigator, and a link to the online questionnaire package hosted by SurveyMonkey. Participants were then recruited using the procedure described below.

3.2.3 Recruitment.

Participants were recruited using a range of methods in order to maximise the number of participants. See below for details of each recruitment method.

3.2.3.1 Indirect Emailing of RMIT Students.

The primary method and first wave of recruitment was via the internal university email system. Between 27.07.2009 and 14.08.09, higher education course coordinators (n=75) and TAFE lecturers (n=164) were emailed by the principal researcher with a request to forward an invitation to participate in the research on to students in their respective courses. This indirect method of accessing participants was utilised as an alternative to direct email invitations, as the university electronic communications policy prohibits the sending of unsolicited emails to students. Unfortunately, by using this method, the exact number of invitation recipients is unknown. The invitation consisted of a brief description of the study and a link to a secure RMIT web page (mentioned previously) with further information about the study, the plain language statement (Appendix A) and a link to the questionnaire package hosted by SurveyMonkey.

3.2.3.2 Emailing RMIT Village Students.

RMIT Village Old Melbourne is a 454-bed student off-campus accommodation facility. After consultation and approval from RMIT Village management, an invitation to
participate in the current research project was forwarded to all current residents by Village staff on 20.03.2010. Consistent with the previously described recruitment process, the invitation consisted of a brief description of the study and a link to a secure RMIT web page with further information about the study, the plain language statement (Appendix A) and a link to the questionnaire package hosted by SurveyMonkey. As RMIT Village also provides accommodation to non-RMIT students (all registered University, College and TAFE students are eligible to apply for accommodation at the Village and approximately 20% of the current residents attend other educational institutions), the email invitation explicitly stated that only current RMIT students were invited to participate.

### 3.2.33 Advertisement on RMIT Student News.

A second wave of advertising was conducted through the RMIT student news page online. After approval from RMIT administration, a brief article describing the research was posted in the “Get Involved” section of the RMIT News page on 16.09.2009. The article simply consisted of a brief description of the purpose and content of the research and provided a link to a secure RMIT web page with further information about the study, the plain language statement (Appendix A) and a link to the questionnaire hosted by SurveyMonkey.

### 3.2.34 Advertisement on MyRMIT Student Lounge.

The MyRMIT Student Lounge is an online environment, hosted by RMIT, for online interaction between current RMIT students. The ‘Lounge’ consists of news, classifieds, forums, maps and galleries. Users may post topics and messages in the forums that are available to be read and commented on by other users. The current research study was advertised in the forum section of the MyRMIT Student Lounge on 15.03.2010 in a third
wave of advertising. A brief post was made with a short description of the study and a link to the secure RMIT web page (mentioned previously) which hosted a link to the questionnaire package. At the time of writing, the post had received 391 views.

3.2.3.5 Posters and Flyers in RMIT Student Services.

Advertising posters and flyers, describing the structure and purpose of the study and the URL of the secure RMIT web page, were also placed in the RMIT Student Services office at the RMIT city campus.

3.2.4 Measures.

Survey data were collected using a package consisting of the following questionnaires:

3.2.4.1 AUDIT.

The Alcohol Use Disorders Identification Test (AUDIT: Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) was designed as a brief, effective screening tool to identify the presence of excessive alcohol consumption and assist in assessment of alcohol use disorders (consistent with ICD-10 definitions of alcohol dependence and harmful alcohol use). The AUDIT consists of 10 questions relating to current alcohol consumption patterns (previous two weeks; questions 1-3), symptoms of alcohol dependence (questions 4-6) and alcohol use problems (questions 7-10). Psychometric properties of the AUDIT are excellent. A number of studies have evaluated the internal-consistency of the measure as excellent (Flemming, Barry, & MacDonald, 1991; Hays, Merz, & Nicholas, 1995; Reinert & Allen, 2007). The AUDIT manual cites test-retest reliability as high ($r=.86$), and construct, discriminant and concurrent validity have been verified (Lyvers, Hasking, Hani, Rhodes, & Trew, 2010; Shields & Caruso, 2004).
3.2.42 Attitudinal Measures.

Attitudinal questions relating to alcohol treatment services were included in the package. The items attempt to assess the acceptability of various brief intervention approaches to hazardous alcohol consumption and are identical to those created by Kypri, Saunders and Gallagher (2003). In the original study, the items were administered to a cohort of New Zealand university students and, as such, are considered applicable to an Australian university population. As in the Kypri, Saunders and Gallagher study, respondents were asked the following questions: “For the following services concerning alcohol, which do you think (A) should be available to students; and (B) you would use if you had a drinking problem?: (1) reading materials/leaflets about alcohol and its effects, (2) health education seminars on alcohol, (3) anonymous web-based alcohol risk assessment and personalized feedback, (4) alcohol risk assessment and advice from a nurse, counsellor, or psychologist, (5) alcohol risk assessment and advice from a doctor”. Respondents answer Yes or No to each item.

3.2.43 Treatment Related Variables.

Additional items relating to treatment were also included in the questionnaire package. Participants were asked “Have you ever sought professional help for your drinking?”. Respondents answered Yes or No to this item. In order to recruit participants for Study Two, respondents were also asked to complete their email address for follow up if they were interested in participating in the intervention phase of the research. These responses were coded as ‘Volunteered for treatment’ if they provided their email address, and ‘Did not volunteer for treatment’ if no email address was provided.
3.2.5 Ethical Considerations.

This project was approved by the RMIT University Human Research Ethics Committee (Project No. 20/09) on 21.07.2009. Prior to completing the survey, participants were provided with a plain language statement outlining the purpose of the research, the relevant research questions being addressed, requirements associated with participation, potential risks and disadvantages of involvement, information regarding data management, the individual’s rights as a participant and the contact details of the principal investigator and supervisors. The voluntary nature of participation was highlighted in this document.

To protect the privacy of participants, a number of measures were taken. All digital data was stored on a secure server, password protected and de-identified, with each participant allocated a participant number. A file containing the email addresses of participants volunteering for the intervention and their associated participant number was kept separate from other research data. Access to both digital and hard-copy data was restricted to the principal investigator and supervisor, all test results, reports and other information of a personal nature generated in the course of the project was stored in a locked filing cabinet located within the Discipline of Psychology and electronic data were stored on a secure RMIT server with access only granted to the Principal Investigator and the supervisor. Finally, information will be retained only for the required period (5 years) and will then be securely destroyed. Electronic data will be disposed of through an approved method of electronic deletion. Paper materials will be shredded.
3.3 Results.

3.3.1 Preparation of Data for Statistical Analysis.

All data were analysed using the SPSS 18 statistical package. Due to restrictions imposed by the researcher on the online survey, participants were unable to skip individual items and, as such, no missing data was identified and no incomplete surveys were submitted.

3.3.2 Descriptive Statistics – Demographics.

The total sample consisted of 1046 participants, comprising 580 females ($M = 23.42$ years, $SD = 6.11$) and 466 males ($M = 23.47$ years, $SD = 6.69$). Chi square analyses confirmed a significantly greater proportion of females in the sample, $X^2(1, N =1046) = 12.42, p < .001$. Descriptive statistics for the entire sample are presented in Table 4.

<table>
<thead>
<tr>
<th>Variable</th>
<th>$N$</th>
<th>$M$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1046</td>
<td>23.44</td>
<td>6.37</td>
</tr>
<tr>
<td>Years of tertiary education</td>
<td>1046</td>
<td>2.67</td>
<td>2.39</td>
</tr>
</tbody>
</table>

3.3.3 Representativeness of the Sample.

To establish the representativeness of the sample, and ensure the generalisability of the findings, demographic information derived from the survey was compared to current RMIT statistics. The data indicates that the sample was broadly representative of RMIT. This comparison is presented in Table 5.
Table 5.

*RMIT Demographics and Study Sample Demographics*

<table>
<thead>
<tr>
<th>N (%)</th>
<th>RMIT</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>35778 (50.0%)</td>
<td>580 (55.4%)</td>
</tr>
<tr>
<td>Male</td>
<td>35826 (50.0%)</td>
<td>466 (44.6%)</td>
</tr>
<tr>
<td>Total</td>
<td>71604</td>
<td>1046</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15–19 years</td>
<td>10239 (14.3%)</td>
<td>243 (23.2%)</td>
</tr>
<tr>
<td>20–24 years</td>
<td>33941 (47.4%)</td>
<td>511 (48.9%)</td>
</tr>
<tr>
<td>25–44 years</td>
<td>23844 (33.3%)</td>
<td>271 (25.9%)</td>
</tr>
<tr>
<td>45 years and above</td>
<td>3580 (5.0%)</td>
<td>21 (2.0%)</td>
</tr>
<tr>
<td>Total</td>
<td>71604</td>
<td>1046</td>
</tr>
</tbody>
</table>

*Note.* RMIT data derived from Pocket Statistics – RMIT by Numbers, 2009.

### 3.3.4 Descriptive Statistics – AUDIT

The mean total AUDIT score for the sample was 9.92 (*SD* = 6.78). Based on total AUDIT scores, the sample was split into risk categories, as indicated by Babor, Higgins-Biddle, Saunders, and Monteiro (2001). Data indicated that 42.0% (*n*=439) were categorised Low Risk drinkers (*AUDIT*=0-7), 38.4% (*n*=402) as Excess of Low Risk drinkers (*AUDIT*=8-15), 9.1% (*n*=95) as Harmful/Hazardous drinkers (*AUDIT*=16-19), and 10.5% (*n*=110) as Possible Dependence drinkers (*AUDIT*=20+). Overall, 58.0% (*n*=607) of the sample drank above the Low Risk threshold. Risk category and related gender data for the sample is presented in Table 6.
Table 6.

**AUDIT Risk Category by Gender.**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Low Risk (AUDIT = 0-7)</th>
<th>Excess of Low Risk (AUDIT = 8-15)</th>
<th>Harmful/Hazardous (AUDIT = 16-19)</th>
<th>Possible Dependence (AUDIT = 20-40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>173 (39.4%)</td>
<td>178 (44.3%)</td>
<td>53 (55.8%)</td>
<td>62 (56.4%)</td>
</tr>
<tr>
<td>Female</td>
<td>266 (60.6%)</td>
<td>224 (55.7%)</td>
<td>42 (44.2%)</td>
<td>48 (43.6%)</td>
</tr>
<tr>
<td>Total</td>
<td>439 (100%)</td>
<td>402 (100%)</td>
<td>95 (100%)</td>
<td>110 (100%)</td>
</tr>
</tbody>
</table>

The majority of participants in the sample were classified as Low Risk drinkers. Female participants were overrepresented in the Low Risk and Excess of Low Risk categories, while male participants were overrepresented in the Harmful/Hazardous and Possible Dependence categories.

To examine the broad drinking characteristics of the sample, responses to individual items from the AUDIT are presented below. Responses to items 1 and 3-8 are presented in Table 7, responses to item 2 are presented in Table 8, and responses to items 9 and 10 are presented in Table 9. Please note, item responses are grouped in this manner for ease of presentation, based on response format. Item groupings do not reflect underlying constructs. For information on items and their relation to underlying constructs, refer back to section 3.2.41.
Table 7.

*Responses to AUDIT Items 1 and 3-8 (N=1046).*

<table>
<thead>
<tr>
<th>AUDIT Item</th>
<th>Response count (%)</th>
<th>Never</th>
<th>Less than monthly</th>
<th>Monthly</th>
<th>Weekly</th>
<th>Daily or almost daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How often do you have a drink containing alcohol?</td>
<td>(4.4%) (12.3%)</td>
<td>46</td>
<td>176</td>
<td>369</td>
<td>326</td>
<td>129</td>
</tr>
<tr>
<td>3. How often do you have six or more drinks on one occasion?</td>
<td>(17.7%) (0.8%)</td>
<td>185</td>
<td>312</td>
<td>264</td>
<td>277</td>
<td>8</td>
</tr>
<tr>
<td>4. How often during the last year have you found that you were not able to stop drinking once you had started?</td>
<td>(58.6%) (0.8%)</td>
<td>613</td>
<td>234</td>
<td>111</td>
<td>80</td>
<td>8</td>
</tr>
<tr>
<td>5. How often during the last year have you failed to do what was normally expected from you because of drinking?</td>
<td>(58.7%) (0.0%)</td>
<td>614</td>
<td>287</td>
<td>109</td>
<td>36</td>
<td>0</td>
</tr>
<tr>
<td>6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?</td>
<td>(93.0%) (0.2%)</td>
<td>973</td>
<td>56</td>
<td>9</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>7. How often during the last year have you had a feeling of guilt or remorse after drinking?</td>
<td>(47.4%) (0.8%)</td>
<td>496</td>
<td>375</td>
<td>130</td>
<td>37</td>
<td>8</td>
</tr>
<tr>
<td>8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?</td>
<td>(50.5%) (0.3%)</td>
<td>528</td>
<td>361</td>
<td>113</td>
<td>41</td>
<td>3</td>
</tr>
</tbody>
</table>
Examination of these figures highlights some striking trends. Over 12% of the sample report being daily drinkers, 30% consume more than 6 drinks in one session at least weekly, and 15% report memory loss as a result of alcohol use occurring at least monthly.

Table 8.

*Responses to AUDIT Item 2 (N=1046).*

<table>
<thead>
<tr>
<th>Item</th>
<th>Response count (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 or 2</td>
</tr>
<tr>
<td>2. How many drinks containing alcohol do you have on a typical day when you are drinking?</td>
<td>270 (25.8%)</td>
</tr>
</tbody>
</table>

As reported, over 52% of the sample consume 1-4 drinks on a typical drinking day, indicating that almost 48% of the sample drink at least 5 drinks on a typical drinking day.

Table 9.

*Responses to AUDIT Items 9 and 10 (N=1046).*

<table>
<thead>
<tr>
<th>Item</th>
<th>Response count (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes, but not</td>
</tr>
<tr>
<td></td>
<td>in the last year</td>
</tr>
<tr>
<td>9. Have you or someone else been injured as a result of your drinking?</td>
<td>701 (67.0%)</td>
</tr>
<tr>
<td>10. Has a relative or friend or doctor or other health worker been concerned about your drinking or suggested you cut down?</td>
<td>834 (79.7%)</td>
</tr>
</tbody>
</table>
As reported here, 33% of the sample have been injured or injured someone else as a result of alcohol use and over 20% report that others have, at some point, been concerned about their drinking behaviours.

### 3.3.5 Descriptive Statistics – Treatment Variables.

Descriptive data for treatment related variables are presented Table 10. As demonstrated, a very small percentage of the sample had previously sought professional assistance for alcohol concerns; chi-square analyses confirmed that a significantly greater proportion of the sample had not sought professional help, when compared with those who had, \(X^2(1, N = 1046) = 914.42, p < .001\). Similarly, a small number of participants volunteered to be involved in the treatment phase of the current research study; chi-square analyses demonstrated the difference between those that did and those that did not volunteer was also significant, \(X^2(1, N = 1046) = 436.88, p < .001\). In spite of the low number of volunteers, the majority of participants were eligible for inclusion in the treatment phase, based on a total AUDIT score of 8-20.
Table 10.

*Frequency Statistics for Treatment Variables.*

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sought professional help for drinking?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>34</td>
<td>3.3%</td>
</tr>
<tr>
<td>No</td>
<td>1012</td>
<td>96.7%</td>
</tr>
<tr>
<td>Total</td>
<td>1046</td>
<td>100.0%</td>
</tr>
<tr>
<td>Eligibility for Study Two based on total AUDIT score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No – Low (&lt;8)</td>
<td>439</td>
<td>42.0%</td>
</tr>
<tr>
<td>Yes (8-20)</td>
<td>512</td>
<td>48.9%</td>
</tr>
<tr>
<td>No – High (&gt;20)</td>
<td>95</td>
<td>9.1%</td>
</tr>
<tr>
<td>Total</td>
<td>1046</td>
<td>100.0%</td>
</tr>
<tr>
<td>Volunteered for Study Two?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>185</td>
<td>17.7%</td>
</tr>
<tr>
<td>No</td>
<td>861</td>
<td>82.3%</td>
</tr>
<tr>
<td>Total</td>
<td>1046</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

3.3.6 Inferential Analyses – Drinking Variables.

A series of one sample t-tests were conducted to compare the mean total AUDIT score of the current sample to the mean total AUDIT scores reported in Reavley et al., (2006) and Kelly et al., (2005). Data indicated that the mean AUDIT score for the current study \( (M = 9.92, SD = 6.78) \) was significantly higher than that reported in Reavley and colleagues, \( (M = 6.0, SD = 5.7) \), \( t(1045) = 18.70, p < .001 \), and that reported in Kelly and colleagues \( (M = 8.37, SD = 6.16) \), \( t(1045) = 7.39, p < .001 \).

A one-way analysis of variance (ANOVA) was conducted to identify significant gender differences in total AUDIT scores within the sample. Descriptive statistics for this analysis
are presented in Table 11. The ANOVA was significant, $F(1, 1044) = 11.36, p < .001$, with male participants scoring significantly higher than female participants on the AUDIT. Eta squared was used to assess the percentage of variance in AUDIT scores that is explained by gender in the sample data. Eta squared effect sizes are interpreted according to Cohen’s guidelines, where $\eta^2 = .01$ is considered a small effect, $\eta^2 = .06$ a medium effect and $\eta^2 = .14$ a large effect (Cohen, 1988). The size of eta squared was small, $\eta^2 = .01$, with gender explaining only 1% of the variance in overall AUDIT scores.

Table 11.

*Mean Total AUDIT Scores Across Gender.*

<table>
<thead>
<tr>
<th>Gender</th>
<th>$M$</th>
<th>$SD$</th>
<th>$N$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>10.70</td>
<td>7.16</td>
<td>466</td>
</tr>
<tr>
<td>Female</td>
<td>9.29</td>
<td>6.40</td>
<td>580</td>
</tr>
<tr>
<td>Total</td>
<td>9.92</td>
<td>6.78</td>
<td>1046</td>
</tr>
</tbody>
</table>

To examine the relationship between age and overall AUDIT score, a Pearson’s correlation coefficient was computed. Again, Cohen’s guidelines are used to interpret effect sizes for Pearson’s $r$, where $r = 0.10$ is considered a small effect, $r = .30$ a medium effect and $r = 0.50$ a large effect (Cohen, 1988). Analysis found a strong, negative relationship between age and AUDIT score, $r(1046) = -.70, p = .24$.

A one-way analysis of variance (ANOVA) was conducted to identify significant differences in overall AUDIT scores between participants that did volunteer for treatment in Study Two, and those that did not volunteer for treatment in Study Two. The independent variable included two levels, volunteered for treatment and did not volunteer for treatment.
The dependent variable was the overall AUDIT score. Descriptive statistics for this analysis are presented in Table 12. Analysis produced a significant result, $F(1, 1044) = 20.45, p<.001$, with participants volunteering for treatment recording significantly higher AUDIT scores than participants who did not volunteer for treatment. Eta squared was used to assess the percentage of variance in AUDIT scores that is explained by volunteer preference in the sample data. The size of eta squared was small, $\eta^2 = .02$, with volunteer preference explaining only 2% of the variance in overall AUDIT scores.

Table 12.

*Mean Total AUDIT Scores for Volunteers and Non-Volunteers.*

<table>
<thead>
<tr>
<th>Volunteered for Study Two?</th>
<th>$M$</th>
<th>$SD$</th>
<th>$N$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>11.95</td>
<td>8.09</td>
<td>185</td>
</tr>
<tr>
<td>No</td>
<td>9.48</td>
<td>6.38</td>
<td>861</td>
</tr>
<tr>
<td>Total</td>
<td>9.92</td>
<td>6.78</td>
<td>1046</td>
</tr>
</tbody>
</table>

3.3.7 Attitudes Toward Alcohol Services.

To examine the relative acceptability of various alcohol services, participants were asked to indicate, first, whether or not five common intervention approaches should be made available to students, and second, whether the individual would use each approach if they had a problem with alcohol. The large majority of the sample indicated that all listed services should be made available to students. The most highly endorsed service was ‘Anonymous web-based alcohol risk assessment and personalized feedback’ with 91.9% of the sample indicating that this service should be made available to students. In contrast, ‘Health education seminars on alcohol’ garnered the least support, with 70.7% of students
indicating that this service should be made available to students. Anticipated use of services was similar to endorsement of general availability. As shown, ‘Anonymous web-based alcohol risk assessment and personalized feedback’ was the service most endorsed by the sample, with 83.1% indicating that they would use the service if they had a problem with alcohol. ‘Alcohol risk assessment and advice from a nurse, counsellor, or psychologist’ was the next most commonly endorsed service, with 74.0% of participants indicating that they would use the service if they had a problem with alcohol. The majority of participants would not use ‘Health education seminars on alcohol’; only 33.1% of participants stated that they would use this service if they had a problem with alcohol.

As any intervention utilised in Study Two would be targeted toward hazardous drinkers, responses to the attitudinal items for participants scoring AUDIT ≥8 were also examined in detail. The patterns of endorsement for participants scoring ≥8 on the AUDIT are similar to those of the entire sample. For general availability, ‘Anonymous web-based alcohol risk assessment and personalized feedback’ garnered the greatest level of support with 91.4% of this group endorsing this mode of treatment. ‘Health education seminars on alcohol’ were the least favourably perceived, with only 67.5% of this group indicating that this service should be made available to students. Endorsements for personal use of services were similar to those reported for the entire sample. Again, ‘Anonymous web-based alcohol risk assessment and personalized feedback’ was the most highly endorsed, with 81.5% indicating that they would use the service if they had a problem with alcohol, and again ‘Alcohol risk assessment and advice from a nurse, counsellor, or psychologist’ was the next most commonly endorsed service, with 71.3% of these participants indicating that they would use the service if they had a problem with alcohol. The relative unacceptability of
‘Health education seminars on alcohol’ is also mirrored in this group, with only 28.5% of participants indicating that they would use this service if they had an alcohol problem. Descriptive statistics for the entire sample and participants with a total AUDIT score of >8 are presented in Table 13.

Table 13.

<table>
<thead>
<tr>
<th>Modality of treatment</th>
<th>Total sample</th>
<th>AUDIT ≥8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Endorse availability</td>
<td>Would use</td>
</tr>
<tr>
<td></td>
<td>% (n)</td>
<td>% (n)</td>
</tr>
<tr>
<td>Anonymous web-based alcohol risk assessment and personalized feedback</td>
<td>91.9% (961)</td>
<td>83.1% (869)</td>
</tr>
<tr>
<td>Alcohol risk assessment and advice from a nurse, counsellor, or psychologist</td>
<td>88.0% (921)</td>
<td>74.0% (774)</td>
</tr>
<tr>
<td>Alcohol risk assessment and advice from a doctor</td>
<td>82.5% (863)</td>
<td>69.2% (724)</td>
</tr>
<tr>
<td>Reading materials and leaflets about alcohol and its effects</td>
<td>81.7% (855)</td>
<td>53.9% (564)</td>
</tr>
<tr>
<td>Health education seminars on alcohol</td>
<td>70.7% (740)</td>
<td>33.1% (346)</td>
</tr>
</tbody>
</table>
3.4 Discussion

Study One examined the current drinking behaviours and beliefs of a large Australian university sample, and was used to screen participants for a subsequent intervention study. Variables of interest were demographic information, such as age and gender, current drinking behaviours and attitudes towards various alcohol intervention modalities. The current section will address each research hypothesis and discuss the outcomes in the context of the broader research literature.

3.4.1 AUDIT.

It was predicted that there would be no significant difference in total mean AUDIT score between the current sample and other comparable Australian university samples reported in the literature. Although some problems exist in directly comparing AUDIT from the current study with other reported outcomes, including lack of use of the AUDIT in Australian studies and variation in the version of AUDIT used, data from Reavley et al., (2006) and Kelly, Masterman and Marlatt (2005) was appropriate for comparison. Data did not support the hypothesis. The mean total AUDIT score was found to be significantly higher than totals reported in Reavley and colleagues (2006) and Kelly and colleagues (2005).

In attempting to explain the significantly higher mean AUDIT score of the current sample, it is useful to examine the composition of the comparison groups. Participants in all studies were Australian university students and the mean age of the samples were similar, with the current sample reporting a mean age 23.44 years ($SD = 6.37$), and the Reavley et al., (2006) and Kelly et al., (2005) samples reporting mean ages of 24.5 years ($SD = 8.4$) and 22 years ($SD = 6.26$) respectively. In light of these similarities, the most likely explanatory factor is the gender make-up of the samples; the current sample was comprised
of 44.6% male students, whilst the sample used by Reavley et al., (2006) was made up of
38% male, and the sample used by Kelly and colleagues, (2005) of 31% male students. There
is a large body of literature highlighting gender-based differences in drinking behaviours
amongst university and college students, with males consistently reporting higher frequency
and volume of alcohol consumption (Ham & Hope, 2003). Male college students also report
greater frequency of alcohol related negative consequences (Neighbours et al., 2007). The
larger proportion of male students in the current sample, compared to the target samples,
likely lead to the larger observed mean AUDIT score due to increased hazardous
consumption amongst male participants. A more detailed discussion of gender differences
in drinking behaviour amongst university students is provide in Section 4.1.2.

It should be noted here that the groups chosen for comparison are not necessarily
representative of Australian university students as a whole, and the total mean AUDIT
scores reported may not reflect the true population mean. One sample t-tests are generally
reserved for comparing a sample mean against a known population mean. As noted,
however, the body of research on alcohol consumption behaviours amongst Australian
students is limited. While this factor was managed in the current analysis by conducting
multiple one sample t-tests using data from studies with relatively large sample sizes, the
lack of a suitable data set for comparison highlights the need for further research in this
area. There is a need for a large scale, multi-site, multi-university survey to be conducted in
order to provide Australian researchers, universities and policy developers with data that
accurately reflects the true alcohol related behaviours of this group.

The findings reported here support previous data that indicate high rates of
hazardous alcohol consumption amongst Australian university students. The mean total
AUDIT score for this cohort suggests that the average participant in this study consumes alcohol in a manner that categorizes them as ‘risky’ in terms of AUDIT categories. Indeed, the data shows that 58.0% of the sample were categorised as ‘risky’ drinkers, scoring ≥8 on the AUDIT. An examination of responses to individual items further reinforces this observation. Data indicate that over 27% of the sample consume more than 6 drinks in one session at least weekly; in terms of MHMRC guidelines, this suggests that 27% of the sample drink in a fashion that is considered ‘risky’, in terms of short term harm, at least once a week. This pattern of consumption places these individuals at risk of experiencing a range of negative alcohol related consequences. Indeed, data suggests that alcohol related negative events were also common amongst this group, with 33% the sample reporting having been injured or injured someone else as a result of their alcohol use and 15% reporting memory loss as a result of alcohol use occurring at least monthly. These figures mirror data reported by other recent Australian research, for example research conducted by the University of Sydney found that 20.6% of their university sample reported drinking, on average, 6 or more standard drinks in one session at least weekly (UoS, 2005), while Davey et al. (2002) also found that 20% of their Australian sample reported binge drinking weekly (defined as 5+ drinks per session for females and 7+ drinks per session for males). The available data also highlight frequent negative consequences of alcohol use: the NSW Health University Drug and Alcohol Survey found that, as a result of drinking or drug use, 28.1% reported experiencing some kind of significant personal issue, such as suicidality, injuries and sexual assault.

It is clear that the current cohort drink frequently, consume large amounts of alcohol and report a history of negative alcohol related consequences, such as injury and memory
loss. In spite of the mean AUDIT score of the current sample being significantly higher than other figures reported in the field, the data fits with the broader picture of drinking behaviours of Australian university students.

### 3.4.2 AUDIT and Gender.

The hypothesis that male participants would record significantly higher AUDIT scores than female participants was supported by the data. As described, the AUDIT is designed as a screening tool for harmful alcohol use, and higher scores represent more harmful drinking behaviours. These data, where male participants in the current study recorded significantly higher total AUDIT score than female participants, confirms previously noted trends in international literature; male university students are consistently found to drink significantly more alcohol and more frequently than female students, and report significantly higher rates of negative alcohol related consequences (Ham & Hope, 2003; Neighbours et al., 2007; Turisi et al., 2009). Indeed, this gender-difference in alcohol behaviours is evident in studies of Australian university students; for example, Lyvers and colleagues (2009) found that male Australian university students in their sample reported significantly higher mean AUDIT scores compared to female university students. Similarly, male participants in Roche and Watt’s (1999) study recorded drinking greater amounts of alcohol, and with greater frequency, when compared to female participants, and Ball et al., (2000) indicated that Australian male university students in their sample recorded significantly greater proportion of unsafe alcohol consumption compared to women.

Interestingly, in the current study, the observed effect size of gender difference in mean AUDIT score was relatively small, suggesting that the actual differences in harmful consumption between males and females in this sample was relatively minor. This
observation supports recent Australian research which has identified trends towards increased consumption amongst females, reducing previously identified gender differences in consumption rates (Johnstone & White, 2004). This pattern amongst Australian female university students has been acknowledged in the literature and is the subject of at least two recent research studies dedicated solely to this topic (see Johnstone & White, 2004, and O’Hara, Harker, Raciti, & Harker, 2008). As noted, the majority of research supports a gender difference in consumption, with males consuming more alcohol than females, however data from some Australian empirical studies have not revealed this difference. For example, Davey and Davey (2002), in a study of 275 Australian university students, found no significant differences between genders in measures of drinking frequency, quantity or level of risk, according to AUDIT risk categories. Similarly, Basten and Kavanagh (1996) identified no gender differences in typical weekly consumption in a sample of Australian university students. Increases in female student’s consumption levels are particularly troubling when biological-based gender differences in alcohol absorption are considered. Research has shown that gender differences in body mass, metabolism and fat-to-water ratios lead to females reaching similar blood alcohol concentrations (BAC) as men after consuming less alcohol (Ham & Hope, 2003). Thus, for females, intoxication, and subsequent negative consequences, can occur at lower consumption levels than for males. This fact is reflected in the NMRC guidelines, where consumption levels for short and long term risk are adjusted according to gender.

Overall, these findings highlight a significant, albeit relatively small, gender difference in mean AUDIT score, with males reporting significantly higher scores than females. Although previous research has consistently found males to be at particular risk of
alcohol related harms, due to frequent, high-level consumption, additional studies have shown an increase in female consumption and alcohol related harms over time. Indeed, in the current study both males and females reported a mean total AUDIT score in the ‘hazardous’ range (AUDIT +8), with males scoring 10.70 (SD = 7.16) and females 9.29 (SD = 6.40). These findings suggest that the development of intervention approaches to harmful alcohol use would benefit from targeting both male and female students. Although male students have traditionally been found to be more at risk of alcohol related harms, high rates of hazardous female consumption necessitate an inclusionary approach to intervention with this group.

3.4.3 AUDIT and Age.

The hypothesis that there would be a significant, negative correlation between age and total AUDIT scores was supported by the findings. Data indicated that as participants’ age increased, their level of problematic drinking tended to decrease. This finding indirectly supports the concept of natural maturation, wherein it is proposed that as the majority of young people age, their responsibilities and roles (such as intimate relationships, work or study pressures) become more significant and, as such, their lifestyles become incompatible with high levels of alcohol consumption, and, as a consequence, alcohol consumption reduces without intervention. A large scale longitudinal study by Bewick and colleagues (2008) confirmed this pattern of reduction over time, with data indicating that consumption rates decline across the first three years of undergraduate studies. The study however did not explore reasons for this reduction. Other authors have suggested that the noted pattern of reduction is not necessarily a sole function of external roles and responsibilities. For example, research by Littlefield, Sher and Wood (2009) suggests that the broad pattern of
changes in alcohol consumption seen in young adults across time may also be related to changes in personality structure (e.g. reductions in extroversion and impulsivity) rather than purely role changes, such as parenthood and marriage.

In spite of the various proposed mechanisms for the natural maturation process, it is beyond the scope of the current research to make hypotheses to account for this change; limited demographic data was collected and the reasons for ‘natural maturation’ were not a focus of this study. In the future however, research conducted in this manner could include questionnaire items relating to personality and role changes in an attempt to better account for any noted changes in drinking behaviours for this population.

3.4.4 Study Volunteering.

Although 58% of the sample was drinking at ‘risky’ levels, as measured by a total AUDIT score of ≥8, only 17.7% volunteered to be involved in the treatment phase of the current study. This represents a large division between harmful drinking behaviours and the perceived need, or willingness, to receive treatment. Unfortunately, this finding is not uncommon in the Australian literature. In a sample of 300 Australian undergraduate students in the EXPOSED project, conducted by the University of Sydney, 31% of participants acknowledged excessive alcohol use, but did not believe that this manner of consumption was problematic (University of Sydney, 2005). Indeed, as reported previously, In spite of these observations, presentations for alcohol treatment at Australian university counselling services are minimal (Urbis, 2007). Similar findings have been published in international journals. Caldeira and colleagues (2009) found that in a sample of 946 US university students, 46.8% had met full DSM-IV-TR criteria for a substance use disorder (SUD) over the past three years, however only 3.6% of the SUD cohort perceived a need for assistance.
Similarly, Wu and colleagues (2007) found that only 2% of college students who met criteria for alcohol use disorder perceived a need for treatment.

The hypothesis that individuals volunteering to take part in treatment (Study Two) would report significantly higher AUDIT scores than individuals that did not volunteer was supported by the data. These findings are indirectly supported by the work of Shealy, Murphy, Borsari and Correia (2007) who demonstrated that, in a sample of university students, motivation to change was positively related to frequency and quantity of alcohol use and alcohol related problems. Similar data, regarding the positive relationship between high levels of alcohol consumption and negative alcohol related consequences, and motivation to change and help-seeking have been reported elsewhere in the literature (Coder, Freyer-Adam, Rumpf, John, & Hapke, 2009; Hajema, Knibbe, & Drop, 1999). These variables are theoretically reflected in the total AUDIT score; as stated in the AUDIT manual, “higher scores... indicate greater likelihood of hazardous and harmful drinking. However, such scores may also reflect greater severity of alcohol problems and dependence” (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001, p.19). It may be possible, therefore, that individuals volunteering to take part in the intervention phase of the research were engaging in hazardous or harmful drinking behaviours or experiencing negative alcohol related consequences and, as a result, were more likely to acknowledge that a problem exists, and pursue treatment.

That said, the factors that mediate alcohol use and help-seeking amongst young adults are complex and poorly understood. In addition to consumption levels and frequency, and negative consequences, a wide range of variables such as attitudes toward treatment, impulsivity and impulse control, problem recognition and perceived stigma have
have been described in studies as potentially influential in determining help-seeking (Celluci, Krogh, & Vik, 2006; Codd & Cohen, 2003). Due to the limited additional data collected for this sample, it is difficult to state categorically the key variables that influenced volunteers vs. non-volunteers. Future intervention research could include a brief item in screening questionnaires asking participants not wishing to be involved in the intervention component of the research to state their reasons for non-involvement. This may provide additional qualitative data.

3.4.5 Intervention Modality Preference.

It was hypothesised that an online alcohol intervention would be the most highly endorsed intervention modality, for both use by the individual and for the availability for others, by all participants and also those drinking at ‘risky’ levels. This hypothesis was fully supported by the findings. Indeed, ‘anonymous web-based alcohol risk assessment and personalised feedback’ was the most highly endorsed option for availability, with almost 92% of the sample supporting its availability. Similarly, this option was also the most highly endorsed for a modality that individuals would use if they had a problem, with over 83% of the sample supporting this option. With regard to participants categorised as ‘risky’ drinkers (as measured by AUDIT ≥8), the pattern of findings was the same; 91.4% of these participants stated that ‘anonymous web-based alcohol risk assessment and personalised feedback’ should be available to students and 81.5% stated that they would use this option if they had a problem.

These data are supported by the findings of Kypri, Saunders and Gallagher (2003), on whose research these attitudinal items were based. In their study of 1910 New Zealand university students, Kypri et al. (2003) noted that ‘anonymous web-based alcohol risk
assessment and personalised feedback’ was the most highly endorsed treatment option in terms of availability and likelihood of use, and, perhaps more importantly, the option that hazardous drinkers \((n = 980)\) reported that they were most likely to use if they felt they had a problem. Interestingly, these results have not been consistently replicated in the literature. Epler, Sher, Loomis, and O’Malley (2009) investigated the receptiveness of US college students \((N=2084)\) to a range of treatment options for alcohol misuse. Students were asked “Which ones of the following would you consider if you were wanting to cut down on or stop drinking?” and were provided with the following 8 options, “self help book”, “computer-based self-help program”, “self-help group”, “group with a therapist/counsellor”, “individual therapist/counsellor”, “anti-drinking medication that was administered by injection once per month”, “anti-drinking medication to take only on days when I might drink”, and “anti-drinking medication to take every day”. Results demonstrated that individual therapy was the most highly endorsed treatment option with 34.6% of the sample supporting this modality, while the computer based self-help program (analogous to Kypri and colleagues [2003] ‘anonymous web-based alcohol risk assessment and personalised feedback’) was endorsed by less than a third of this figure, with only 10.5% of the sample supporting this option. Interestingly, oral medication was seen more favourably than the computer based intervention.

Although the relative unpopularity of computer based interventions in Epler and colleagues (2009) study is striking, the high level of endorsement of individual therapy options is not. Indeed, in the current research, the ‘alcohol risk assessment and advice from a nurse, counsellor, or psychologist’ was the second most highly endorsed treatment option in terms of availability and personal use, for the entire sample and hazardous drinkers in
particular. Similar results were found in Kypri et al (2003). In a comparative study of face-to-face and online intervention for alcohol use amongst US college students \( N = 84 \), Butler and Correia (2009) found that participants rated the acceptability of the face-to-face intervention more highly than the acceptability of the online intervention. While the exact wording of the questions in these studies, the demographic characteristics of the sample and the countries in which the studies were conducted all will have undoubtedly influenced the outcomes and contributed to the mixed picture presented here, it is clear that, overall, brief internet-based feedback interventions are acceptable to the majority of university students and, importantly, are favoured by students currently drinking in a hazardous fashion. Similarly, brief face-to-face interventions also seem to be acceptable to a large proportion of students. These data suggest that these particular intervention approaches are worthy of further study due to their relatively high levels of acceptability amongst target populations.

3.5 Limitations

Although the design and execution were strong, data from Study One must be examined in light of the limitations. The recruitment process was flawed in several ways. Firstly, the indirect email approach, while convenient, may have lead to a biased sample. This process was wholly dependent on RMIT lecturers and tutors forwarding the invitations to students, and as such, the researchers have no method of knowing the patterns of distribution, or whether particular student groups were omitted from participation based on the discretion of their teaching staff. Secondly, no incentives or remuneration was provided for participation. Again, this factor may have lead to a biased sample; it is reasonable to assume that students who were more open about their alcohol use and motivated to
engage in reflection about their consumption were more likely to participate. Future research should offer some form of incentive for participation as a matter of course, in an attempt to create a more balanced sample.

The final composition of the sample was also a limitation. Female participants were overrepresented, leading to a gender imbalance in the data. Similarly, a large percentage of the sample (27.9%) were over the age of 25 years; the skewed age range may have lead to artificially low mean AUDIT scores. As described in Section 2.8, young adults generally progress through a ‘natural maturation’ period whereby hazardous drinking behaviours are reduced over time. It is likely that the older participants in the study had achieved natural maturation and, as such, reported lower AUDIT scores. Although these factors raise some questions as to the generalisability of the data, overall the study design was strong and the data should be considered valid.

3.6 Overall Summary

Study One was designed to provide a brief description of current drinking behaviours and attitudes toward alcohol treatment modalities amongst an Australian university sample. The study also served as a screening and recruitment tool to facilitate Study Two, a comparative examination of the efficacy of two brief alcohol interventions. Although analyses were intentionally kept brief and simple, a number of notable themes arise from an examination of the findings. Broadly, the findings from Study One indicate that the current sample consume alcohol in a manner that is largely similar to other Australian university samples reported in the literature. Although direct comparison of data is difficult, it is clear that this cohort, along with previously reported Australian university samples, consume alcohol regularly, in quantities that surpass NHMRC low risk guidelines, and have
experienced negative consequences, such as memory loss and guilt, as a result. In spite of this finding, the majority of participants drinking above the low risk threshold did not volunteer for treatment. Taken together, these results lend further support to Australian and international research highlighting high rates of harmful consumption within this population existing alongside an unwillingness to pursue treatment.

In examining the relative acceptability of various treatment modalities, it is clear that for this cohort, online and brief face-to-face treatment approaches are the most highly endorsed. Consistently, data indicated that these treatment approaches were the most highly endorsed for both general availability but, perhaps more importantly, likelihood of personal use. Increasing the significance of this finding, the high levels of endorsement for these modalities were replicated amongst individuals drinking above the low risk threshold, the same individuals that would be most likely to benefit from alcohol interventions. No other studies examining attitudes toward alcohol treatment modalities amongst Australian university populations are known to the author. Although findings in the broader literature are mixed, overall this data reflects identified trends in the international literature suggesting that online and brief face-to-face treatments are considered acceptable by this population. Although acceptability does not equal efficacy, the acceptability of a treatment is important for client engagement and treatment compliance and the reported acceptability of these treatment approaches in an Australian sample suggests that further empirical studies examining their relative efficacy are warranted.

Study One contributes to the relatively small body Australian literature on alcohol use amongst university students. In addition to providing detail regarding consumption variables, it provides evidence highlighting the apparent acceptability of both online and
brief face-to-face treatments for problematic alcohol consumption amongst this population. This data should be used to guide further research examining the efficacy of these modalities with Australian populations in order to assist in the identification and implementation of acceptable, evidence-based treatment approaches for Australian universities.
Chapter 4. Individual Focussed Interventions for Harmful Alcohol Use

As established, research has consistently demonstrated that Australian university students drink more alcohol and in a more harmful fashion that non-university peers, and as such are at a greater risk of both short and long term harm. This observation necessitates an examination of current individual-focused intervention approaches designed to reduce harmful alcohol use in this population. Although, Study One demonstrated that participants reported a preference for online and brief face-to-face treatments for problematic alcohol consumption, the evidence base for these, and other approaches, to the treatment of harmful alcohol behaviours must be examined prior to any intervention trial. The current review utilises Larimer and Cronce’s (2007) classification of individual-focused interventions, defined as “...those that focus on demand reduction of individual drinkers through provision of information or skills to influence student decision-making and behavior” (p.2440). For the purposes of the current review, individual-focussed alcohol interventions for university populations will be classified into one of the following categories: cognitive behavioural skill-based interventions, motivational and feedback interventions, educational and awareness Interventions and online Interventions. In the current chapter, research examining the efficacy of various alcohol interventions, according to these categories, will be critically explored, with the intention of identifying appropriate treatments for this population. Due to the large number of publications in this field, the review presented here is not designed to be a thorough critique of all available intervention research, rather its purpose is to examine a small number of relevant studies and provide a broad description of the current state of the literature. Comprehensive reviews of interventions for university and college alcohol misuse can be found in Larimer and Cronce (2002) and Larmier and Cronce (2007).
4.1 Cognitive Behavioural Skill-Based Interventions

Cognitive-behavioural skill-based interventions (CBI’s) are defined as “an approach covering a range of strategies and techniques derived from learning principles, including cue exposure therapy, behavioural self-control training, skills training and cognitive restructuring” (Gibson & Shanahan, 2007, p.5). While many CBI’s are multi-component, and incorporate strategies from other approaches such as information provision, values clarification and normative feedback, all are rooted in modifying alcohol related beliefs and behaviours (Larimer & Cronce, 2002).

4.1.1. Theory.

CBI’s understand problematic drinking in terms of Bandura’s social-cognitive or social learning theory. This theory suggests that classical conditioning, operant conditioning and social and peer modelling directly influence behaviour, expectations and beliefs regarding alcohol use. Broadly, the theory underpinning CBI’s suggest that engaging in excessive alcohol use provides the individual with immediate rewards, such as increased pleasure, and/or a reduction in aversive states, such as anxiety, and these ‘benefits’ of excessive alcohol consumption then serve to maintain the maladaptive behaviour (Range & Marlatt, 2008; Raytek, Morgan & Chung, 2003). From this understanding, CBI’s attempt to assist the individuals to fully understand the functional relationship between the problematic behaviour and the context in which it occurs, challenge positive alcohol expectancies and provide the necessary skills to anticipate and manage ‘high risk’ situations (wherein harmful drinking is likely to occur) without engaging in the problematic behaviour (Dimeff, Baer, Kivlahan, & Marlatt, 1999; Longabaugh & Morgenstern, 1999). Therefore, the cognitive behavioural model views ongoing problematic alcohol consumption as a manifestation of
skill deficits, which can be addressed through the identification of the specific skill areas that require strengthening and the teaching of appropriate coping skills. It is hypothesised that, if these skills are developed, the individual is then able to actively manage the cues and stressors that precipitate excessive alcohol use.

4.1.2. Research.

A thorough literature review retrieved no published studies evaluating CBI’s with Australian university populations. As such, three international research studies are reported here. A number of intervention studies examining the effects of ‘alcohol expectancy challenges’ (AEC) on alcohol beliefs and behaviours exist in the literature. AEC aim to change inaccurate beliefs regarding cognitive, behavioural and affective consequences of drinking in order to reduce overall consumption. For a description of a commonly used structure for alcohol expectancy challenges please refer to Darkes and Goldman (1993; 1998). This approach to targeting harmful alcohol use amongst this population has been associated with some reductions in consumption, particularly with male participants (e.g. Corbin, McNair, & Carter, 2001). AEC is primarily a cognitive, rather than a cognitive behavioural intervention, and as such individual AEC studies will not be examined here. This section will focus solely on multi-component CBI’s. The implications of these studies will be considered in the final section of this review.

Johnsson and Berglund (2005) conducted a randomized controlled trial comparing the effectiveness of a face-to-face CBI and mailed minimal intervention in reducing alcohol consumption amongst ‘high-risk’ university students. The AUDIT was used to identify 177 ‘high-risk’ drinkers and all were randomly allocated to either the Cognitive Behavioural Alcohol Program (CPAP) or Mailed Minimal Intervention (PMMI). Individuals assigned to the
CPAP \((n = 89)\) received 5 x 2 hours weekly sessions of a CBI, covering the following content domains: (i) Identifying High-Risk Drinking Situations; (ii) Providing Accurate Information about Alcohol; (iii) Identifying Personal Risk Factors; (iv) Challenging Myths and Positive Expectations; (v) Establishing Appropriate and Safer Drinking Goals; (vi) Managing High-Risk Drinking Situations, and; (vii) Learning from Mistakes. Individuals in the PMMI group \((n = 88)\) received, by mail, written feedback on AUDIT scores in relation to all other students, recommendations to drink less and, if necessary, advice to contact treatment organizations.

Outcome data indicated significant decreases in total AUDIT scores as well as in the alcohol consumption subscale at one-year follow up, with no significant difference between the two treatment groups. Additionally, the CBAP group demonstrated a significant decrease in the alcohol dependence subscale and the PMMI group in the alcohol-related consequences subscale at one year follow-up.

Kivlahan and colleagues (1990) evaluated two individual alcohol intervention strategies, a cognitive behavioural alcohol skills training program (ASTP) and a didactic alcohol information (AI) program, with a sample of ‘at-risk’ university students. The authors used a screening process to identify ‘at-risk’ participants based on alcohol dependence, consequences and volume measures. A cohort of 43 subjects \((M = 23 \text{ years})\) were randomly assigned to one of three experimental conditions; ASTP, AI or assessment only control. The ASTP group received an 8-week multi-component intervention, targeting assertive drink refusal skills, relaxation and general lifestyle balance skills and alcohol specific skills such as drink pacing, limit setting and blood alcohol discrimination training, while the AI group attended an 8 session program, which used lectures and films to address issues such as alcohol myths, behavioural effects, alcoholism and responsible decision making.
Follow-up data indicated that the participants from the ASTP group demonstrated significant reductions in alcohol use and consequences throughout the 2-year follow-up period as compared with students who received the alcohol information school program or assessment only. Neither group, however, demonstrated any significant change in drinking related negative consequences.

Fromme and Corbin (2004) conducted a randomised control trial to assess the efficacy of a Lifestyle Management Class (LMC) against a wait list control, in reducing alcohol consumption, negative alcohol related consequences and drink driving and increasing motivation to change amongst a university sample. The LMC is a two-session intervention presented in a group format, by either peer or professional group leaders, and utilises elements of cognitive behavioural skills training and motivational approaches. Specifically, the LMC aims to “(a) increase students’ knowledge about drinking patterns, consequences, and alternatives to drinking; (b) correct misperceptions about peer norms; (c) increase motivation to adopt or maintain healthy lifestyles and to reduce heavy alcohol use; and (d) provide skills in behavioral self-management, including alcohol use, time, and stress management” (Fromme & Corbin, 2004, p.1041). Participants were obtained through either a campus wide recruitment program or were mandated to participate in the program following an on-campus alcohol of drug related infraction. Participants, regardless of voluntary/mandated status, were randomly assigned to one of the following three conditions: peer delivered LMC \((n = 193)\), professional delivered LMC \((n = 159)\), or control group \((n = 164)\). Assessments were conducted pre-test, post-test and 6-month follow up.

Follow up data indicated that all LMC participants, regardless of voluntary/mandated status, reduced frequency of drink driving, when compared to controls. LMC participants
also demonstrated larger reductions in alcohol related consequences, when compared to controls, although this difference was non-significant. Data also indicated that voluntary LMC participants demonstrating higher RTC evidenced greater reductions in a heavy drinking composite (composed of measures of monthly frequency of intoxication, monthly consumption of 5+ drinks and highest weekly consumption) when compared to controls and participants lower in RTC.

4.1.3. Evaluation of CBI Research.

While the current review can only examine a limited number of studies, the CBI research reported herein has demonstrated significant changes in drinking behaviors over significant follow-up periods. However, the studies are restricted by a number of methodological issues. All studies have utilized small sample sizes in their research and, as such, the reported effect sizes may be exaggerated, thus calling into question the generalizability of the data. Kivlahan and colleagues (1990) and Fromme and Corbin (2004) used an experimental design to demonstrate change however, both Johnsson & Berglund (2005) and Borsari and Carey (2005) neglected to use control groups (although both used comparison groups). This is problematic due, primarily, to the maturational changes in drinking behaviours exhibited by university students; without controls, the experimenters cannot state, confidently, that the exhibited changes were due solely to the intervention and not natural outcomes. It must be noted however, that this limitation was acknowledged in both studies. Additional criticism centers on the relatively long periods of treatment in CBI interventions; the majority of studies in this review, with the exception of Fromme and Corbin (2004), administered programs ranging from 5 to 8 weeks. While in traditional clinical interventions, this would not be a significant issue, the alcohol literature indicates
that there is no clear relationship between effectiveness and length of intervention (Walters & Neighbours, 2005).

Despite these limitations, more extensive reviews have indicated that, overall, CBI’s for problem drinking amongst university population have been effective in reducing alcohol consumption amongst this population (Carey et al., 2007; Larimer & Cronce, 2002). The lack of Australian data however makes it difficult to evaluate the applicability of this approach for local populations. A discussion of legal, social and cultural differences between Australia and other countries and the impact of these differences on drinking behaviors and treatment is provided in Section 5.5.

4.2. Motivational and Feedback Interventions

Motivational and feedback interventions draw on motivational and social psychology to bring about rapid, internally motivated change (Miller, 1994). Rather than being guided through the ‘recovery’ process, these interventions encourage individuals to draw upon their own resources to facilitate change. Individual drinking behaviors (quantity and frequency, peak blood alcohol content [BAC], expenditure etc) and risk factors (tolerance, dependence, genetic risk of alcoholism, etc.) are explored in the context of normative comparisons (Walters & Neighbours, 2005).

4.2.1. Theory.

Motivational and feedback interventions are grounded in the theories of motivational interviewing, motivational enhancement therapy and self-regulation theory. Brief descriptions of relevant theories are presented below.
4.2.11 Transtheoretical Model of Behaviour Change.

Prochaska and Clemente’s (1983) Transtheoretical Model of Behaviour Change (TTM) is a popular stage-based model of intentional change. In this model, behaviour change is treated as a dynamic, rather than an absolute, state, with individuals moving between 5 stages of change. Precontemplation, the first stage of change, is defined by lack of intention and resistance to behaviour modification. This may apply, for example, to a university student who drinks to intoxication with friends every weekend and experiences interpersonal conflict and absenteeism as a result, but does not accept a need to change this behaviour. To progress through this stage, individuals must experience cognitive dissonance and be able to acknowledge the problematic nature of their behaviour (Lenio, 2006). The next stage, contemplation, is characterised by intention is change, generally within the next 6 months. Individuals in the contemplation stage are generally undertaking decisional balance processes, where they weigh the pros and cons of the target behaviour. If, for example, the student described above begins to acknowledge a link between alcohol use and the aversive consequences and considers the possibility of altering the drinking behaviour, they may be considered to be in the contemplation stage. An individual will progress through the contemplation stage if they believe that the negative consequences of the behaviour are greater than the positives. In the preparation stage, individuals are making active plans to change the target behaviour. The student in the example given above would be occupying the preparation stage if they have acknowledged the need for behaviour change and are considering various ways of modifying their behaviour. Theoretically, individuals will progress through the preparation stage when they have decided on an acceptable, and potentially successful, plan to change the behaviour. The
action stage is defined by the execution of plans to change the behaviour. Individuals in the action stage will exert a significant amount of effort to achieve the desired change, including modifying behaviours, cognitions and the environment (Prochaska & Velicer, 1997). If the student in the example had decided to reduce the frequency of interpersonal conflict and absenteeism by limiting drinking days to 1 per week and setting an upper limit of 5 drinks per drinking session and was attempting to adhere to these limits, they would be considered to be in the action stage. To progress from this stage, the individuals must see evidence of the change. The final stage is maintenance, wherein individuals attempt to maintain the changes established in the action stage; within the TTM, the maintenance stage is defined by the absence or acceptable modification of the target behaviour for at least 6 months. If the example student had effectively modified drinking behaviours in line with the decided limits and reduced the frequency of alcohol related conflict and absenteeism for a period of 6 months or more, they may be considered to be in the maintenance stage.

A key aspect of the TTM is the process through which individuals actually change their behaviours. It is theorised that specific activities are undertaken by individuals, labelled processes of change, in order to progress through the aforementioned stages. Processes of change are emphasised at various points, in accordance with the corresponding stage of change. This is represented in Table X. These processes of stage are as follows: Consciousness raising, understanding the triggers, impact and potential strategies to overcome the target behaviour; dramatic relief, experiencing and expressing emotions; self re-evaluation, the assessment of oneself with and without the behaviour; environmental re-evaluation, the assessment of the behaviour on the social environment; self-liberation, the belief that change is possible and that it can be committed to; social
liberation, the opportunity for alternative behaviours; counter-conditioning, learning healthy substitute behaviours; stimulus control, the eradication or reduction of environmental cues for the problem behaviour; contingency management, implementation of consequences (aversive and positive) for specific behaviours; helping relationships, relationships that foster trust and openness and acceptance of change. Processes of change and the relevant stages of change are presented in Table 14.

Table 14.

Processes of Change Across Stages of Change.

<table>
<thead>
<tr>
<th>Stage of Change</th>
<th>Precontemplation</th>
<th>Contemplation</th>
<th>Preparation</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevant processes of change</td>
<td>Consciousness raising</td>
<td>Self re-evaluation</td>
<td>Self-liberation</td>
<td>Contingency management</td>
</tr>
<tr>
<td></td>
<td>Dramatic relief</td>
<td></td>
<td></td>
<td>Helping relationship</td>
</tr>
<tr>
<td></td>
<td>Environmental re-evaluation</td>
<td></td>
<td></td>
<td>Counter conditioning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Stimulus control</td>
</tr>
</tbody>
</table>

Table adapted from Lenio (2006).

4.2.12 Motivational Interviewing.

Motivational interviewing (MI) is defined as “a client-centered, directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence” (Miller & Rollnick, 2002, p.25) and its principles are central to most motivational and feedback interventions for hazardous alcohol consumption amongst university students. MI was
developed separately from Prochaska and Clemente’s (1983) TTM, however, theoretically, the effective use of MI principles can assist individuals progress through the stages of change set out in the TTM (Miller & Rollnick, 2002). Broadly, MI is defined by a number of central principles: 1) individuals are responsible for bringing about changes in their own behaviour, 2) resistance to change is characterised as ambivalence, and change is dependent on the successful resolution of ambivalence, 3) MI practitioners do not generate change, rather they create a setting where clients ambivalence can be resolved, and decisions to change made 4) any movement toward change, however small, is considered a success, and 5) the manner and communication of the MI practitioner should be empathic, focussed on the development of discrepancy between current behaviour and desired behaviour, accepting of and flexible toward resistance, and supportive of self efficacy, in order to foster reflection, decision making and change (Rotgers, 2006).

Although motivational interviewing (MI) techniques were primarily derived from application and clinical trials, rather than pure theory, recent research reviews have attempted to formulate an underlying theory to account for behavior change associated with MI (Miller & Rose, 2009). Broadly, the theory proposes that change in behavior through MI is a function of two active components; firstly, empathy and the ‘interpersonal spirit’ of MI provided by the therapist, described as the relational component, and secondly, the elicitation and reinforcement of clients’ own reasons for changing their behavior (change talk), labeled the technical component (Miller & Rose, 2009). Techniques used to elicit change talk include decisional balance exercises, where clients are invited to consider costs and benefits of changing and not changing the target behaviour, personalised feedback and normative comparisons, where client generated data regarding the target behaviour is
compared against population norms, and the provision of risk related information. In summary, it is hypothesized that if a therapist can provide a client-centered, non-confrontational style when discussing behavior change, develop discrepancy between current behaviours and desired behaviours, evoke change talk and respond with empathy when faced with a client’s ambivalence to change, modification of target behaviours is more likely (Miller & Rollnick, 2002).

Although confusion exists in the literature, it should be clarified here that MI is considered to be a clinical style, and not an intervention in and of itself. MI principles have been used to develop formal, manualised treatments for hazardous alcohol use. For example, Motivational Enhancement Therapy (MET), developed by Miller (2000), is often confused with MI. MET is a 4-session treatment protocol and uses MI principles and normative-based feedback to bring about changes in substance use.

4.2.2. Research.

Motivational feedback interventions have some of the strongest empirical support in the field. Generally, these studies have been shown to be not only effective in impacting alcohol-related variables, but methodologically superior to many other approaches (Larimer & Cronce, 2002). While this particular review is intentionally kept brief, it must be acknowledged that many studies utilizing the motivational feedback approach have produced significant results with university populations (e.g. Barnett, Murphy, Colby & Monti, 2007; Helmkamp et al., 2003; Marlatt et al., 1998; Martens et al., 2007; Walters, 2000; Wood et al. 2007). In spite of the wealth of research on motivational feedback approaches, at the time of writing, no published research with Australian university populations was available. Three international studies examining the efficacy of
motivational feedback interventions, selected due to their strong methodologies, are presented below. Selection criteria for the reviewed studies were as follows: the study utilised a RCT design, assessed at least one motivational feedback based intervention, used university students as participants, and had follow-up periods of at least one-month post intervention. It should be noted here that research relating to the Brief Alcohol Screening and Intervention for College Students (BASICS; Dimeff et al., 1999), a motivational feedback intervention, is not included in this section. A thorough review of this intervention and related research is presented in Section 4.6.

Baer and colleagues (2001) evaluated the impact of a preventative, brief motivational intervention on drinking behaviors of ‘heavy-drinking’ tertiary students, over a 4-year follow up. A screening process of 4000 American college students identified 508 individuals as ‘high risk’ (5-6 drinks in one session in the previous month or 3 negative consequences from drinking on 3-5 occasions in the past 3 years). A financial incentive of US$25 was offered to potential participants. Of the 508, 348 ‘high risk’ drinkers agreed to participate and were randomly allocated to the intervention or no-intervention control group. 113 participants randomly selected from the original pool of 4000 students also agreed to participate in the study in order to track natural history of changes in drinking behavior.

At baseline, participant data regarding quantity, frequency and peak instances of drinking behaviour, average number of drinks per day and week, alcohol related consequences and alcohol dependence was collected. The intervention group received an individual, single session (length not reported) of personalized feedback regarding consumption patterns, alcohol related normative data for same-age peers and information
regarding risks and benefits of alcohol consumption, drinking myths, the effects of alcohol and tolerance and a 1-page list of tips to reduce alcohol consumption. Follow up assessments for all participants were completed, by mail, annually. Individuals in the intervention group also received additional mailed feedback in their second year.

Data indicated that, at each annual assessment over a four year period, the intervention group were drinking less often, drinking smaller amounts and reporting less alcohol related negative consequences than the control group.

The second study, by Carey and colleagues (2006), was a randomized, controlled trial to evaluate a series of brief motivational interventions for ‘at-risk’ American college drinkers. After screening, 509 ‘at-risk’ students (5+/4+ drinks in one session in the past week) university students aged 18-25 ($M = 19.3$, $SD = 1.5$) were randomly assigned to one of six intervention groups based on Timeline Follow-Back Assessment (TLFB) (present versus absent) and intervention type (basic brief motivational intervention, brief motivational intervention enhanced with a decisional balance module, or none). The TLFB is a form of daily drinking measure (see Chapter 2.4.21 for a full description); in the study, a research assistant used a calendar to prompt participants to recall daily drinking behaviours over the past 90 days, starting from the present and working backwards. Outcome variables were typical drinking behaviour (average drinks per week, drinks per drinking day), risky drinking (heavy drinking frequency, peak BAC), and drinking-related problems; each outcome was assessed at baseline and at 1-, 6- and 12-month follow up.

Data demonstrated that, at 1-month follow up, participants who received either form of brief motivational intervention (regardless of TLFB status) demonstrated significant reductions beyond those achieved by the TLFB/control condition across all outcome
variables. Participants receiving the brief motivational intervention drank 2.66 fewer drinks per week, drank 0.66 fewer drinks per drinking day, had 1.3 fewer heavy drinking days, and decreased their peak BAC by 0.032, when compared to TLFB/control. Outcomes for the brief motivational intervention groups were either maintained or further reduced at a 12-month follow up.

In the third study, using a randomised controlled design, Borsari and Carey (2000) evaluated a single-session motivational intervention in reducing ‘heavy drinking’ amongst an American college sample. 60 individuals ($M = 18.45$ years) who had 4+/5+ drinks in one session (women/men) two or more times in the past months were selected as participants and were assigned to either a no-treatment control or a brief motivational intervention group. Baseline data, regarding average/heaviest weekly drinking, typical alcohol consumption over past 30 days and alcohol-related consequences over the past 30 days, was collected from all participants. Participants from the BMI group ($n = 29$) received a single session (length not reported) of motivational interviewing consisting of five components; a review of personal alcohol use over the past month and a comparison to national and campus drinking norms, a review of alcohol related negative consequences, influence of positive and negative alcohol expectancies, misconceptions regarding drinking were challenged and options to facilitate a decrease in alcohol consumption were provided.

At a 6-week follow up, data indicated that the brief motivational intervention participants had significantly reduced the number of drinks consumed per week, number of times drinking alcohol in the past month and frequency of binge drinking (4+/5+ in one session for women/men) in the past month in comparison to controls.
4.2.3. Evaluation of Motivational and Feedback Interventions.

The motivational and feedback interventions reported here have demonstrated effectiveness in reducing harmful drinking behaviours amongst university students. Although Borsari and Carey’s (2000) study was limited by a brief follow-up period, the majority of the reported studies have been methodically sound, employed relatively large sample sizes and ensured extended follow-up periods. These factors, in light of the demonstrable impact on drinking behaviours, provide strong support for the efficacy of this approach. The brevity of motivational and feedback interventions also makes them appealing; all reviewed interventions utilized a single session treatment.

In a recent meta-analytic review of individual–level interventions to reduce drinking in university students, Carey and colleagues (2007) state “...individual, face-to-face interventions using motivational interviewing and personalized normative feedback predict greatest reductions in alcohol-related problems” (p.269). Again, however, the lack of Australian data makes it difficult to accurately judge the effectiveness of this approach with Australian university students.

4.3. Educational and Awareness Interventions

Educational or awareness interventions are “...primarily based on the assumption that students misuse alcohol or other substances due to a lack of knowledge or awareness of health risks and that an increase in knowledge regarding the negative effects of these substances leads to a decrease in use” (Larimer & Cronce, 2002, p.149). This idea is indirectly supported by the work of Dowling, Clark and Corney (2006) who demonstrated that Australian university students have relatively low levels of knowledge in regard to responsible drinking practices.
4.3.1. Theory.

Educational and awareness interventions typically lack a theoretical foundation. As highlighted by previous commentators, these treatments are largely based on “weak or non-existent theory” (Larimer & Cronce, 2002, p. 149). A thorough literature review failed to find a fully articulated theory underlying these approaches; however, it can be inferred from these treatments that hazardous drinking behaviours are motivated by a lack of knowledge regarding the associated harms, and that by increasing the target's knowledge of these risks, reductions in hazardous drinking behaviours will occur.

4.3.2. Research.

Ricciardelli and McCabe (2008) evaluated the alcohol campaign “Is Getting Pissed Getting Pathetic? (Just Ask Your Friends)”. The campaign was developed as part of the Victorian Tertiary Alcohol Campaign in Australia and was designed to target university students. The campaign consisted of 5 posters with various alcohol-related messages (e.g. “Go out, get blind. Go out, get blind. Your friends are over it. Aren't you?”) Posters were placed in areas with high student traffic, such as universities, bathrooms of bars and nightclubs, campus common rooms and student service areas, between July 2003 and July 2004.

In the study, 671 university students between the ages of 18-25 years were recruited to take part in the focus-group based evaluation of the study. Overall, positive comments \( n = 1343 \) regarding the campaign outweighed the negative comments \( n = 670 \). Large percentages of the sample felt that the message was relevant to university students (53%) and truthful and realistic (50%). In spite of the positive reflections, tellingly, the main negative comment regarding the campaign focussed on its perceived inability to alter
drinking behaviours in the target population; 26% of the sample endorsed this view.

Similarly, 22% of respondents indicated that university students wouldn’t listen or wouldn’t care about the main message of the campaign. Smaller proportions of the sample stated that the message was overly simplistic (21%), felt that the way in which the message was conveyed might undermine the effectiveness of the campaign or reduce the likelihood that individuals would ask for help (9%) and that the message was irrelevant (9%).

Roche and Watt (2000) conducted a qualitative evaluation of the Drink Smart educational intervention. Drink Smart was an alcohol-focused public health campaign targeted at university students in Australia. Drink Smart aimed to “…increase knowledge of safe drinking levels and impact on the drinking culture within the university environment” (Roche & Watt, 2000, p.246). Differing from traditional educational interventions, Drink Smart was held at student functions where alcohol was available, aimed to be interactive and fun, was hosted by a team of easily recognizable, student volunteers or staff and involved a ‘kit’ consisting of a mix of novelty and important items and a breathalyzer (Roche & Watt, 2000, p.246).

To evaluate the intervention, the authors established focus groups in six university campuses across Queensland, with a total sample size of 95. Each group was made up of university students aged 18-25 years who self-identified as current drinkers. Sample groups were asked to make judgments about various aspects of the Drink Smart program and gauge its potential impact on the target population. Positive reaction to the program included comments indicating that the concept was “fun” or “novel” and “beneficial and interesting” (p.246). Overall, however, reactions were predominately negative; it was suggested that only sensible drinkers would be attracted to the program, many regarded
Drink Smart as “a bit of a joke” (p.246) and others considered it to be unsophisticated and too novel. Most importantly, respondents believed that the program’s message was not strong enough to influence drinking attitudes or drinking behaviours, particularly for those students who were intent on ‘getting drunk’. Overall, the authors assessed the impact of Drink Smart as unsubstantial; it appeared to have little impact on drinking attitudes or behaviour.

Walker (2002) developed and implemented an educational-based, social norms marketing (SNM) intervention to address the false beliefs of university students regarding normative levels of tobacco and alcohol use amongst other tertiary students. The SNM model is characterized by the supply of accurate information for the specific cohort and the provision of healthy, positive, normative information about the target behaviour. It is believed that misperceptions regarding peers’ drinking behaviours may lead some individuals to view their own behaviour as normal and therefore less harmful. By affecting these false-beliefs, SNM attempts to encourage individuals to reframe their own behaviour in the true context of their community. Although a number of individual studies have found SNM interventions to be effective in influencing descriptive and injunctive norms (Thombs & Hamilton, 2002) and alcohol consumption behaviours amongst college populations (Perkins & Craig, 2006), a recent Cochrane Review, including 22 studies with a total of 7275 college students, concluded by stating that SNM approaches could not be recommended for addressing alcohol misuse amongst college populations due to insignificant results (Moreira, Smith, & Foxcraft, 2009).

To establish a baseline for evaluation, Walker (2002) used information regarding beliefs about university peers tobacco and alcohol use taken from a representative sample
of students from two South Australian universities. One of the universities was chosen as the target population, while the other university was used as a control. Normative messages, such as, “77.2% of university students are light drinkers (drink between 0 and 5 drinks per week” and “The average number of drinks per week for X university students is 3.5” were distributed on key-chains and pens, and presented via posters placed in high traffic areas of the campus. Advertisements carrying the normative messages were also published fortnightly in the student paper. The alcohol component of the intervention ran for approximately 13 months. To establish the effectiveness of the intervention, a random group of students from each university was selected and had the original questionnaire sent to them. Results indicated that there was no significant change in the target group’s beliefs regarding peers alcohol use; in fact, the data showed a shift indicating that students believed their peers actually drank more than they did previously.

4.3.3. Evaluation of Educational and Awareness Interventions.

All reported Australian educational and awareness studies, with the exception of Walker (2002), utilized a qualitative design to evaluate their programs. This negates any possibility of quantifying the actual impact of these interventions on alcohol consumption amongst the target population. Even when a quasi-experimental design was utilized, for example in Walker (2002), the aim was to examine beliefs regarding alcohol use, rather than actual alcohol consumption. Therefore, overall, the reported studies cannot be readily evaluated on their ability to influence hazardous drinking. Regardless of the design, however, the impact of these interventions is questionable; in the qualitative studies participants commonly expressed doubt regarding the effectiveness of the interventions in
curbing hazardous drinking behaviours (Ricciardelli & McCabe, 2008; Roche & Watt, 2000), while Walker’s study (2002) data showed no significant change in normative perceptions.

Indeed, the broader literature in the field largely dismisses the effectiveness of these approaches. Traditional, education-based approaches often demonstrate increases in alcohol-related knowledge, but are rarely accompanied by decreases in alcohol consumption (Moskowitz, 1989; Walters, Bennett & Noto, 2000). In a recent meta-analysis of randomized controlled trials investigating alcohol prevention in university populations, Maddock (1999) concluded that the impact of educational and awareness approaches was negligible and produced only small effects on behaviour ($d=0.17$). Similarly, Larimer and Cronce (2002) state that “...the majority of these studies have found no effect... on alcohol use and/or alcohol-related negative consequences” (p.152).

4.4. Online Interventions

The online format offers a number of advantages over traditional face-to-face alcohol interventions. First, there is no direct clinician contact, thus minimizing treatment costs and resource expenditure (Riper et al., 2008). Second, online interventions offer a high level of privacy, both in initiation and process of the service, potentially increasing uptake and decreasing inhibition (Walters, Miller & Chiauzzi, 2005). Third, the service can be accessed without limitations of distance, thus increasing accessibility for remote or disabled populations (Finfgeld-Collett, 2006). Fourth, the format may be less threatening to hazardous drinkers than face-to-face intervention, due to the absence of the clinician (Walter, Vader & Harris, 2007). Further strengthening the potential for online alcohol interventions, a recent study found that teenagers prefer receiving advice about drinking via the Internet rather than talking with physicians (Moore, Soderquist & Merch, 2005). Indeed,
approximately 25% of internet users aged 18-24 years have researched drug and alcohol issues on the internet (Rideout, 2001). Studies examining the efficacy of this modality of treatment in reducing harmful alcohol use amongst tertiary students have generally produced favourable findings; in a qualitative review of 17 research articles, Elliot, Carey and Bolles (2008) concluded that online interventions usually produce greater reductions in key alcohol variables when compared to no-treatment and assessment only controls, and produce roughly equivalent outcomes as available alternative treatments. A review of relevant studies is presented below in Section 4.4.2.

A range of stand-alone, computer-delivered alcohol interventions (CDAI) currently exist, and many have received provisional empirical support from trials. AlcoholEdu for College is an online alcohol prevention program, designed for population-level administration in colleges. It combines educational, motivational and feedback components to reduce harmful consumption amongst tertiary populations. AlcoholEdu for College can take up to 3 hours to complete. The intervention has received some empirical support in reducing alcohol-related consequences amongst first-year college students (Hustad, Barnett, Borsari, & Jackson, 2010; Paschall, Antin, Ringwalt, & Saitz, 2011). Alcohol 101 is an interactive CDAI that Alcohol 101 provides alcohol information and data on drinking and driving, and presents role play scenarios representing high-risk environments. It can be tailored for various subgroups of tertiary students, including first-years and live-on-campus students. Recent research has produced favourable results, with Alcohol 101 demonstrating reductions over time in consumption and alcohol-consequences amongst a sample of mandated college students (Carey, Carey, Henson, Maisto, & DeMartini, 2011). College Alc takes a harm minimisation approach to college drinking; this CDAI consists of 4-modules and
provides alcohol information, challenges alcohol myths, and demonstrates harm reduction strategies to promote skill development. College Alc can be completed in approximately 1-hour, and has received empirical support; research indicates that the CDAI is effective in increasing alcohol-related knowledge and reducing high-risk consumption behaviours (Pascal, Bersamin, Fearnow-Kenney, Wyrick, & Currey, 2006). The College Drinkers Check-Up is a brief motivational CDAI, designed specifically for ‘heavy drinking’ tertiary students. The intervention takes approximately 45-minutes to complete and has received strong, initial empirical support. Research has found the College Drinkers Check-Up effective in significantly reducing alcohol consumption and alcohol-related consequences at up to 12-months follow up (Hester, Delaney, & Campbell, 2012). MyStudentBody utilises motivational, attitudinal and skill-training components to reduce risky behaviours amongst college students; the intervention addresses a range of wellbeing issues, including drugs, alcohol and violence, and can take up to 3 hours to complete. Although research is limited, some studies have found MyStudentBody to be effective in reducing total consumption, peak consumption and negative consequences in university samples (Chiuazzi, Green, Lord, Thum, & Goldstein, 2005). e-CHUG, another CDAI, has also received strong empirical support and will be discussed in more detail in Section 4.6.

4.4.1. Theory.

While current online alcohol interventions are diverse in their theoretical foundation, they are typically based on harm minimization philosophies (Finfgeld-Connett, 2006). In contrast to traditional abstinence-focussed strategies, harm minimization holds that a reduction in alcohol consumption is a legitimate treatment goal and any significant reduction in drinking behaviors is considered a success (Finfgeld-Connett, 2006). Many of
the available online interventions are based on a modified version of motivational interviewing and utilize normative feedback as a key treatment strategy, however other options also utilize elements of CBI’s or educational approaches (Larimer & Cronce, 2002).

4.4.2. Research.

Research on online treatment for harmful alcohol use amongst Australian tertiary populations is scarce. A recent large-scale study conducted by Kypri and colleagues (2009), however, provides strong initial evidence in support of this method of alcohol treatment in influencing relevant outcome variables with Australian university students. The researchers invited 13000 Australian undergraduate students to complete the AUDIT; from 7237 respondents, 2435 were identified as drinking in a harmful/hazardous manner (total AUDIT $\geq$8). These participants were then randomly allocated to either an online 10-minute motivational feedback intervention or a screening only control condition. Follow up assessments were conducted at 1 and 6 months, and 2050 participants completed at least a 1-month assessment.

At 1 month follow up, participants receiving the intervention reported significantly less drinking frequency, volume per occasion and total consumption when compared with controls. The observed intervention effects were maintained at 6-month follow up for frequency of drinking and overall consumption. No significant differences in alcohol consequences were observed.

While the majority of research investigating the viability of internet-based alcohol interventions for tertiary students has been conducted in the US, the following section will focus on New Zealand studies. The cultural similarities, geographical proximity, legal age of alcohol consumption and drinking behaviours between New Zealand and Australia make the
NZ studies, in light of the distinct lack of Australian research, the most appropriate for an Australian centered review. It is assumed that results derived from NZ studies are more generalisable to Australian university populations than other international data.

Kypri and colleagues (2003) investigated the acceptability of various alcohol intervention approaches for hazardous drinking amongst a NZ university cohort. A sample of 1564 individuals with a mean age of 20.5 years (SD=2.5) completed a survey examining alcohol use and alcohol related services. Participants were asked “For the following services concerning alcohol, which do you think should be available to students?” and “Which would you use if you had a drinking problem?”. The following options were given, a) reading materials/leaflets about alcohol and its effects, b) health education seminars on alcohol, c) anonymous web-based alcohol risk assessment and personalized feedback, d) alcohol risk assessment and advice from a nurse, counsellor, or psychologist, e) alcohol risk assessment and advice from a doctor.

Data suggested that the majority of students supported the availability of all forms of alcohol services, with 87.7-95.3% of the sample endorsing each of the service modes. Tellingly, however, responses to the “I would use it if I had a problem” question varied greatly. Health education seminars received the lowest amount of support (41.2%), while the greatest endorsement was for the anonymous web-based alcohol risk assessment and personalized feedback (81.1%). Importantly, of the 980 students identified as hazardous drinkers, 81.9% reported that they would use the web-based service if they had a problem, again, the highest endorsement of all options. These finding demonstrate that anonymous web-based alcohol risk assessment and personalized feedback may be a promising approach for addressing hazardous drinking amongst university students.
Kypri and colleagues (2004) conducted a double-blind randomized controlled trial of a web based screening and brief intervention to reduce hazardous drinking amongst a New Zealand university sample. The researchers screened 167 students aged 17-26 years using the AUDIT. Males who had consumed more than six drinks in one session, and females who had consumed over four drinks in one session, over the last four weeks, and who gave consent, were selected to participate in the study ($n = 104$). Participants were randomly assigned to either the treatment group ($n = 51$), who received 10-15 minutes of web-based assessment and personalised feedback on their drinking, or to the control group ($n = 53$), who received a leaflet on the health effects of alcohol. The researchers assessed the drinking frequency, typical occasion quantity, total volume, heavy episode frequency, number of personal problems and academic problems at both pre- and post-intervention.

Data indicated that, at 6 weeks, participants from the intervention group reported significantly lower total alcohol consumption, lower heavy episode frequency and fewer personal problems than controls. At 6 months, personal problems remained significantly lower, although consumption levels did not differ significantly. Similarly, at 6-months, academic problems were lower in the intervention group relative to controls. Kypri and colleagues (2004) reported that the online intervention had “...reduced hazardous drinking among university students, to an extent similar to that found for practitioner-delivered brief interventions in the general population” (p.1410).

Moore, Soderquist and Werch (2005) evaluated the efficacy of a ‘binge drinking’ intervention, administered in either a web-based or print format. The researchers recruited 116 university students, with a mean age of 21.69 years ($SD = 0.16$), to take part in the study. Baseline data on alcohol consumption, risk and protective factors, sociodemographics
and social desirability was collected. Participants were then randomly allocated to one of two groups, the web group or the print group. Each group received 4, almost identical, weekly newsletters delivered either electronically or in print. Each newsletter was comprised of 5 components, with each challenging a commonly endorsed alcohol expectancy (e.g., drinking makes parties more fun, makes you sexier etc). Post-tests were conducted 30 days after the intervention had concluded.

Results of the study indicated no significant differences in outcomes between the two modalities; however both intervention groups demonstrated significant decreases in 30-day frequency of ‘binge drinking’ (defined as 5+/4+ drinks per session for men/women). Data also indicated a decline for both groups on 5 other drinking measures, past-year frequency, 30-day quantity, ‘binge-drinking’ frequency, ‘get drunk’ quantity and greatest number of drinks, however these reductions were not statistically significant.

4.4.3. Evaluation of Online Interventions.

All reviewed studies of online interventions demonstrated a significant reduction in alcohol consumption amongst university samples; however, these studies suffer from a number of methodological issues. The primary limitation of these studies is the use of relatively short follow up periods, ranging from 30 days (Moore, Soderquist, & Werch, 2005) to 6 months (Kypri et al., 2004). This makes it difficult to examine long term impact of these interventions and assess their efficacy over time. Additionally, it has been acknowledged that alcohol assessment is an effective intervention in and of itself (Kypri, Langley, Saunders & Cashell-Smith, 2007); however, without longer term follow up we cannot accurately separate the effect of the treatment from the initial assessment. It should be noted here that a number of studies in the broader literature have utilised large sample sizes when
assessing online interventions for alcohol misuse (see Neighbours et al., 2007; Saitz et al., 2007); this critique applies only to the studies reviewed herein. Second, sample sizes have generally been small (with the exception of Kypri et al., 2009); all studies reported here utilised sample sizes ranging from 104 (Kypri et al., 2004) to 116 (Moore, Soderquist & Werch, 2005). Again, this factor raises doubts about the generalizability of the data. In spite of these flaws, the online approach appears to be a promising form of intervention and requires further investigation, particularly with Australian samples. Replication of Kypri’s study (2009) would be particularly beneficial.

4.5. Comparison and Comment

Based on the available data, the majority of Australian university students drink and many do so at levels that put them at risk of both short and long term harm (Davey, Davey & Obst, 2002). Negative alcohol-related consequences are common amongst this population; however, many students do not feel it is necessary to change their behaviour and alcohol-focused presentations to Australian university counselling services are minimal (Urbis, 2007; Roche & Watt, 1999). In light of these observations, it is necessary for Australian tertiary institutions to implement effective, easily accessible interventions to address this situation. Regardless of the chosen approach, interventions must be based on available scientific evidence and demonstrable impact on hazardous drinking behaviours.

This review considered both local and international studies of current intervention approaches, broadly falling under the categories of cognitive behavioral, motivational and feedback, education and awareness and online and interventions. Based on the reviewed evidence and the broader literature, educational and awareness based interventions should not be considered for implementation in Australian universities. Evidence from Australian
studies suggests that these approaches are largely ineffective in influencing alcohol related
behaviours or attitudes and similar conclusions have been reported in international studies
(Maddock, 1999; Ricciardelli & McCabe, 2008). Second, while individual-level cognitive
behavioural interventions have generated impressive results, the relatively long periods of
intervention and associated resource expenditure, combined with a lack of Australian data,
suggest that this approach may also be inappropriate. Comparative studies (e.g. Borsari &
Carey, 2005) have also suggested that CBI’s may produce more modest reductions in target
behaviours when compared to motivational feedback interventions. Further studies in
Australian university settings, however, may alter this conclusion.

Based on the available research, motivational and feedback interventions appear to
offer one potentially applicable approach to curbing hazardous drinking in Australian
university populations. While, at present, there are no Australian studies examining the
efficacy of this intervention strategy, motivational and feedback approaches have generated
the greatest level of international support, with data demonstrating significant changes in
drinking behaviours amongst university students that are maintained over long periods of
time (Carey et al., 2007). Additionally, the brevity of the interventions is appealing; the
minimal cost involved in these interventions, due to their time-limited nature, is important
in Australian tertiary institutions where resources are often scarce. Prior to implementation,
however, the approach must replicate previously reported results with Australian
populations.

Similarly, online interventions offer a promising approach for local settings.
Extensive international data indicates that online interventions are effective in reducing
excessive alcohol consumption, and recent New Zealand studies demonstrate that, not only
are online intervention effective, they are also appealing to university samples (Kypri et al., 2003; Kypri et al., 2004). Additionally, the reported advantages of the delivery mode are also beneficial; the ease of accessibility, anonymity of the service and reduced cost all make this medium an appealing option for Australian universities. Again, however, trials with Australian populations are necessary to replicate previous findings.

The single most compelling observation that can be drawn from a review of drinking behaviours and interventions in Australian university populations is the scarcity of local data. First, there is insufficient normative alcohol behaviour data for this population. As recently stated “A survey of university students in several states (preferably at all universities) would be required to produce estimates of drinking patterns which could be used in normative feedback” (Urbis, 2007, p.16). Without this data, any intervention based on normative data, such as motivational and feedback approaches, some online interventions and SNM, are restricted. Troublingly, it is these interventions that appear to have the greatest potential for reducing high levels of alcohol consumption and alcohol related harm amongst this population. Any potential implementation of these approaches in Australian tertiary institutions necessitates a representative and valid body of normative data to facilitate their effectiveness.

Second, there is an almost total absence of published evaluation studies of Australian university-specific alcohol interventions. A thorough literature review produced only five published studies over the last 20 years. Two, conducted by Roche and Watt (2000) and Ricciardelli and McCabe (2008) were qualitative in nature, whilst Research by Walker (2002) generated data that was lacking in detail and highlighted the relative inefficacy of the SNM approach. Additionally, these studies evaluated educational and awareness
interventions, an approach that has demonstrated little value in terms of changing behaviour of the target population. The available research indicates high levels of consumption, risk and harm amongst Australian university students however there is virtually no local intervention data available. The notable exception to this critique is the recent research by Kypri et al. (2009), which utilised a large sample size, a methodologically sound experimental design and provided compelling data in support of an online treatment for this group.

Australian researchers must make a conscious effort to fill this gap in the literature. It is not appropriate to simply generalise data from American studies to Australian populations. A number of key differences between the tertiary and legal systems of these countries make this inappropriate. In most American states, the legal age for buying and consuming alcohol is 21, while in Australia it is 18. This difference impacts upon the behaviour of the target groups; American college students may be less experienced with alcohol by the time they start college, thus influencing individual drinking patterns, motivation to change and responsiveness to alcohol interventions. Similarly, the fraternity culture and the common live-on-campus patterns in American colleges, which are comparably rare in Australia, inevitably impact upon peer-influenced drinking behaviour (Larimer, Cronce, Lee & Kilmer, 2005). While a number of New Zealand based studies have generated promising results and, indeed, data from these studies may be the most applicable to Australian populations, key differences between cultures make generalising data problematic. In light of the current state of the literature, it is important that Australian researchers be focused on generating normative data and executing high quality
intervention evaluations to provide universities the opportunity to implement the most effective, scientifically valid interventions available.

4.6. Promising interventions: BASICS and e-CHUG

Based on the conclusions of this review, two intervention programs were selected, according to their theoretical basis and format, for closer examination and comparison: the Brief Alcohol Screening and Intervention for College Students (BASICS; Dimeff et al., 1999), a brief feedback and skills based alcohol intervention, and the Electronic Check-Up and Go (e-CHUG), a brief online intervention.

4.6.1 BASICS.

BASICS (Dimeff et al., 1999) is a brief feedback and skills based alcohol intervention that utilizes motivational interviewing principles to reduce harmful alcohol behaviours; the treatment program is designed for use with tertiary students aged 18-24 years old who drink alcohol heavily and have experienced, or are at risk of experiencing, alcohol-related problems. In the literature, BASICS is conceptualized as a MI plus feedback intervention (Borsari & Carey, 2000; Borsari & Carey, 2005). In the intervention, alcohol misuse is conceptualized within a biopsychosocial model and harm minimization is the goal. Participants engage in an assessment, feedback, and advice and skills provision process over two 50-minute sessions, with the clinician modifying the style, intensity and structure of the intervention in accordance with the participant’s current motivation to change. Theoretically, the treatment assumes that normative feedback, provided in the context of a motivational interviewing style, will increase participant’s motivation to change, which will lead to reductions in harmful alcohol use, which will, in turn, reduce negative alcohol consequences (Dimeff et al., 1999). The BASICS program has a strong evidence base, with
early studies demonstrating significant reductions in consumption variables and harm, compared with assessment only controls, over a 4 year follow up period (Baer et al., 2001).

4.6.11 Program Structure.

BASICS is conducted over the course of two structured interviews and is delivered using an adaptation of the motivational interviewing technique. A summary of the content and clinical process is presented in Table 15. The first session is based primarily on assessment and rapport building. Within the interview, typical drinking patterns and peak episodic drinking occasions are assessed, along with indices of alcohol dependence and family history of alcohol and substance use problems and/or psychopathology. In addition to these areas, self-report questionnaires are used, either before or immediately following the session, to assess beliefs about the drinking habits of other students, number and type of experienced alcohol-related negative consequences, alcohol outcome expectancies and the individuals perceived level of risk for developing a drinking problem. Finally, toward the end of the first session, the participant is provided with a number of monitoring cards and instructed to monitor daily drinking behaviours until the next session.

The second interview, which occurs 1-2 weeks after the initial interview, provides the student with personalized feedback about each piece of information gathered in the assessment session. Psychoeducation is offered opportunistically throughout session 2 and, in line with the MI foundations of the intervention, the clinician maintains a non-judgmental, non-confrontational style at all times. The objectives of this session are to compare the quantity and frequency of alcohol use to a normative university sample, review the individuals risk factors, debunk myths and increase the individual’s understanding of alcohol and its effects, provide strategies to reduce current and future risks related to
alcohol use and increase motivation to change. Initially, data from the monitoring cards is examined, with feedback regarding peak periods and precipitants and consequences of heavy consumption, then the client is provided with a personalised feedback sheet, consisting of a summary of session 1 data and normative comparisons (see Figure 1). Each piece of data on the feedback sheet is explored, including current and peak drinking behaviours and alcohol related consequences. Finally, advice and recommendations are made regarding alcohol behaviours, and, if appropriate, the participant’s sets alcohol related goals. Specific skills to manage high-risk situations are also taught (such as drink refusal, counting drinks etc).
Table 15.

*Overview of the BASICS Two-Session Structure.*

<table>
<thead>
<tr>
<th>Session 1</th>
<th>Components</th>
<th>Foci</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Structured clinical interview</td>
<td>Typical drinking pattern – Past 30 days.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Atypical or episodic drinking patterns – Past 30 days.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Symptoms of alcohol dependence.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>History of alcohol and/or mental health problems.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Family history of alcohol/substance use and/or mental health problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negative alcohol-related consequences (6 months).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alcohol outcome expectancies.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perception of health and behavioural risks due to alcohol.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Readiness to change.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perceptions of university drinking norms.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ongoing monitoring of drinking behaviours (~2 weeks)</td>
</tr>
<tr>
<td></td>
<td>Self-report questionnaires</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session 2</th>
<th>Components</th>
<th>Foci</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Feedback and advice</td>
<td>Review and discussion of monitoring cards.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Review of drinking pattern with comparison to norms.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Review of personal risks and negative consequences.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Advice and recommendations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Generalising use of strategies beyond brief intervention.</td>
</tr>
</tbody>
</table>

*Note.* Table adapted from Dimeff, Baer, Kivlahan & Marlatt (1999)
4.6.12 Research.

Since its inception, BASICS has been widely researched. The studies presented here are not intended to be a comprehensive review of all relevant research, rather a sample of the BASICS literature. As yet, there is no published literature assessing the applicability or efficacy of BASICS for Australian tertiary populations, so the research reported herein will be from international studies only. Selection criteria for the reviewed studies were as follows: the study utilised BASICS as the primary intervention, used university or college students as participants, and had a follow-up periods of at least one-month post intervention. Relevant studies have been summarised, with regards to participants, methodology, findings and limitations, and are presented in Table 16.
### Table 16.

**BASICS Research Summary**

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>Assessment phases (% retained)</th>
<th>Treatment conditions</th>
<th>Key outcomes</th>
<th>Limitations</th>
</tr>
</thead>
</table>
| Marlatt et al. (1998); Baer et al. (2001) | 433 | Baseline (100) 4 years (84)    | BASICS Control       | Treatment group evidenced significant reductions in alcohol use and alcohol related consequences over controls, with improvements being maintained through 2 and 4 year follow ups.                                          | Sample taken from single university.  
Self report measures. |
| Borsari & Carey (2000)       | 60  | Baseline (100) 6 weeks (99)    | BASICS Control       | At follow up, BASICS group demonstrated significant reductions in drinks per week, frequency of consumption and monthly frequency of heavy drinking episodes, relative to controls.                                      | Brief follow up.  
Possible selection bias                     |
| Murphy et al., (2004)        | 54  | Baseline (100) 6 months (94)   | BASICS without feedback | Both intervention groups demonstrated significant reductions in alcohol consumption, from baseline to follow up.  
Female participants demonstrated significantly greater reductions than males.                                                                                                                                         | No control group.                                |
Table 16 (Cont.)

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample Size</th>
<th>Baseline (N)</th>
<th>Follow-up (N)</th>
<th>Intervention</th>
<th>Intervention Effect</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borsari, &amp; Carey (2005)</td>
<td>64</td>
<td>Baseline (100)</td>
<td>3 months (100)</td>
<td>BASICS Alcohol education session</td>
<td>Both intervention groups demonstrated reductions in alcohol consumption over follow up period, however BASICS group evidenced fewer alcohol related problems at both 3 and 6 month follow up.</td>
<td>No assessment-only control.</td>
</tr>
<tr>
<td>McNally, Palfai, &amp; Kahler (2005)</td>
<td>73</td>
<td>Baseline (100)</td>
<td>Post-test (100)</td>
<td>30-minute BASICS Control</td>
<td>BASICS group demonstrated significant reductions in problematic drinking when compared to controls.</td>
<td>Small sample size.</td>
</tr>
<tr>
<td>White et al., (2006)</td>
<td>235</td>
<td>Baseline (100)</td>
<td>3 months (94.5)</td>
<td>BASICS BASICS written feedback</td>
<td>Both treatment groups evidenced significant reductions in alcohol consumption, heavy drinking episodes and negative consequences from baseline to follow up. No significant difference between groups on outcomes.</td>
<td>No control group.</td>
</tr>
<tr>
<td>Study</td>
<td>N</td>
<td>Follow-up Times</td>
<td>Intervention</td>
<td>Control</td>
<td>Outcome</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------</td>
<td>-----------------</td>
<td>--------------</td>
<td>---------</td>
<td>-------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Larimer et al., (2007)</td>
<td>148</td>
<td>Baseline (100), 12 months (67)</td>
<td>BASICS mailed feedback</td>
<td>Control</td>
<td>Compared to controls, BASICS group demonstrated significant reductions in alcohol use and likelihood of heavy drinking.</td>
<td>High attrition rate.</td>
</tr>
<tr>
<td>Martens et al., (2007)</td>
<td>175</td>
<td>Baseline (100), 6 weeks (69)</td>
<td>BASICS</td>
<td>Control</td>
<td>Significant reductions in drinks per week, peak drinking and frequency of heavy drinking. Significant increases in accuracy of perceived consumption behaviours of peers and use of protective strategies.</td>
<td>No control group. No assessment of alcohol consequences. Brief follow up.</td>
</tr>
<tr>
<td>Schaus et al., (2009)</td>
<td>363</td>
<td>Baseline (100), 3 months (76), 6 months (58), 9 months (59), 12 months (65)</td>
<td>BASICS adaptation</td>
<td>Control</td>
<td>BASICS group demonstrated significant reductions in typical BAC, peak BAC, peak consumption, drinks per week, weekly frequency of intoxication, risk taking behaviour and total RAPI scores, compared to controls, between baseline and various follow up points.</td>
<td>Possible selection bias. Self-report alcohol measures.</td>
</tr>
</tbody>
</table>
Table 16 (Cont.)

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample Size</th>
<th>Timepoints</th>
<th>Intervention Groups</th>
<th>Findings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turrisi et al. (2009)</td>
<td>1275</td>
<td>Baseline (100) 10 months (85.5)</td>
<td>BASICS Parent intervention (PI) BASICS &amp; PI Control</td>
<td>Combined BASICS and PI evidenced significantly lower consumption, high risk drinking and consequences than controls. BASICS alone demonstrated significantly lower weekend drinking, compared to PI and control, and peak BAC compared to control.</td>
<td>BASICS administered by peers, rather than trained professionals. Low BASICS completion rate (53.8%)</td>
</tr>
<tr>
<td>Amaro et al. (2010)</td>
<td>449</td>
<td>Baseline (100) 6 months (100)</td>
<td>BASICS</td>
<td>Significant reductions in weekly consumption, typical weekend consumption, peak consumption, alcohol consequences and distress symptoms. The treatment group also reported significant increases in protective factors and readiness to change.</td>
<td>No control group.</td>
</tr>
<tr>
<td>Murphy et al. (2010)</td>
<td>133</td>
<td>Baseline (100) 1 month (89)</td>
<td>BASICS e-CHUG Control</td>
<td>BASICS groups demonstrated significant improvements on alcohol variables relative to controls, and greater reductions in heavy drinking over e-CHUG (however this finding was not significant).</td>
<td>Brief follow up period Small sample sizes</td>
</tr>
</tbody>
</table>

*Note. Table format adapted from Larimer & Cronce (2007)*
4.6.13 Summary of Findings.

The published literature examining the efficacy and effectiveness of BASICS in influencing alcohol consumption and other related variables amongst university populations is largely favourable. All studies reported in Table 17 produced significant reductions in key drinking variables, including drinks per week, peak consumption, peak and typical BAC and alcohol related negative consequences, indicating a consistent therapeutic effect of the treatment. Novel adaptations of the standardised BASICS protocol, including BASICS in combination with a parental intervention (Turris et al., 2009), mailed feedback (Larimer et al., 2007) and a shortened, brief BASICS intervention (McNally, Palfai, & Kahler, 2005), also produced positive outcomes. Sample sizes range from 54 (e.g. Murphy et al., 2004) through to 1488 (e.g. Larimer et al., 2007). Reinforcing the findings, most studies used control groups and a number of studies utilised extended follow up periods, with Larimer et al., (2007) and Schaus et al., (2009) conducting follow-up assessments 12 months post-intervention and Baer and colleagues (2001) conducting follow-up assessment 4 years post-intervention.

Despite the strong outcomes reported above, a number of studies are marked by methodological flaws that limit their generalisability. Research by Martens et al., (2007), Murphy et al., (2004), White et al., (2006) and Amaro et al. (2010) all failed to include control groups in their studies. Other studies, such as Martens et al., (2007), McNally, Palfai, and Kahler (2005), White et al., (2006), and Borsari and Carey (2000), utilised relatively brief follow-up periods.

In spite of these criticisms, the sheer volume of research conducted on the BASICS intervention, and the relatively consistent therapeutic effects demonstrated, suggest that
BASICS is an efficacious approach to treating harmful alcohol consumption amongst this population. Indeed, BASICS is classed as a 'model program' according to the US Department of Health and Human Services, National Registry of Evidence-Based Programs and Practices (NREPP), with external reviewers providing highly favourable evaluations of the quality of BASICS research (NREPP, 2008).

4.6.2 e-CHUG.

The Electronic Check-Up and Go (e-CHUG) is a brief, online alcohol intervention that provides immediate, personalised feedback regarding current drinking practices; in the literature, e-CHUG is conceptualised an online, feedback intervention (Walters, Vader & Harris, 2007). The program is grounded in harm reduction theory and utilises motivational interviewing, motivational enhancement and social norm approaches to reduce levels of hazardous drinking. In line with these theories, it is hypothesised that e-CHUG reduces drinking through the integration of motivational components (personalised feedback, normative comparisons and risk analysis) and suggestions for moderating excessive consumption. Recent data from randomised controlled trials indicates that e-CHUG produces significant reductions in alcohol consumption and associated risk behaviours amongst university samples, when compared with controls (Walters, Hester, Chiauzzi & Miller, 2005; Walters, Vader & Harris, 2007).

4.6.21 Program Structure.

e-CHUG is delivered as a standalone computerised alcohol intervention. Although created in the USA, the program has been amended for use internationally, with e-CHUG being used in a number of universities in Canada, Ireland and Australia; data sets for local normative consumption patterns are provided by the purchaser and localised language and
units of measurement are added as required. The program takes approximately 20-30 minutes to complete.

On logging in to e-CHUG, participants enter a range of demographic data, such as age, height, and weight. Then on the following screen, a brief plain language statement is provided, discussing the confidential and anonymous nature of the program and the necessity of answering all questions relating to alcohol in an honest manner. A text definition of a standard drink is also provided, complemented by illustrations. At this point, respondents answer specific items relating to alcohol consumption: typical and peak consumption behaviours are assessed, along with high risk alcohol-related behaviours (e.g. drink driving), family history of alcohol problems, and estimates of monthly alcohol expenditure. Respondents then complete the AUDIT as part of the e-CHUG program (although this measure is not identified as such). A number of true/false items, relating to alcohol issues such as caloric value of alcohol, the impact of alcohol consumption on muscle strength and recovery, are then presented. The importance-confidence ruler is then presented; this instrument is a commonly used motivational assessment tool, where individuals are asked “How important is it to you to make any change in your personal use of alcohol?” and “How confident are you that you are able to make any change in your personal use of alcohol?”, with responses varying across a 10-point likert scale (1 = “Not at all important/confident, and 10 = “Very important/confident”).

Following the assessment stage, participants’ data is immediately analysed and personalised feedback and psychoeducation is provided in the form of a “drinking profile”. Data pertaining to the individual’s drinking behaviours are explored in the context of normative comparisons and specific alcohol information, relating to issues such as BAC and
short/long term risk levels. Correct responses to the true/false questions in the assessment phase are reported, accompanied by relevant information. Feedback and informational data is presented in a variety of mediums including text, graphics and video. A summary of provided data and the related e-CHUG feedback is provided in Table 17.
Table 17.

**Summary of Data Provided and Associated Feedback in e-CHUG.**

<table>
<thead>
<tr>
<th>Participant data</th>
<th>Relevant feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of drinks per week</td>
<td>Cost per year</td>
</tr>
<tr>
<td></td>
<td>Percentage of yearly income</td>
</tr>
<tr>
<td></td>
<td>Cost equivalency in other items (e.g. music downloads)</td>
</tr>
<tr>
<td></td>
<td>Equivalent caloric intake per month (e.g. monthly consumption = X cheeseburgers)</td>
</tr>
<tr>
<td></td>
<td>Necessary amount of exercise required to ‘burn off’ alcohol-related caloric intake</td>
</tr>
<tr>
<td></td>
<td>Highest estimated BAC during a typical week</td>
</tr>
<tr>
<td>Drinks per episode</td>
<td>Percentage of Australian males/females that consume more per sitting</td>
</tr>
<tr>
<td></td>
<td>Percentage of Australian tertiary students that consume more per sitting</td>
</tr>
<tr>
<td></td>
<td>NHMRC risk level (short term)</td>
</tr>
<tr>
<td>Drinking frequency</td>
<td>Percentage of Australian males/females that consume more frequently</td>
</tr>
<tr>
<td></td>
<td>NHMRC risk level (long term)</td>
</tr>
<tr>
<td></td>
<td>Tolerance level</td>
</tr>
<tr>
<td>Peak alcohol consumption</td>
<td>Estimated highest BAC</td>
</tr>
<tr>
<td>Age started drinking</td>
<td>Risk of developing alcohol dependence in the future</td>
</tr>
<tr>
<td>Family history of alcohol problems</td>
<td>Risk of developing alcohol dependence in the future</td>
</tr>
</tbody>
</table>

At the conclusion of the feedback phase, respondents are provided with a number of strategies that individuals can use to cut down their drinking and reduce the risk of injuring themselves or their friends, such as “Alternate drinking non-alcoholic and alcoholic drinks”
and “Refuse to ride with a 'buzzed' or drunk driver”. Finally, a number of alcohol specific follow-up resources are provided, such as university counselling centres, drug and alcohol telephone counselling services and online alcohol information. The respondent may print out their personalised feedback profile for use at a later point.

4.6.22 Research.

In the current section, research examining the efficacy of e-CHUG as an intervention for problematic use amongst university populations will be summarised. Although the creators of the intervention highlight that e-CHUG has been demonstrated to be effective in reducing a range of alcohol outcomes in at least 12 separate studies (San Diego State University, 2011), it must be acknowledged that many of these studies are unpublished and have not undergone peer-review. Published studies have been summarised, with regards to participants, methodology, findings and limitations, and are presented in Table 18. It is noteworthy that no published studies examining the efficacy of the treatment with Australian populations are available.
### Table 18.

**e-CHUG Research Summary**

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>Assessment phases (% retained)</th>
<th>Treatment conditions</th>
<th>Key outcomes</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doumas &amp; Andersen (2009)</td>
<td>80</td>
<td>Baseline (100)</td>
<td>e-CHUG Control</td>
<td>High risk drinkers (defined as 5+ drinks in a row for males and 4+ drinks in a row for females at least once in the past month) in the e-CHUG condition demonstrated reduced weekly consumption, episodes of drinking to intoxication and alcohol related consequences compared to controls.</td>
<td>Brief follow up. Sample size of sub-groups not reported.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 months (65)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walters, Vader &amp; Harris (2007)</td>
<td>106</td>
<td>Baseline (100)</td>
<td>e-CHUG Control</td>
<td>Significant reductions in drinks per week, peak BAC and RAPI scores from baseline to 16-weeks for both control and intervention groups. Intervention group demonstrated significantly greater reductions in drinks a week and BAC from baseline to 8 weeks.</td>
<td>Brief follow up. Self report measures. Multiple imputation - Data assumed to be missing at random.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 weeks (71.7)</td>
<td></td>
<td>No significant between group differences on outcome measures at 16 weeks.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>16 weeks (77.4)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 18 (Cont.)

<table>
<thead>
<tr>
<th>Study Details</th>
<th>N</th>
<th>Baseline</th>
<th>Follow-up</th>
<th>Intervention</th>
<th>Follow-up Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hustad, Barnett, Borsari, &amp; Jackson (2010)</td>
<td>82</td>
<td>Baseline (100)</td>
<td>1 month (98)</td>
<td>e-CHUG AlcoholEdu Assessment only control</td>
<td>All participants were incoming college students. e-CHUG group reported increases in typical consumption, peak consumption, and heavy drinking episodes, however increases were not as large as in the assessment only control group. Non-significant reductions in alcohol related consequences for e-CHUG group compared to assessment only control. e-CHUG group reported stable typical and peak BAC from baseline to follow up.</td>
</tr>
<tr>
<td>Doumas, Workman, Smith &amp; Navarro (2011)</td>
<td>135</td>
<td>Baseline (100)</td>
<td>8 months (average) (61.5)</td>
<td>e-CHUG e-CHUG with MI feedback review</td>
<td>All participants were mandated students. e-CHUG with feedback review demonstrated significantly greater reductions in weekly drinking and binge drinking frequency compared to e-CHUG. Increase in weekly drinking quantity, binge drinking frequency and alcohol consequences from baseline to follow up for e-CHUG.</td>
</tr>
</tbody>
</table>
4.6.23 Summary of Findings.

The published e-CHUG studies summarised above provide qualified preliminary support for the intervention in influencing a number of alcohol related variables in the short term. Doumas and Anderson (2009) and Walter and colleagues (2007) demonstrated reductions in drinks per week, peak BAC, alcohol related consequences and episodes of intoxication in e-CHUG participants over controls. Hustad and colleagues (2010) demonstrated a constraining effect of the intervention on alcohol use amongst incoming college students, with small increases in consumption variables relative to assessment only controls. In this study, the e-CHUG intervention was also associated with a reduction in alcohol related consequences.

It must be acknowledged, however, that not all research has produced plainly favourable data. Doumas and colleagues (2011) found that mandated students in the e-CHUG intervention group reported increases in drinking quantity, binge drinking frequency and alcohol related consequences from baseline to follow up. In this study, the addition of an MI feedback review to e-CHUG lead to significant reductions in target variables. In Walter, Vader and Harris’ (2007) study, the significant differences between e-CHUG and controls on alcohol variables at 8 weeks had disappeared by 16 week follow up, suggesting that the effects of the intervention were limited to the short term.

The studies reported here are also characterised by a number of notable methodological issues. All studies used small samples, with sample sizes ranging from 80 to 135 participants, which raises questions regarding the representativeness of the samples used. Generally, the studies described here were also hampered by relatively brief follow up periods, ranging from 3 months to 8 months. Short follow up periods disallow an
assessment of the long-term ability of the intervention to change alcohol related behaviours; this observation is particularly relevant when the diminished intervention effect of e-CHUG, noted in Walter, Vader and Harris’ (2007), is considered.

Overall, published e-CHUG research presents a mixed picture of the efficacy of the intervention. A number of studies report significant reductions in key alcohol outcome variables over controls (e.g. Doumas & Anderson, 2009; Walter, Vader, & Harris, 2007), indicating a likely intervention effect, however these findings are offset by other research which has reported increases in similar variables. What is noteworthy, however, is the relative scarcity of peer-reviewed published efficacy studies. Although the publishers report that e-CHUG has been shown effective in reducing alcohol use and consequences in at least 12 separate studies, a literature review identified only 4 published studies. (SDSU, 2011). Further peer-reviewed research is required to develop a clear understanding of the utility of e-CHUG in addressing hazardous alcohol behaviours amongst tertiary students.

**4.6.3 Active Components and Mechanisms of Change in e-CHUG and BASICS.**

Despite some differences in the modality of treatment, the e-CHUG and BASICS interventions share many similarities. Both are brief interventions, and integrate motivational and feedback components to bring about reductions in harmful alcohol use, within a harm minimisation framework. Both aim to increase motivation to change by assessing individual drinking behaviours, and providing feedback in the context of normative comparisons, with the intention to reducing drinking behaviours. Psychoeducation is provided in both interventions, with information regarding personal risks, financial, social and academic consequences of heavy alcohol consumption, alcohol dependence, BAC and referral options being a feature of both treatments. In spite of the similarities, some
fundamental differences in content are apparent; predominantly due to the extended contact period and the presence of a clinician, BASICS is able to provide additional components that e-CHUG does not. BASICS requires a 2-week period of alcohol self-monitoring, which is not a feature of e-CHUG (it should be noted here that although the 2-week monitoring period is a feature of the manualised treatment, many BASICS trials in the literature do not use this as part of the intervention; for examples, see Amaro et al. [2010]; Martens et al., [2007]). BASICS also provides for active goal setting by the participant and skills training to meet these goals. Due to the presence of a clinician, ambivalence about changing can also be explored and, potentially resolved, with the use of motivational interviewing techniques with BASICS.

Although data is limited, some initial research has been conducted in an attempt to identify the components of brief interventions that directly influence changes in alcohol behaviours; this information can be used to make assumptions about the possible differential efficacy of e-CHUG and BASICS. Generally, research indicates that personalised feedback, a core component of all brief interventions, is more effective than no intervention in influencing alcohol behaviours (Agostinelli et al., 1995; Collins et al., 2002; Walters et al., 2000). Early findings also suggested that personalised feedback, rather than motivational elements of brief interventions, was responsible for change evidenced through these treatment. For example, research by Murphy and colleagues (2004) compared the relative efficacy of personalised feedback, delivered with and without a single motivational interviewing session, in changing alcohol consumption amongst a group of American college drinkers. Data indicated that, at 6 moth follow-up, participants from both the personalised feedback only group ($n = 28$) and the personalised feedback plus motivational interviewing
group \((n = 26)\) had demonstrated small to moderate reductions in alcohol consumption, but there was no significant differences between the groups. The authors concluded that MI did not improve the efficacy of personalised feedback. Similar results were reported by White and colleagues (2006), who found no difference in alcohol-related outcome variables at 3-month follow up, between participants that had received a brief motivational intervention those who had received written feedback only. Although these findings are intriguing, both studies used small samples sizes and failed to use a no-treatment control group; these limitations reduced the generalisability of the findings.

Subsequent research, with generally more robust methodologies, produced data contradicting these initial findings; these studies suggest that the efficacy of personalised feedback can be improved through the addition of in-person motivational strategies. Walters et al., (2009) randomly allocated a sample of heavy-drinking American college students to one of four treatment conditions: web-feedback only \((n = 70)\), a single MI session without feedback \((n = 69)\), a single MI session with feedback \((n = 69)\), or assessment only control \((n = 69)\). At 6-month follow-up, the MI with feedback condition demonstrated significant reductions in alcohol consumption variables, as compared with all other groups. No difference was observed between feedback only, MI only and control groups. Similar findings were reported by Doumas and colleagues (2011); the researchers randomly allocated mandated American college students \((N = 135)\) to either a web-based assessment and self-guided feedback condition or web-based assessment and counsellor guided feedback (utilising MI strategies) condition. Follow-up assessments at 8-months showed that participants in the counsellor guided feedback condition reported significantly greater
reductions in weekly drinking quantity and binge drinking frequency than those in the self-guided feedback condition.

Taken together, these findings offer a mixed picture as of the effectiveness of various components of brief interventions. Further research is required to clarify which elements are “necessary and sufficient” (White, 2006, p. 317), and which components are differentially effective with various sub groups of tertiary students, such as males and females, heavy drinking individuals, and incoming students.

Although it is difficult to fully compare e-CHUG and BASICS, a broad summary of commonalities and differences between the two treatments are presented in Table 19. The only study to offer a direct comparison of the two interventions (Murphy et al., 2010) is provided in Section 4.6.4.

Table 19.

*Comparison of Key Components in the e-CHUG and BASICS Programs.*

<table>
<thead>
<tr>
<th>Treatment components</th>
<th>e-CHUG</th>
<th>BASICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment of drinking behaviours</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Ongoing monitoring of drinking behaviours</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Personalised normative feedback</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Examination of personal risk</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Psychoeducation</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Decisional balance exercise</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Goal setting</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Advice on strategies to reduce consumption</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Skills training</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
4.6.4 Comparability of BASICS and e-CHUG.

At the time of commencing the current study, no published research studies had compared the efficacy of e-CHUG versus BASICS with university populations. However, recent research by Murphy, Dennhardt, Skidmore, Martens and McDevitt-Murphy (2010), examined the mechanisms of change and relative efficacy of these interventions. The authors screened first year US university students and recruited 133 participants (50% female) identified as having engaged in one or more heavy drinking episodes (>5/4 drinks on one occasion for males/females) in the past month. Participants were then randomly allocated to either the BASICS intervention \((n=46)\), e-CHUG intervention \((n=45)\) or assessment only control \((n=42)\). Outcome variables were drinks per week, heavy drinking episodes, motivation to change, normative discrepancy (discrepancy between the drinking behaviours and the drinking behaviours of peers), self-ideal discrepancy (the perceived negative impact of alcohol use on relationships, academic performance, health and appearance) and session evaluations. Alcohol variables were assessed at baseline and 1-month follow up, while session evaluations were conducted post-intervention.

Data analysis indicated that although both treatments were rated favourably by participants, the BASICS intervention was rated significantly more highly than the e-CHUG intervention. The participants in BASICS condition also evidenced higher mean levels of self ideal discrepancy than e-CHUG participants from baseline to follow up. Neither group demonstrated a treatment effect on motivation to change. With regard to drinking variables, treatment effects were identified for weekly consumption and frequency of heavy drinking; the BASICS groups demonstrated significant improvements on these variables relative to controls, and greater reductions in heavy drinking over e-CHUG (however this
finding was not significant). No other significant contrast effects were identified in these analyses, including between e-CHUG and controls. Subjective participant reports indicated that 68% of BASICS participants described a decrease in drinking, compared to 58% in the e-CHUG group and 38% in the assessment-only control. The authors stated “The overall pattern of results in Study Two provides qualified support for the superiority of BASICS in achieving short term drinking reductions” (Murphy et al., 2010, p.636), however it must be noted that the superiority of BASICS in reducing consumption variables, over e-CHUG, was often small. Although the study was limited by small sample sizes and a brief follow up period, the outcomes further advance the research base with regards to the efficacy of computerised and face-to-face motivational-feedback interventions for problematic alcohol behaviours amongst this population.

4.7. Summary and Recommendations

As highlighted by the review, the current body of literature on alcohol interventions for university students is characterised by an almost total lack of Australian research. Significant social and legal differences exist between Australia and other countries, such as legal age of drinking and college living arrangements, which challenge the applicability of international intervention data to Australian populations. These dissimilarities contribute to variation in drinking behaviours between countries and, as such, necessitate methodologically sound intervention research with Australian participants in order to identify efficacious treatments that are appropriate to local populations. Data from international research, however, can be used to select promising treatments for further study, and the data suggests that motivational and online approaches to treating harmful
alcohol use amongst university students may represent the most promising treatment approaches for Australian populations.

Based on international research and the reported acceptability of treatment modalities from participants in Study One, two interventions were selected for closer review: BASICS and e-CHUG. BASICS is a brief feedback and skills based alcohol intervention, grounded in motivational interviewing principles and e-CHUG is a brief, online alcohol intervention that uses motivational interviewing and social norm approaches to reduce levels of hazardous drinking. While key differences between the interventions exist, specifically with regard to the modality of treatment, the available research lends mutual support to their efficacy. BASICS has been widely studied and has consistently demonstrated significant changes in target variables with international university samples. e-CHUG, being more recent, has been less researched, but preliminary findings also suggest that this may be an efficacious approach to treatment harmful alcohol use with university populations.

Based on the evaluation of the research, both BASICS and e-CHUG appear to be excellent candidates for further evaluation in an Australian university setting. Study Two attempts to address the need for methodologically sound, Australian intervention research in this field by using an RCT design to compare the efficacy of BASICS and e-CHUG in influencing alcohol behaviours in a sample of Australian university students. A full description of Study Two is presented in Chapter 6.
Chapter 5. Study Two: Intervention

5.1 Study Description, Aims and Hypotheses

As highlighted by the literature, and supported by the outcomes reported in Study One, Australian university students consume alcohol in a fashion that puts them at risk of both short and long term harm. However, as reported, very few methodologically sound Australian intervention studies have been conducted with this population. Data from Study One indicated that the most highly endorsed modes of alcohol treatment were online and face-to-face (“Anonymous web-based alcohol risk assessment and personalized feedback” and “Alcohol risk assessment and advice from a nurse, counsellor, or psychologist”). The literature reported above highlights the potential efficacy of both e-CHUG and BASICS in reducing harmful alcohol consumption in university populations, and both treatment programs reflect the populations’ stated preferences for treatment modality outlined in Study One. Unfortunately, these treatments, whilst reflecting population preferences, have not been assessed with an Australian population. In light of these observations, the purpose of Study Two was to address this gap in the literature by comparing the efficacy of brief online (e-CHUG) and face-to-face (BASICS) interventions for harmful alcohol consumption amongst Australian tertiary students, utilising a RCT design. Participants from Study One who volunteered to be involved, and met the inclusion criteria, were randomly allocated to one of three experimental conditions, an online intervention (e-CHUG), a brief motivation-feedback intervention (BASICS) or a control condition. Outcome variables of interest were drinking behaviours (AUDIT), readiness to change (RTCQ), alcohol related consequences (RAPI) and specific alcohol variables, including average number of drinks per week, peak levels of alcohol consumption and peak BAC. Assessments were conducted at baseline, 1-
month and 3-months. To maintain the fidelity of the control group, alcohol consumption items were not administered to this cohort; specifically, this group completed the AUDIT, the RTCQ and the RAPI, but did not monitor their drinking habits as did participants in the other experimental conditions. This decision was made based on previous research indicating that assessment alone can reduce drinking behaviours (e.g. Kypri et al., 2003).

It should be noted here that, although as highlighted in Chapter 4, differences do exist between Australia and other countries which raise questions regarding the interpretation of international intervention data for Australian populations, the decision was made to not make any significant alterations or adjustments to BASICS or e-CHUG in the current study. Study Two was designed as a pilot to assess the appropriateness of these interventions with Australian populations. As both treatments have a strong and growing research base, the author’s intention was not, in the first instance, to make any significant changes to the structure, content or processes of the interventions. If, after Study Two, the treatments are shown to be ineffective with Australian students, then, based on the outcome data, follow-up studies can be undertaken that alter the structure of the treatments in an attempt to address any key ‘translation’ problems. However, a number of key amendments, primarily related to measurement issues and normative data, were required to make the interventions functional in an Australian setting. These changes are set out in Section 5.2.3.

The primary hypotheses of the current study were that participants in both intervention conditions would display significant improvements in relevant alcohol outcomes when compared to participants in the control condition, and participants in the BASICS group would display significantly greater improvements in relevant alcohol
outcomes when compared to participants in the e-CHUG group. Although the literature suggests that online alcohol interventions may deliver similar treatment effects as traditional face-to-face treatments, the hypotheses regarding the predicted superiority of BASICS over e-CHUG are informed by the outcome data reported in Murphy et al. (2010), the relatively small and inconsistent literature regarding the efficacy of e-CHUG in modifying alcohol related target behaviours and the sizable evidence base supporting the efficacy of BASICS. Specifically, our hypotheses were as follows:

_Hypothesis 1:_ Participants in both experimental conditions, e-CHUG and BASICS, would demonstrate significant reductions in risky drinking behaviours as measured by the AUDIT, from baseline to post-intervention.

_Hypothesis 2:_ Participants in the BASICS group would demonstrate the greatest reductions in risky drinking behaviours, as measured by the AUDIT, when compared to both the control and e-CHUG groups.

_Hypothesis 3:_ Participants in both experimental conditions, e-CHUG and BASICS, would significantly increase their readiness to change, as measured by the RTCQ, from baseline to post-intervention, when compared to controls.

_Hypothesis 4:_ Participants in the BASICS group would demonstrate significantly greater reductions in alcohol related consequences at 1-month and 3-month follow up when compared to e-CHUG and control groups.

_Hypothesis 5:_ There would be a significant negative relationship between RTC and actual changes in drinking behaviours, as measured by change scores on the AUDIT (3-month AUDIT score – baseline AUDIT score), for both BASICS and e-CHUG groups.
**Hypothesis 6:** There would be a significant negative relationship between preference for online treatment and actual changes in drinking behaviours for the e-CHUG group, as measured by change scores on the AUDIT (3-month AUDIT score – baseline AUDIT score).

**Hypothesis 7:** There would be a significant negative relationship between preference for face-to-face treatment and actual changes in drinking behaviours for the BASICS group, as measured by change scores on the AUDIT (3-month AUDIT score – baseline AUDIT score).

**Hypothesis 8:** Both BASICS and e-CHUG would demonstrate significant reductions in peak consumption levels between baseline and follow up.

**Hypothesis 9:** BASICS would demonstrate greater reductions in peak consumption levels when compared with e-CHUG.

**Hypothesis 10:** Both BASICS and e-CHUG would demonstrate significant reductions in estimated weekly consumption between baseline and follow up.

**Hypothesis 11:** BASICS would demonstrate greater reductions in estimated weekly consumption when compared to e-CHUG.

**Hypothesis 12:** Both BASICS and e-CHUG would demonstrate significant reductions in peak BAC between baseline and follow up.

**Hypothesis 13:** BASICS would demonstrate greater reductions in peak BAC when compared with e-CHUG.

**Hypothesis 14:** For both BASICS and e-CHUG groups, there would be a significant positive relationship between readiness to change and change scores for peak alcohol consumption, peak BAC and estimated drinks per week.

**Hypothesis 15:** There would be a significant negative relationship between preference for online treatment and actual changes in drinking behaviours for the e-CHUG
group, as measured by simple change scores on peak consumption, weekly consumption and peak BAC (3-month– baseline).

*Hypothesis 16:* There would be a significant negative relationship between preference for face-to-face treatment and actual changes in drinking behaviours for the BASICS group, as measured by simple change scores on peak consumption, weekly consumption and peak BAC (3-month– baseline).

5.2 Method

5.2.1 Participants.

Based on responses from Study One, 182 individuals (70 male, 115 female) registered interest in participating in Study Two; however of this number, only 90 were eligible for inclusion (32 male, 58 female), based on a total AUDIT score from 8 to 20 (inclusive). Of this 90, only 37 commenced the intervention phase (13 male, 24 female). For attrition analyses, please refer to section 6.3.3. Descriptive statistics for the sample are presented in Table 22 in section 6.3.5.

5.2.2 Procedure.

5.2.21 Recruitment and Eligibility

All respondents in Study One were invited to participate in the intervention component of the current study. Respondents were asked to record their email address if interested in participating. Participants who registered their interest were then screened for eligibility. Both interventions (BASICS and e-CHUG) are explicitly designed for individuals exhibiting low-moderate risk, based on current alcohol consumption patterns. As such, eligibility criteria were based on treatment guidelines for the AUDIT. The AUDIT makes recommendations for specific treatment approaches based on an individual’s score and
associated risk levels. Zone I risk (AUDIT score of 0-7) describes a low risk consumption pattern or abstinence; alcohol education is indicated as primary treatment. Zone II risk (AUDIT scores 8-15) refers to “alcohol use in excess of low risk guidelines” (p.21); brief intervention consisting of psychoeducation and advice is indicated for this group. Zone III risk (AUDIT scores 16-19) indicates the presence of hazardous and harmful drinking; treatment recommendations include simple advice, brief counselling and continued monitoring. Zone IV (AUDIT scores 20+) refers to a consumption pattern that may indicate the presence of alcohol dependence; for this group, referral to specialist treatment services for assessment, diagnosis and intervention is recommended. In light of these guidelines, participants recording an AUDIT score of 8-20 were considered to be eligible for the intervention. Similar cut-off criteria have been utilised by other studies in this area (e.g. Walters, Hester, Chiauzzi & Miller, 2005)

Individuals scoring below the cut-off score of 8 were contacted via email and informed that their current drinking pattern was classed as “low risk” and that they were not eligible for participation in the study. These individuals were also provided with referrals to various local drug and alcohol counselling services, if they required assistance with problematic alcohol consumption. Individuals scoring above the upper cut-off score of 20 were also contacted via email; these individuals were informed that their current pattern of alcohol consumption put them at risk of both short and long term harm, and were encouraged to seek further treatment and support. Referrals to drug and alcohol treatment services were provided.

Eligible participants (N = 90) were provided with a plain language statement (Appendix B) and, if consenting, randomly allocated to one of the three groups (BASICS, e-
CHUG, control). Randomisation was conducted using Microsoft Excel, in accordance with guidelines set out by Sharpe (2009). A list of all eligible participants was collected and entered into Excel. In each cell next to the listed email addresses, a random number, using Excel’s RAND function, was created. This function produces random numbers between 0 and 1 that do not follow a predictable pattern. The entire data set was then sorted in ascending order based on the RAND values, thus randomising the sample. Group allocation was then conducted by dividing this randomised data set into three: the first 30 participants were allocated to the BASICS treatments group, the next 30 participants were allocated to the e-CHUG treatment group and the final 30 participants were allocated to the control group. No compensation or incentives for participation were provided for study participants. Described below are the procedures for each intervention group.

5.2.22 BASICS.

Participants allocated to the BASICS group ($n = 30$) were sent an email acknowledging their interest in being involved in the intervention phase of the research project and confirming their eligibility. A brief description of the BASICS intervention format was provided. Participants were also provided with a timetable showing available session times, and were asked to reply to the email indicating preferences for date and time of the first BASICS session and their preferred location (sessions were offered on the University’s two campuses). On receipt of these preferences, the researcher forwarded a reply email confirming the session time and date and provided a map for the relevant session location. Participants who did not respond to the initial email were sent two follow up emails.

Of the 30 participants allocated to this group, 7 responded to the initial email and were allocated session times. Of the 23 participants that did not commence the
intervention, 17 did not respond to the invitation emails, 3 were currently abstinent due to medical or personal reasons and, as such, were not eligible for intervention, 2 replied stating that they were unable to attend sessions due to their current location (rural and international) and 1 was unable to be involved due to unspecified commitments.

5.2.23 e-CHUG.

As with the BASICS group, participants allocated to the e-CHUG group \((n = 30)\) were sent an email acknowledging their interest in the study and confirming their eligibility for the intervention phase. The email also included a brief description of the format and anticipated duration of the e-CHUG intervention. Participants were invited to follow a link embedded in the email; this link took the participant to a SurveyMonkey page where they completed the RAPI and then followed another link to the e-CHUG page. Participants who did not complete the RAPI and e-CHUG were sent two follow up emails.

Of the 30 participants allocated to the e-CHUG condition, 10 completed the intervention. Of the 20 participants that did not complete e-CHUG, 18 did not respond to the invitation emails and 2 were unwilling to undergo the intervention (reason unspecified).

5.2.24 Control Group.

Members of the control group \((n = 30)\) were contacted via email to acknowledge their desire to be involved in the study. Participants were informed that they had been allocated to a control group and, as such, would not receive any intervention. These participants were invited to be involved in the study by completing a brief survey (RAPI); a link to a SurveyMonkey page containing the RAPI was presented in the email and the addressee was instructed to follow the link. Participants who did not complete the RAPI
were sent two follow up emails. At the conclusion of the intervention and follow up period, all participants in the control group were offered access to either e-CHUG or BASICS.

Of the 30 participants allocated to the control group, 20 completed the RAPI. The remaining 10 did not reply to the sent emails and did not give reasons for non-participation.

5.2.3 Intervention.

5.2.3.1 BASICS.

Prior to the commencement of Study Two, postgraduate psychology students at RMIT were invited to participate in the study by delivering the BASICS intervention. Interested clinicians \((N = 7)\) attended a BASICS training session created and delivered by the principal researcher. The training included information regarding alcohol use within Australian universities, current treatment approaches, motivational interviewing, a full description of the BASICS program and an in-depth examination of the BASICS treatment structure, delivery, assessments and required therapeutic style. A workshop-style format was used for the training with lecture material, interview transcripts, group discussion and practical tasks all used. For clinicians that were to take part in delivering the BASICS program, group and individual supervision was arranged through a registered clinical psychologist and supervisor with extensive experience in drug and alcohol treatment and motivational interviewing. The number of trained clinicians required to implement the BASICS program as part of Study Two was dependent on the response rate and final sample size of the intervention group. Due to the high level of attrition and subsequent small number of participants in the BASICS group \((n = 7)\), the trained clinicians were not needed to deliver the BASICS program. The principal researcher delivered all BASICS interventions in Study Two and accessed supervision as described above.
A full description of the BASICS intervention and treatment process has been described in Section 5.6. In the current study, the treatment and procedure were identical to this; however, in addition to the standard assessments, participants also completed the AUDIT and the Rutgers Alcohol Problem Index (assessing alcohol related problems over the past 6 months).

5.2.32 e-CHUG.

A full description of the e-CHUG intervention and treatment process has been provided in Section 5.6. In the current study, the treatment and procedure were identical to this, apart from prior to accessing the e-CHUG intervention, participants completed the AUDIT and the Rutgers Alcohol Problem Index (assessing alcohol related problems over the past 6 months). The e-CHUG program was modified by e-CHUG administrators to enable the use of Australian normative data for feedback; data sources were the NDS Drug and Alcohol survey (AIHW, 2005) and Davey and colleagues (2002).

5.2.4 Follow-up Procedure.

Follow-up data collection occurred at two separate points post-intervention to identify changes in alcohol related variables over time. At one month following completion of the interventions, participants were emailed an invitation to complete a battery of questionnaires and provided with a link to a SurveyMonkey site hosting the questionnaires. The nature of the instruments varied slightly according to the experimental group. Participants from all three groups completed the AUDIT, the RTCQ and an amended version of the RAPI, specifying negative alcohol related events over the previous month (as opposed to 6 months, as in the original). In addition to these measures, participants in the BASICS and e-CHUG groups also completed a retrospective assessment of their alcohol...
consumption patterns over the previous month, reporting the number of standard drinks consumed and the number of drinking hours for each day in a typical week and the highest number of drinks consumed and the number of hours drinking on one occasion. Participants that did not complete the questionnaire package were sent two follow up emails to encourage them to complete the measures.

At three months following the completion of the interventions, participants were emailed another invitation to complete follow-up surveys. Again, a link to a SurveyMonkey site hosting the questionnaires was provided. The format and content of the questionnaire package was identical to the one month follow-up package that each group received, aside from the retrospective period of the RAPI (adjusted to 2 months). Again, participants who did not complete the questionnaire package were sent two follow up emails to encourage them to complete the measures. Data describing the timing of the various assessments for each group are presented in Table 20.
Table 20.

*Data Collection for Experimental Groups Across Assessment Phases.*

<table>
<thead>
<tr>
<th>Group</th>
<th>Screening</th>
<th>Intervention</th>
<th>1-month follow up</th>
<th>3-month follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASICS</td>
<td>RTCQ</td>
<td>Typical daily consumption and estimated hours</td>
<td>Typical daily consumption and estimated hours</td>
<td>Typical daily consumption and estimated hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Peak consumption and estimated hours</td>
<td>Peak consumption and estimated hours</td>
<td>Peak consumption and estimated hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>hours</td>
<td>hours</td>
<td>hours</td>
</tr>
<tr>
<td>AUDIT</td>
<td>RTCQ</td>
<td>Typical daily consumption and estimated hours</td>
<td>Typical daily consumption and estimated hours</td>
<td>Typical daily consumption and estimated hours</td>
</tr>
<tr>
<td>RAPI (6-m)</td>
<td>RAPI (1-m)</td>
<td>AUDIT</td>
<td>AUDIT</td>
<td>AUDIT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RTCQ</td>
<td>RTCQ</td>
<td>RTCQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RAPI (2-m)</td>
<td>RAPI (2-m)</td>
<td>RAPI (2-m)</td>
</tr>
<tr>
<td>e-CHUG</td>
<td>RTCQ</td>
<td>Typical daily consumption and estimated hours</td>
<td>Typical daily consumption and estimated hours</td>
<td>Typical daily consumption and estimated hours</td>
</tr>
<tr>
<td>RAPI (6-m)</td>
<td>RAPI (1-m)</td>
<td>AUDIT</td>
<td>AUDIT</td>
<td>AUDIT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RTCQ</td>
<td>RTCQ</td>
<td>RTCQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RAPI (2-m)</td>
<td>RAPI (2-m)</td>
<td>RAPI (2-m)</td>
</tr>
<tr>
<td>Control</td>
<td>AUDIT</td>
<td>Typical daily consumption and estimated hours</td>
<td>Typical daily consumption and estimated hours</td>
<td>Typical daily consumption and estimated hours</td>
</tr>
<tr>
<td>RTCQ</td>
<td>RAPI (6-m)</td>
<td>AUDIT</td>
<td>AUDIT</td>
<td>AUDIT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RTCQ</td>
<td>RTCQ</td>
<td>RTCQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RAPI (1-m)</td>
<td>RAPI (1-m)</td>
<td>RAPI (1-m)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RAPI (2-m)</td>
<td>RAPI (2-m)</td>
<td>RAPI (2-m)</td>
</tr>
</tbody>
</table>
5.2.5 Measures.

A number of outcome measures, assessing risky alcohol consumption, readiness to change, alcohol related problems, and typical and peak alcohol consumption, were used in Study Two. A description of each measure is presented in the following section.

5.2.51 AUDIT.

The standard 10-item Alcohol Use Disorders Identification Test (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) was used as a screening tool for risky alcohol consumption. The instrument has been fully described previously in Sections 2.4.11 and 3.2.41.

5.2.52 The Readiness to Change Questionnaire (RTCQ).

Based on Prochaska and DiClemente’s (1986) stages of change model, the Readiness to Change Questionnaire (RTCQ; Heather, Gold, & Rollick, 1991) is a 12-item instrument that assesses current interest in changing excessive alcohol consumption. Individuals are asked to respond to statements such as “It’s a waste of time thinking about my drinking” on a five-point Likert scale, ranging from “Strongly Disagree” to “Strongly Agree”. Based on a total score, individuals are identified as occupying one of three stages of change: Precontemplation, Contemplation or Action. Cronbach’s alpha coefficient was calculated for each of the three stages of change measured by the instrument, in order to establish internal consistency. Data indicated high internal consistency for each of the scales; Precontemplation, α=0.73, Contemplation, α=0.80, and Action, α=0.85 (Heather, Gold, & Rollick, 1991). The measure also demonstrates strong test-retest reliability.

It should be noted here that a single-factor version of the RTCQ is available (Budd & Rollnick, 1998). Although the conceptualisation of readiness to change as a single continuous variable has received some empirical support (see Budd & Rollnick, 1998;
Rollnick, 1998), the original TTM, upon which the RTCQ was based, views readiness to change as a categorical, stage-based construct. The decision was made to utilise the original three-factor RTCQ in the current study, rather than the single-factor version, due to the strong psychometric properties of the instrument itself (noted above), and in an attempt to adhere to the original structure of the TTM.

5.2.53 RAPI.

The Rutgers Alcohol Problems Index (RAPI; White & Labouvie, 1989) is a 23-item self-report screening tool for the assessment of problematic alcohol use amongst adolescents and young adults. Primarily, the RAPI assesses the consequences of alcohol consumption behaviours. The RAPI introduction states “Different things happen to people while they are drinking ALCOHOL or because of their ALCOHOL drinking. Several of these things are listed below. Indicate how many times each of these things happened to you WITHIN THE LAST YEAR”. Respondents then respond to items such as “Passed out or fainted suddenly” or “Noticed a change in your personality” on a 4-point likert-style response set comprised of the following options: None, 1-2 times, 3-5 times or More than 5 times. Each item is scored 0-3 and an overall score is derived by adding each item; total scores can range from 0-69.

The RAPI manual reports strong psychometric properties (White & Labouvie, 1989). Reliability is reportedly .8 and above in both clinical and non-clinical samples. Construct validity is strong; the instrument has demonstrated discriminant validity, distinguishing between non-problematic and problematic drinking amongst adolescents, and convergent validity, with analysis indicating strong associations with other alcohol measures, such as the AAIS, ADS, DSM-III and DSM-III-R (r>.7) (Miller et al., 2002; White & Labouvie, 1989; White et al., 1988).
It should be noted here that the original RAPI assesses the frequency of alcohol related consequences over a *six month* time period. However, as the total follow up period in the current study was only three months, any change over time associated with the interventions would not be captured by the RAPI. As such, the retrospective reporting period of the RAPI was altered by the researcher; this alteration is recommended by the authors of the instrument for such situations (Center of Alcohol Studies, 2009). At each administration of the RAPI (baseline, 1-month post intervention and 3-month post intervention), participants were required to report the frequency of alcohol related problems over varying time periods; at baseline, the time period was the previous 6 months, at the 1-month follow up, the time period was 1 month, and at the 3-month follow up, the time period was two months. This allowed the researchers to capture changes in alcohol related problems within the time constraints of the study. However, as a result, RAPI scores over time were not comparable. To account for this, differences in RAPI score between experimental groups at all three administration periods were used to assess the influence of intervention type on alcohol related consequences (see Section 6.3.64).

5.2.54 Alcohol Consumption Items.

To assess typical and peak levels of alcohol consumption amongst participants in the intervention groups (e-CHUG and BASICS only), two brief consumption measures were included in the one and three month follow-up assessments. These items served as Quantity-Frequency measures, as described by Sobell and Sobell (2003) (see Section 2.4.1). Participants were asked, firstly, “For a TYPICAL MONTH, please describe a TYPICAL DRINKING WEEK. For each day, fill in the number of STANDARD DRINKS you consumed and the NUMBER OF HOURS you drank on that day”. Respondents entered the number of
standard drinks consumed on a typical day (Monday-Sunday) and the estimated time period over which these drinks would be consumed. Secondly, participants were asked “Think of the one occasion during the PAST MONTH when you DRANK THE MOST. Fill in the number of standard drinks of you consumed and the number of HOURS you drank that day”. Respondents entered the estimated number of drinks consumed in this episode and the time period over which these drinks were consumed.

5.2.55 BAC.

Blood Alcohol Concentration (BAC) is a measure of alcohol concentration in the blood, in terms of grams of alcohol per decilitre (Hustad & Carey, 2005). In the current study, retrospective BAC was estimated using Matthew and Miller’s (1979) formula. A recent comparative study, assessing the validity of various BAC estimation formula’s in terms of their accuracy against a calibrated electronic breath alcohol concentration measurement instrument (BrAC), found Matthew and Miller’s formula produced significantly stronger correlations with BrAC readings than other tested formulas, indicating that this measure may be the strongest formula in providing the closest estimate of actual BAC (Hustad & Carey, 2005). Matthew and Miller’s formula is as follows:

\[ \text{BAC} = \left( \frac{c}{2} \right) \times \left( \frac{GC}{w} \right) - \beta_{60} \times t \]

where \( \text{BAC} \) = blood alcohol concentration in grams / decilitres \((\text{g/dl})\), \( c \) = standard drinks consumed, \( GC \) = gender constant (females = 9.0; males = 7.5), \( w \) = weight in pounds, \( \beta_{60} \) = metabolism rate of alcohol per hour \((0.017 \text{ g/dl})\), \( t \) = time in hours from first sip of alcohol to assessment.
5.3 Results

5.3.1 Power Analysis and Missing Data Estimation.

A power analysis was conducted to establish the optimal size of the sample for identifying an intervention effect. An *a priori* power analysis was conducted using the program G*Power (Erdfelder, Faul, & Buchner, 1996). An appropriate effect size was established by averaging effect sizes relating to various measures of consumption (quantity and frequency) and intoxication reported in a meta-analysis of individual level interventions for alcohol misuse amongst college students authored by Carey and colleagues (2007). The power analysis was performed using Cohen’s $d = 0.26$, $p = 0.05$, and power = 0.90. Outcome of the analysis indicated that a sample size of 510 would be necessary to accurately identify an effect size of this order.

All data analysis in Study Two was conducted using SPSS for Windows V.18. Initial analyses confirmed normal distribution of the data as well as homogeneity of variance. Analysis of missing data was conducted for total scores of all outcome variables. Examining data from all baseline, 1-month and 3-month measures, missing data ranged from 0% for the majority of baseline assessments to a maximum of 35.1% for some 3-month follow up measures. Somewhat surprisingly, considering the high rate of attrition, Little’s MCAR test in SPSS found to be Missing Completely At Random. Missing data were then estimated using the default SPSS multiple imputation procedure, in accordance with the guidelines of Graham (2009), and pooled estimates of all imputed values were used for subsequent analysis.
5.3.2 Attrition Analysis.

Attrition rates varied between the groups. For the BASICS group, 5 of the initial 7 participants completed both the one month and three month follow up questionnaires. For the e-CHUG group, 8 of the 10 participants who completed the intervention responded to the one month follow up questionnaire package, while 7 of those 8 completed the three month follow up package. For the control group, of the 20 participants who completed the initial RAPI on invitation, 16 completed the one month follow up. Of this 16, 12 participants completed the three month follow up package. No replies to reminder emails were received from any participant from any group and, as such, no reasons for non-completion could be established. Follow up procedure and attrition rates are presented in Figure 2. Group size by experimental condition across the three assessment phases are presented in Table 21.
Volunteered to participate
\((n=182)\)

Ineligible
\((n=92)\)

Eligible
\((n=90)\)

BASICS
\((n=30)\)

Commenced
\((n=7)\)

1-M Follow Up
\((n=5)\)

3-M Follow Up
\((n=5)\)

e-CHUG
\((n=30)\)

Commenced
\((n=10)\)

1-M Follow Up
\((n=8)\)

3-M Follow Up
\((n=7)\)

Control
\((n=30)\)

Commenced
\((n=20)\)

1-M Follow Up
\((n=16)\)

3-M Follow Up
\((n=12)\)

*Figure 2.* Flow chart plotting randomisation, group size and attrition by experimental group across time
Table 21.

*Group Size by Experimental Condition Across Time.*

<table>
<thead>
<tr>
<th>Experimental condition</th>
<th>Allocated to group</th>
<th>Commenced intervention</th>
<th>One month follow up</th>
<th>Three month follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASICS</td>
<td>30</td>
<td>7</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>e-CHUG</td>
<td>30</td>
<td>10</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Control</td>
<td>30</td>
<td>20</td>
<td>16</td>
<td>12</td>
</tr>
</tbody>
</table>

Due to the high rate of attrition noted in this study, an attrition analysis was conducted. A series of ANOVA and chi square analyses were used to examine differences between those participants who volunteered for intervention but did not commence, those who commenced intervention but did not complete and those that completed the intervention, on age, gender, years of completed tertiary education, total AUDIT score, AUDIT risk level, stage of change designation, previous treatment for alcohol problems, endorsement of online alcohol treatment and endorsement of face-to-face alcohol counselling. Analysis revealed no significant difference between the groups on any variable.

### 5.3.3 Baseline Comparability.

Baseline comparability between the BASICS, e-CHUG and control groups was analysed using ANOVA and chi-square analyses. Data indicated no significant differences between the groups on measures of age, gender, stage of change, completed tertiary years and total AUDIT score.

### 5.3.4 Descriptive Statistics.

Descriptive statistics for each experimental group are presented in Table 22.
Table 22.

*Descriptive Statistics for Gender, Age and Completed Years of Tertiary Study for all Experimental Groups.*

<table>
<thead>
<tr>
<th>Variable</th>
<th>BASICS (n=7)</th>
<th>e-CHUG (n=10)</th>
<th>Control (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (% of group)</td>
<td>1 (14.3%)</td>
<td>3 (30%)</td>
<td>9 (45.0%)</td>
</tr>
<tr>
<td>Female (% of group)</td>
<td>6 (85.7%)</td>
<td>7 (70%)</td>
<td>11 (55.0%)</td>
</tr>
<tr>
<td>Mean age (SD)</td>
<td>26.6 (7.53)</td>
<td>30.0 (10.79)</td>
<td>24.15 (6.27)</td>
</tr>
<tr>
<td>Mean years of completed tertiary study (SD)</td>
<td>2.71 (1.80)</td>
<td>4.10 (2.64)</td>
<td>2.70 (1.90)</td>
</tr>
</tbody>
</table>

The BASICS group had a slightly higher ratio of female participants compared with the other experimental groups, whilst the e-CHUG group reported a higher mean age and completed years of tertiary study compared with the other groups. Descriptive statistics relating to baseline AUDIT scores and stage of change for each experimental group are presented in Table 23.
**Table 23.**

*Descriptive Statistics for AUDIT and RTCQ for all Experimental Groups.*

<table>
<thead>
<tr>
<th>Variable</th>
<th>BASICS (n=7)</th>
<th>e-CHUG (n=10)</th>
<th>Control (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUDIT Mean total (SD)</td>
<td>12.71 (3.45)</td>
<td>12.30 (2.79)</td>
<td>14.25 (3.67)</td>
</tr>
<tr>
<td>Excess of low risk: AUDIT 8-15 (%)</td>
<td>5 (71.4%)</td>
<td>9 (90.0%)</td>
<td>12 (60.0%)</td>
</tr>
<tr>
<td>Hazardous / Harmful: AUDIT 16-20 (%)</td>
<td>2 (28.6%)</td>
<td>1 (10.0%)</td>
<td>8 (40.0%)</td>
</tr>
<tr>
<td>RTCQ Precontemplation (%)</td>
<td>1 (14.3%)</td>
<td>2 (20.0%)</td>
<td>5 (25.0%)</td>
</tr>
<tr>
<td>RTCQ Contemplation (%)</td>
<td>3 (42.9%)</td>
<td>5 (50.0%)</td>
<td>5 (25.0%)</td>
</tr>
<tr>
<td>RTCQ Action (%)</td>
<td>3 (42.9%)</td>
<td>3 (30.0%)</td>
<td>10 (50.0%)</td>
</tr>
</tbody>
</table>

*Note.* AUDIT = Alcohol Use Disorders Identification Test. RTCQ = Readiness to Change Questionnaire

### 5.3.5 Inferential Analyses - All Groups.

Despite not achieving the desired sample size outlined in Section 5.3.1., the decision was made to proceed with conducting parametric analyses. The appropriate use of parametric tests is informed by assumptions of normality and homogeneity of variance, rather than sample size (Chan, 2003), and, as described, data for Study Two satisfied tests of distribution and homogeneity. Inferential analyses are presented in the following section.

#### 5.3.5.1 Change in Total AUDIT Over Time.

A two-way (3x3) mixed analysis of variance was conducted on total AUDIT scores, to assess change over time. The independent variables included one between groups variable, treatment group, with three levels (BASICS, e-CHUG, control) and one within subject
variable, time, with three levels (baseline, 1-month follow up, 3-month follow up).

Descriptive data is presented in Table 24.

Table 24.

Mean Total AUDIT Scores for Experimental Groups Across Time.

<table>
<thead>
<tr>
<th>Group (n)</th>
<th>Assessment Point</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline (SD)</td>
<td>1-month follow up (SD)</td>
<td>3-month follow up (SD)</td>
<td></td>
</tr>
<tr>
<td>BASICS (n=7)</td>
<td>12.71 (3.45)</td>
<td>11.14 (4.20)</td>
<td>11.83 (4.29)</td>
<td></td>
</tr>
<tr>
<td>e-CHUG (n=10)</td>
<td>12.30 (2.79)</td>
<td>12.32 (5.22)</td>
<td>13.00 (5.46)</td>
<td></td>
</tr>
<tr>
<td>Control (n=20)</td>
<td>14.25 (3.67)</td>
<td>12.37 (3.71)</td>
<td>10.28 (2.62)</td>
<td></td>
</tr>
</tbody>
</table>

Mauchly’s test indicated that the assumption of sphericity had been violated $\chi^2(2) = 12.71, p = .002$. In light of this finding, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon=.76$).

Data indicated that there was no significant change in total AUDIT scores across time, $F(2, 68) = 2.37, p = .12, \eta_p^2 = .065$. However, there was a significant interaction between time and group, $F(4, 68) = 2.98, p = .039, \eta_p^2 = .15$.

Univariate tests demonstrated no significant differences in AUDIT scores between the experimental groups at baseline, $F(2, 34) = 1.28, p = .29, \eta_p^2 = .07$, 1-month follow up, $F(2, 34) = 0.23, p = .80, \eta_p^2 = .01$, or 3-month follow up, $F(2, 34) = 1.72, p = .19, \eta_p^2 = .09$.

The BASICS group demonstrated no significant differences in total AUDIT scores across the three measurement times, $F(2, 33) = 0.64, p = .53, \eta_p^2 = .04$. Similarly, the e-CHUG group demonstrated no significant differences in total AUDIT scores across the three measurement times, $F(2, 33) = 0.37, p = .69, \eta_p^2 = .02$. The control group, on the other
hand, demonstrated significant differences in AUDIT scores across the three measurement times, $F (2, 33) = 10.49, p< .001, \eta_p^2 = .39$. Post-hoc pairwise Bonferroni comparisons indicated that AUDIT scores were significantly lower at 1 month follow up than at baseline ($p=.049$), significantly lower at 3 month follow up than at 1 month follow up ($p=.001$), and significantly lower at 3 month follow up when compared to pre-intervention ($p<.001$). For each group, changes in total AUDIT scores across time are presented in Figure 3.

![Figure 3. Changes in mean total AUDIT scores, according to experimental group, across baseline, 1-month and 3-month follow up.](image)

5.3.52 Change in AUDIT 1-8 Over Time.

As the final two items (9 and 10) on the AUDIT examine alcohol related problems across a full year, any behaviour change associated with the interventions in this study
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would not affect participant responses to these items, as follow up was only conducted over three months. In order to better assess changes in drinking behaviour of the sample, these two items were removed from the analysis. A two-way (3x3) mixed analysis of variance was conducted on scores from AUDIT items 1 to 8 (AUDIT1-8), to assess change in drinking behaviours and consequences over time. The independent variables included one between groups variable, treatment group, with three levels (BASICS, e-CHUG, control) and one within subject variable, time, with three levels (baseline, 1-month follow up, 3-month follow up). Descriptive data is presented in Table 25.

Table 25.

*Mean AUDIT1-8 Scores of each Experimental Group Across Time.*

<table>
<thead>
<tr>
<th>Group (n)</th>
<th>Baseline (SD)</th>
<th>1-month follow up (SD)</th>
<th>3-month follow up (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASICS (n=7)</td>
<td>10.71 (2.56)</td>
<td>9.23 (3.59)</td>
<td>9.83 (3.82)</td>
</tr>
<tr>
<td>e-CHUG (n=10)</td>
<td>10.90 (2.81)</td>
<td>11.02 (3.85)</td>
<td>11.02 (4.07)</td>
</tr>
<tr>
<td>Control (n=20)</td>
<td>11.75 (3.18)</td>
<td>10.06 (2.82)</td>
<td>8.85 (2.93)</td>
</tr>
</tbody>
</table>

Mauchly’s test indicated that the assumption of sphericity had been violated \( \chi^2(2) = 14.92, p = .001 \). In light of this finding, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity (\( \varepsilon = .73 \)).

Data indicated that there was no significant overall change in mean AUDIT1-8 scores across time, \( F(2, 68) = 2.50, p = .11, \eta_p^2 = .07 \). Similarly, there was no significant interaction effect for time and group, \( F(4, 68) = 1.75, p = .17, \eta_p^2 = .09 \).
Univariate tests demonstrated no significant differences in AUDIT1-8 scores between the groups at baseline, $F(2, 34) = 0.45, p = .64, \eta_p^2 = .03$, 1-month follow up, $F(2, 34) = 0.64, p = .53, \eta_p^2 = .04$, or 3-month follow up, $F(2, 34) = 1.35, p = .27, \eta_p^2 = .07$.

Despite demonstrating a reduction over time, the BASICS group demonstrated no significant differences in AUDIT1-8 scores across the three measurement periods, $F(2, 33) = 0.79, p = .46, \eta_p^2 = .05$. The e-CHUG group also did not demonstrate significant differences in AUDIT1-8 scores across the three measurement times, $F(2, 33) = 0.01, p = .99, \eta_p^2 < .001$. Conversely, the control group demonstrated significant differences in AUDIT1-8 scores across the three measurement times, $F(2, 33) = 6.37, p = .005, \eta_p^2 = .28$. Post-hoc pairwise Bonferroni comparisons indicated that AUDIT scores were significantly lower at 1 month follow up than at baseline ($p = .040$), significantly lower at 3 month follow up than at 1 month follow up ($p = .014$), and significantly lower at 3 month follow up when compared to baseline ($p = .002$). A graph, highlighting changes in AUDIT1-8 scores across time for each group is presented in Figure 4.
Figure 4. Changes in mean AUDIT1-8 scores, according to experimental group, across baseline, 1-month and 3-month follow up.

5.3.53 Change in SOC Over Time.

To examine the effect of the intervention on readiness to change over time, Friedman’s test, a non-parametric analysis used with ordinal variables, was conducted with SOC at baseline, 1-month and 3-month follow up, for each of the groups. Data indicated no significant changes in SOC across the three time periods for the BASICS group, $X^2(2) = 0.200, p = .91$, the e-CHUG group, $X^2(2) = 1.182, p = .55$, or the control group, $X^2(2) = 1.366, p = .51$.

5.3.54 Between Group Differences in Total RAPI.

To assess the frequency of alcohol related problems over time, the RAPI was administered to participants in all groups. A series of one way analysis of variance (ANOVA)
were conducted to identify any significant differences in RAPI scores between the experimental groups, at baseline, 1-month follow up and 3-month follow up. The independent variable, experimental group, included three levels, BASICS, e-CHUG and control. The dependent variable was the overall RAPI score. Descriptive statistics for these analyses are presented in Table 26.

Table 26.

*Mean Total RAPI Scores by Group Across the Three Assessment Periods.*

<table>
<thead>
<tr>
<th>Group (n)</th>
<th>Baseline (SD)</th>
<th>1-month follow up (SD)</th>
<th>3-month follow up (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASICS (n=7)</td>
<td>12.97 (5.83)</td>
<td>6.11 (4.51)</td>
<td>7.40 (5.48)</td>
</tr>
<tr>
<td>e-CHUG (n=10)</td>
<td>15.80 (10.13)</td>
<td>6.92 (6.30)</td>
<td>10.42 (10.96)</td>
</tr>
<tr>
<td>Control (n=20)</td>
<td>12.25 (4.96)</td>
<td>5.30 (2.90)</td>
<td>5.94 (3.66)</td>
</tr>
</tbody>
</table>

Although participants in the e-CHUG group consistently reported higher mean RAPI scores when compared to other groups, analyses found no significant differences in total mean RAPI scores between the groups at baseline, $F(2, 34) = .908, p=.41, \eta^2_p = .05$, 1-month follow up, $F(2, 34) = .477, p=.63, \eta^2_p = .03$, or 3-month follow up, $F(2, 34) = 1.501, p=.24, \eta^2_p = .08$.

5.3.55 Relationship Between SOC and AUDIT Change Scores.

To examine whether baseline RTC was related to actual changes in drinking behaviour, a Pearson’s correlation coefficient was computed between baseline SOC and AUDIT change scores (3-month AUDIT score – baseline AUDIT score) for each group. Although the use of change scores has been criticised in the literature, many studies in the
alcohol treatment field have used this approach (e.g. Martens et al., 2007) and recent
research has suggested that simple gain scores are not inherently unreliable (Williams &
Zimmerman, 1996). Pearson’s correlation found no significant relationship between
baseline SOC and AUDIT change scores for the BASICS group, \( r(5) = .17, p = .72 \), the e-CHUG
group, \( r(8) = -.39, p = .27 \), or the Control group, \( r(18) = .24, p = .31 \).

5.3.56 Relationship Between Endorsement of Treatment Modality and AUDIT Change
Scores.

To examine whether preference for either online or face-to-face alcohol treatment
was related to actual changes in drinking behaviours for each group, a point biserial
correlation was computed between reported endorsement of online and face-to-face
treatment (“For the following services concerning alcohol, which do you think you would
use if you had a drinking problem: a) anonymous web-based alcohol risk assessment and
personalized feedback, b) alcohol risk assessment and advice from a nurse, counsellor, or
psychologist. Response: “Yes/No””) and AUDIT change scores (3-month AUDIT score –
baseline AUDIT score [Y-X]) for each group. No significant relationship between personal
endorsement of online treatment and treatment effect was found for the e-CHUG group,
\( r(8) = -.56, p = .095 \), or the control group, \( r(18) = -.16, p = .50 \). Correlational analyses were
not possible for the BASICS group as the endorsement variable was constant within this
group. Similarly, no significant relationship between personal endorsement of face-to-face
treatment and treatment effect was found for the BASICS group, \( r(5) = .69, p = .086 \), the e-
CHUG group, \( r(8) = -.46, p = .18 \), or the control group, \( r(18) = .20, p = .40 \).
5.3.6 Inferential Analyses - Intervention Groups Only.

As data pertaining to specific drinking behaviours was not collected for the control group, the following analyses relate only to the BASICS and e-CHUG groups.

5.3.6.1 Changes in Peak Alcohol Consumption Over Time.

To examine the effect of the respective interventions on high level drinking behaviours, a two-way (2x3) mixed analysis of variance was conducted on participant reports of the highest number of standard drinks consumed in one sitting over the previous month. The independent variables included one between groups variable, treatment group, with two levels (BASICS, e-CHUG) and one within subject variable, time, with three levels (baseline, 1-month follow up, 3-month follow up). Descriptive data for this analysis is presented in Table 27.

Table 27.

Highest Mean Number of Standard Drinks Consumed in One Sitting for BASICS and e-CHUG Groups Across the Three Assessment Periods.

<table>
<thead>
<tr>
<th>Assessment point</th>
<th>Group (n)</th>
<th>Baseline (SD)</th>
<th>1-month follow up (SD)</th>
<th>3-month follow up (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BASICS (n=7)</td>
<td>18.07 (7.24)</td>
<td>12.43 (5.59)</td>
<td>11.84 (6.56)</td>
</tr>
<tr>
<td></td>
<td>e-CHUG (n=10)</td>
<td>9.90 (4.28)</td>
<td>13.54 (11.48)</td>
<td>7.83 (3.60)</td>
</tr>
</tbody>
</table>

Mauchly’s test indicated that the assumption of sphericity had not been violated $\chi^2(2) = 4.42, p = .11$. Data indicated that there was no significant overall change in peak
consumption across time, $F (2, 30) = 1.86, p = .17, \eta^2_p = .11$. There was also no significant interaction effect for time and group, $F (2, 30) = 2.14, p = .14, \eta^2_p = .13$.

Univariate tests indicated that the BASICS group reported significantly higher levels of peak alcohol consumption than the e-CHUG group at baseline, $F (1, 15) = 8.61, p = .010, \eta^2_p = .37$. However, no significant difference between the groups was identified at 1-month follow up, $F (1, 15) = 0.56, p = .82, \eta^2_p < .01$, or 3-month follow up, $F (1, 15) = 2.65, p = .12, \eta^2_p = .15$.

The BASICS group demonstrated no overall significant differences in peak alcohol consumption across the three measurement times, $F (2, 14) = 2.83, p = .093, \eta^2_p = .29$. However, data demonstrated that alcohol consumption in the BASICS group was significantly lower at 3 month follow up than at baseline ($p = .026$). Conversely, no significant difference was found between consumption at baseline and 1 month follow up ($p = .19$), or 1 month follow up and 3 month follow up ($p = .87$).

The e-CHUG group did not demonstrate significant differences in peak consumption scores across the three measurement times, $F (2, 14) = 2.11, p = .16, \eta^2_p = .23$. No significant differences in consumption were demonstrated between baseline and 1-month ($p = .31$), baseline and 3-month ($p = .34$), or 1-month and 3-month ($p = .069$). A graph describing change in peak alcohol consumption over time for each group is presented in Figure 5.
5.3.62 Changes in Estimated Drinks per Week Over Time.

To examine the effect of the interventions on regular alcohol consumption, a two-way (2x3) mixed analysis of variance was conducted on participant estimations of weekly alcohol consumption (standard drinks). The independent variables included one between groups variable, treatment group, with two levels (BASICS, e-CHUG) and one within subject variable, time, with three levels (baseline, 1-month follow up, 3-month follow up). Descriptive data is presented in Table 28.
Table 28.

Means and Standard Deviations of Estimated Weekly Alcohol Consumption (in Standard Drinks) for the Two Experimental Groups Across Three Assessment Points.

<table>
<thead>
<tr>
<th>Group (n)</th>
<th>Assessment point</th>
<th>Baseline (SD)</th>
<th>1-month follow up (SD)</th>
<th>3-month follow up (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASICS (n=7)</td>
<td>Baseline</td>
<td>28.36 (12.51)</td>
<td>15.53 (7.61)</td>
<td>14.31 (5.33)</td>
</tr>
<tr>
<td>e-CHUG (n=10)</td>
<td>Baseline</td>
<td>17.00 (9.08)</td>
<td>13.66 (7.67)</td>
<td>13.35 (6.11)</td>
</tr>
</tbody>
</table>

Mauchly’s test indicated that the assumption of sphericity had not been violated \( \chi^2(2) = 2.57, p = .28 \). Data indicated that there was a significant overall change in average weekly consumption across time, \( F(2, 30) = 8.60, p = .001, \eta_p^2 = .36 \), however no significant interaction effect for time and group was found, \( F(2, 30) = 2.64, p = .088, \eta_p^2 = .15 \).

Univariate tests indicated that the BASICS group reported significantly higher average weekly alcohol consumption than the e-CHUG group at baseline, \( F(1, 15) = 4.74, p = .046, \eta_p^2 = .24 \); however, no significant difference between the groups was identified at 1-month follow up, \( F(1, 15) = 0.25, p = .63, \eta_p^2 = .02 \), or 3-month follow up, \( F(1, 15) = 0.28, p = .61, \eta_p^2 = .02 \).

The BASICS group demonstrated significant differences in average weekly alcohol consumption across the three measurement times, \( F(2, 14) = 7.43, p = .006, \eta_p^2 = .52 \). Data showed that estimated average weekly alcohol consumption in the BASICS group was significantly lower at 1 month follow up than at baseline \( (p = .001) \), and at 3 month follow up than at baseline \( (p = .006) \). No significant difference was found between weekly consumption at 1 month follow up and 3 month follow up \( (p = .72) \).
Conversely, the e-CHUG group did not demonstrate significant differences in average weekly consumption across the three measurement times, $F (2, 14) = 0.80, p = .47, \eta^2_p = .10$. No significant differences in consumption were demonstrated between baseline and 1-month ($p=.24$), baseline and 3-month ($p=.26$), or 1-month and 3-month ($p=.73$). Changes in weekly consumption for both groups are presented graphically in Figure 6.

Figure 6. Changes in mean standard drinks per week for e-CHUG and BASICS groups across baseline, 1-month and 3-month follow up.

5.3.63 Changes in Peak BAC Over Time.

To examine the effect of the interventions on estimated peak blood alcohol content (BAC), a two-way (2x3) mixed analysis of variance was conducted. The independent
variables included one between groups variable, treatment group, with two levels (BASICS, e-CHUG) and one within subject variable, time, with three levels (baseline, 1-month follow up, 3-month follow up). Descriptive data is presented in Table 29.

Table 29.

Means and Standard Deviations of Estimated Peak BAC for the Two Experimental Groups Across the Three Assessment Points.

<table>
<thead>
<tr>
<th>Group (n)</th>
<th>Baseline (SD)</th>
<th>1-month follow up (SD)</th>
<th>3-month follow up (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASICS (n=7)</td>
<td>0.227 (0.143)</td>
<td>0.181 (0.141)</td>
<td>0.176 (0.185)</td>
</tr>
<tr>
<td>e-CHUG (n=10)</td>
<td>0.106 (0.106)</td>
<td>0.171 (0.184)</td>
<td>0.078 (0.088)</td>
</tr>
</tbody>
</table>

Mauchly’s test indicated that the assumption of sphericity had been violated $\chi^2(2) = 6.74, p = .034$. In light of this finding, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon=.72$).

Data indicated that there was no significant overall change in peak BAC across time, $F(2, 30) = 1.06, p = .34, \eta_p^2 = .07$. Similarly, no significant interaction effect for time and group was found, $F(2, 30) = 1.32, p = .28, \eta_p^2 = .08$.

Univariate tests found no significant differences in peak BAC between the BASICS and e-CHUG groups at baseline, $F(1, 15) = 4.07, p = .062, \eta_p^2 = .21$, 1-month follow up, $F(1, 15) = 0.02, p = .90, \eta_p^2 < .01$, or 3-month follow up, $F(1, 15) = 2.16, p = .16, \eta_p^2 = .13$.

The BASICS group did not demonstrate significant differences in peak BAC across the three measurement times, $F(2, 14) = 0.93, p = .42, \eta_p^2 = .12$. Data showed no significant
differences in peak BAC between baseline and 1 month follow up ($p = .51$), baseline and 3 month follow up ($p = .18$), or 1 month follow up and 3 month follow up ($p = .92$). The e-CHUG group also did not evidence significant differences in peak BAC across the three measurement times, $F(2, 14) = 2.19, p = .15, \eta_p^2 = .24$. Data showed no significant differences in peak BAC between baseline and 1 month follow up ($p = .27$), baseline and 3 month follow up ($p = .37$), or 1 month follow up and 3 month follow up ($p = .07$). Changes in peak BAC across time for both groups are presented in Figure 7.

Figure 7. Changes in estimated peak BAC across time for both BASICS and e-CHUG groups.
5.3.64 Relationship Between SOC and Consumption Variable Change Scores.

To examine the relationship between baseline Readiness to Change and actual changes in drinking behaviours, a Pearson correlation coefficient was computed for baseline stage of change (SOC) and simple change scores (Y-X) for peak alcohol consumption, peak BAC and estimated number of drinks per week, for both BASICS and e-CHUG groups. Negative change scores denote reductions in outcome variables, whereas positive change scores reflect increases. Data indicated that, overall, there was a moderate strength, significant negative correlation between baseline SOC and peak alcohol consumption change scores, \( r(15) = -.74, p = .001 \), suggesting that higher SOC is related to greater reductions in peak alcohol consumption for all intervention groups over the three time periods. No significant relationships were found between SOC and changes in peak BAC, \( r(15) = -.41, p = .11 \), or between SOC and changes in estimated drinks per week, \( r(15) = -.12, p = .65 \).

Interestingly, when these relationships are examined by group, different patterns emerge. A strong, significant negative correlation between baseline SOC and peak alcohol consumption change scores was found for the e-CHUG group, \( r(8) = -.88, p = .001 \), however no significant relationship between these variable emerged for the BASICS group, \( r(5) = -.67, p = .12 \). These data suggest that higher SOC is related to greater reductions in peak alcohol consumption for members of the e-CHUG group, but not the BASICS group, over the three time periods. Again, however, no significant relationships were found between SOC and changes in peak BAC for e-CHUG, \( r(8) = -.46, p = .19 \), or BASICS, \( r(5) = -.34, p = .45 \), and between SOC and changes in estimated drinks per week for e-CHUG, \( r(8) = -.14, p = .70 \), or BASICS, \( r(5) = .001, p = .99 \).
5.3.65 Relationship Between Endorsement of Treatment Modality and Change Scores.

To examine whether preference for online or face-to-face alcohol treatment was related to actual changes in drinking behaviours for each group, a point biserial correlation was computed between reported endorsement of online and face-to-face treatment (“For the following services concerning alcohol, which do you think you would use if you had a drinking problem: a) anonymous web-based alcohol risk assessment and personalized feedback, b) alcohol risk assessment and advice from a nurse, counsellor, or psychologist. Response: “Yes/No””) and simple change scores (Y-X) for peak alcohol consumption, peak BAC and estimated number of drinks per week, for both BASICS and e-CHUG groups for each group.

No significant relationship between personal endorsement of face-to-face treatment was found for any of the studied outcome variables for the BASICS group. Table 30 presents the relevant data. Preference for online treatment was not examined as the variable was constant within the group and, as such, could not be examined with correlational analyses and is not reported in Table 30.
Table 30.

Summary of Intercorrelations Between Modality Preference and Alcohol Outcome Variable Change Scores for BASICS Participants.

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Would use face-to-face</td>
<td>-</td>
<td>.04</td>
<td>.38</td>
<td>.49</td>
</tr>
<tr>
<td>2. Peak drinks CS</td>
<td>-</td>
<td>.74</td>
<td>.61</td>
<td></td>
</tr>
<tr>
<td>3. Peak BAC CS</td>
<td>-</td>
<td></td>
<td>.43</td>
<td></td>
</tr>
<tr>
<td>4. Drinks per week CS</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. CS = change score.

As with the BASICS group, no significant relationship between personal endorsement of either online treatment or face-to-face treatment was found for any of the studied outcome variables for the e-CHUG group. Table 31. presents the relevant data.

Table 31.

Summary of Intercorrelations Between Modality Preferences (Online and Face-to-face) and Alcohol Outcome Variable Change Scores for e-CHUG Participants.

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Would use online</td>
<td>-</td>
<td>-.41</td>
<td>-.54</td>
<td>-.56</td>
<td>.20</td>
</tr>
<tr>
<td>2. Would use face-to-face</td>
<td>-</td>
<td></td>
<td>.50</td>
<td>.05</td>
<td>.42</td>
</tr>
<tr>
<td>3. Peak drinks CS</td>
<td>-</td>
<td></td>
<td></td>
<td>.58</td>
<td>.32</td>
</tr>
<tr>
<td>4. BAC CS</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>.39</td>
</tr>
<tr>
<td>5. Drinks per week CS</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. CS = change score.
5.4 Discussion

In Study Two, an RCT examining the effect of a brief face-to-face intervention (BASICS), a brief online intervention (e-CHUG) and a wait-list control condition on a range of alcohol-related outcome measures was conducted. Based on previous research, two overarching hypotheses were made: it was hypothesised that, firstly, participants in both intervention conditions, BASICS and e-CHUG, would demonstrate significant improvements in alcohol outcome measures when compared to controls, and, further, the BASICS group would demonstrate significant improvements in relevant alcohol measures when compared to the e-CHUG group. Data revealed mixed support for the predictions. Specific hypotheses will be addressed individually in the following section.

It must be acknowledged from the outset that, as described, high levels of unequal, post-randomisation attrition occurred, resulting in small sample sizes. The resulting sample sizes severely limit the scope and validity of the inferential analyses discussed in the following sections. Due to this issue, all conclusions drawn are tentative, and should be considered in light of the sample sizes reported. Limitations of the research are presented in full in Section 5.4.10.

5.4.1 Change in Total AUDIT Over Time.

The hypotheses that participants in both experimental conditions, e-CHUG and BASICS, would demonstrate significant reductions in risky drinking behaviours as measured by the AUDIT, from baseline to post-intervention, and that participants in the BASICS group would demonstrate the greatest reductions in risky drinking behaviours, were not supported by the data. The differential pattern of change in AUDIT scores from baseline to 3 month follow up across the 3 groups was unexpected. The only group to demonstrate
significant reductions in AUDIT scores was the control group. Although the BASICS group did demonstrate a reduction in AUDIT scores across the three time periods the change was not significant. Conversely, the e-CHUG group actually demonstrated an increase in AUDIT scores from baseline to 3 month follow up. This finding is somewhat confusing and raises several very important questions. First, why did the control group demonstrate significant reductions in AUDIT scores in the absence of intervention? And, second, why were the interventions not effective in reducing AUDIT scores? As both the BASICS and e-CHUG groups failed to demonstrate significant changes in a number of major alcohol related outcomes across the intervention-follow up period, possible explanations for these unexpected results will be dealt with in a single section later in the discussion. In the current section, possible reasons for the significant improvement of the control group will be examined.

5.4.11 Explanation of Control Group Results.

Intervention data from Study Two revealed a number of perplexing results, most strikingly, the large and statistically significant reductions in total AUDIT scores demonstrated by the control group. Mean AUDIT scores dropped almost three full points across the course of the intervention-follow up period, and at three month follow up the groups mean total AUDIT score was almost below the AUDIT ‘risky’ drinking cut-off point of 8. While the data reported here is certainly anomalous, and it would be tempting to dismiss it as such, the findings require examination. Why did the control group demonstrate change when they did not receive any intervention? This phenomenon, wherein control group participants evidence unexpected reductions in self-reported drinking measures in the absence of treatment, is surprisingly common in the alcohol treatment literature, with a
large number of studies reporting this outcome (McCambridge & Day, 2007). For example, recent large scale Australian research by Kypri and colleagues (2009), found that the proportion of university ‘binge drinkers’ (defined as more than 4 standard drinks per session for women, 6 for men) in the assessment only control condition dropped from 100% to 58.6% at 1 month follow up. The frequency of such findings has lead to the publication of at least one systematic literature review dedicated solely to this issue (see Jenkins, McAlaney & McCambridge, 2009). Unfortunately, however, the literature has not as yet provided a satisfactory explanation for this phenomenon. A meta-regression study of changes in alcohol consumption over time for control groups in brief interventions, utilising 26 quantitative studies, did not identify any variables that were strongly predictive of change; none of the 16 candidate variables used in the regression analyses, including control group procedure, duration of the study, participant gender and exclusion of dependent drinkers, adequately predicted control group change (Jenkins, McAlaney & McCambridge, 2009). The complexity of this phenomenon therefore is clear and explaining it presents a significant challenge to researchers in this area. Tentative explanations for change in the drinking behaviours of the current study’s control group will be considered below.

It is tempting to explain the observed reductions in the control groups mean total AUDIT in the context of natural maturation; the process whereby drinking is reduced, without intervention, due to increased demands and responsibilities. However, this hypothesis is unlikely. Natural maturation occurs over the course of years, rather than months, and would be assumed to affect all groups equally, rather than have a discrete impact on the control group only. As such, this explanation seems implausible.
The concept of social desirability bias may better explain the control group findings. Social desirability bias refers to the tendency of survey respondents to respond in a manner that minimises perceived negative traits and behaviours and overstates perceived desirable traits and behaviours (Fox & Schwartz, 2002). Research has demonstrated that social desirability bias is a significant threat to the validity of research data, particularly in drug and alcohol studies, where individuals may be unwilling to accurately report the nature and extent of substance use in order to protect themselves from potential negative reactions from others and to present a socially acceptable image of their own behaviour (Harrel, 1997). Indeed, recent research by Davis, Thake and Vilhena (2010) demonstrated significant associations between impression management bias and alcohol consumption; data taken from self-report measures indicated that individuals classified as “high” impression managers consistently reported 20-33% less consumption and were 50% less likely to report high risk drinking behaviours than other participants (p.302). A significant negative correlation was demonstrated between impression management tendency and AUDIT scores.

In attempting to explain the results of the current study, it is possible that the control group may have comprised of a higher proportion of ‘impression managers’ compared to the intervention groups. If this assumption is accurate, control group participants may have been more prone to report reductions in their problematic drinking behaviours in an attempt to portray themselves as more acceptable or desirable to the researchers. Unfortunately, the current research did not employ the use of a social desirability scale and as such any discussions with regard to the effects of social desirability
bias on outcome data are tentative. Future research might include social desirability scales as a matter of course.

In this study, computer-based, anonymous self-reports were used to limit the influence of social desirability bias on data. While some commentators have suggested that the use of online or computer-administered self-report measures tends to decrease the influence of social desirability bias when addressing delicate topics, the literature indicates that these findings are inconsistent and the use of these technologies does not completely adjust for this bias (Davis, Thake & Vilhena, 2010; Fox & Schwartz, 2002). Indeed, in research by Davis et al. (2010), even in an online, anonymous reporting environment, individuals with an impression management bias underreported alcohol consumption. Again, unfortunately, the desirability-based explanation of these results is hypothesised only, as social desirability was not assessed in the current study.

Another possible explanation for the observed change in AUDIT scores for the control group relates to perceived expectations of change. Due to the lack of contact with researchers or the clear description of what was expected from participants in a control group, there may have been some confusion amongst these participants as to what they were expected to do, or how they were expected to change. Indeed, the introductory page of the follow-up questionnaires includes the sentence, “The current survey will only take a few minutes to complete and will provide us with data about how drinking behaviours change over time”, thus implicitly suggesting that drinking behaviour is expected to change over time. The regular follow-up assessments may have highlighted to these participants that their drinking had in fact not changed, even though at baseline they were drinking at high enough levels to be involved in an alcohol intervention study; this awareness may have
lead them to underreport alcohol consumption on the AUDIT in an attempt to demonstrate changes in their drinking behaviour.

Differential attrition may also provide a plausible explanation for the observed control group data. The control group evidenced lower rates of attrition, compared to both experimental conditions. Differential attrition is a significant threat to the internal and external validity of experimental studies; it is possible that the nature of the observed attrition was related to the intervention itself, and that there were systematic similarities in the characteristics of those who withdrew from the study (Miller & Hollist, 2007). This factor may have directly impacted on the control group outcomes.

The instability of mean estimates in small sample sizes is well documented in the literature, and may have also played a role in the unexpected control group outcomes. Outliers skew mean estimates, and this effect is more pronounced in small samples (Mei, 2005). It is possible, therefore, that extreme outliers in AUDIT scores in the control group skewed the mean estimates for the group, leading to the unexpected outcomes reported herein.

Other possible explanations for the observed reduction in AUDIT scores for the control group include regression to the mean and natural variability in drinking behaviours over time (e.g. Jenkins, McAlaney & McCambridge, 2009), compensatory rivalry (e.g. Thomsen et al., 2010), assessment reactivity (e.g. Kypri et al., 2007) and the Hawthorne effect (e.g. McCambridge & Day, 2007). Although many of the aforementioned hypotheses may potentially explain the demonstrated reductions in AUDIT scores by the control group, none are comprehensive or fully satisfying. This leaves us in a difficult position; at best, we can suppose that this pattern of change is an anomaly, caused partially or fully by factors
described above, however at worst, we can suggest that the interventions themselves have disrupted a natural pattern of change in this cohort and are therefore harmful. The latter explanation too seems unlikely as the interventions have shown to be efficacious in a range of other studies. Most likely the observed change in control group mean AUDIT scores is a function of the combined influence of the aforementioned factors, such as social desirability bias, unstable mean estimates and assessment reactivity, however, as stated, any conclusive explanatory statements are impossible due to measurement limitations.

5.4.12 Explanation of Treatment Group Results – Measurement Issues.

While the unexpected reduction in AUDIT scores demonstrated by the control group is difficult to adequately explain, the inefficacy of the treatment conditions in generating change in AUDIT scores is equally challenging. In the current section, measurement, participant and analysis issues are explored in an attempt to better understand the limited impact of the interventions on AUDIT scores.

In attempting to explain the apparent inefficacy of the interventions to generate significant reductions in overall AUDIT scores, it is important to examine the AUDIT itself. It must be highlighted, firstly, that the AUDIT is designed as a screening tool, rather than a comprehensive assessment of consumption and alcohol related problems. It could be argued, therefore, that actual changes in drinking behaviours exhibited by the treatment groups were not captured due the lack of sensitivity of the instrument. While this is possible, it seems unlikely; although the AUDIT may lack the precision to identify small changes in alcohol behaviours, it has demonstrated ability across hundreds of studies to quantify broader shifts in drinking behaviours, and is used frequently as an outcome measure in alcohol intervention research (Conley & O’Hare, 2006). This hypothesis is
challenged further when we examine the results from the modified AUDIT (questions 1-8 only); even when the final two questions that examine lifetime consequences of alcohol use are removed from the analysis, the broader pattern of change remains the same. The significant improvement in AUDIT scores over time demonstrated by the control group remains, as does the non-significant improvement of the BASICS group and the apparent deterioration of the e-CHUG group.

The timing of the follow up assessments may have played a part in the unexpected results. The one month follow-up procedure was commenced during the period immediately prior to the start of the 2010 Semester 1 exam period and three month follow up procedure was commenced at the end of the same exam period. Research has demonstrated that drinking behaviours amongst tertiary students often vary week to week, according to academic demands and responsibilities, and increased consumption during university holidays is common (Greenbaum, Del Boca, Darkes, Wang, & Goldman, 2005; Patrick & Maggs, 2007). The spike in AUDIT scores seen at 3-month follow up for both e-CHUG and BASICS groups may have been a function of increased consumption and related consequences during the semester break; a time that has been associated with higher levels of drinking in this population. Indeed, many researchers actively avoid conducting alcohol assessments during these times. For example, Weschler and colleagues (2002) planned their alcohol assessment periods to avoid times leading up to and immediately following semester breaks, in an attempt to capture ‘normal’ drinking behaviours, and avoid the potential confounding influence of holiday consumption patterns.

While on the surface this explanation may seem to account for the relatively poor performance of the interventions, it cannot adequately explain the changes in AUDIT scores
across time for the control group, who demonstrated approximately equal reductions in AUDIT scores from baseline to one month, and one month to three month. If university holidays were associated with increased levels of alcohol consumption amongst this population, we would expect to see this influence AUDIT scores across all groups, not just the e-CHUG and BASICS conditions.

5.4.13 Explanation of Treatment Group Results – Participant Issues.

A range of participant factors may have contributed to the relatively poor response to the interventions, as measured by the AUDIT. For example factors such as readiness to change, engagement in social comparison, frequency of negative consequences, self-regulation, alcohol expectancies, discrepancy between a current behaviour and a behaviour standard, and the use of protective behavioural strategies, to name just a few, have all been shown in the literature to mediate or predict individual responses to alcohol interventions (Carey, Henson, Carey, & Maisto, 2007; Barnett et al., 2007; Collins, Carey, & Sliwinski, 2006; Neighbors, Larimer, & Lewis, 2004; Neal & Carey, 2004; Walter, Vader & Harris, 2007; Wood, 2007). Unfortunately, due to the structure and focus of the current study, none of these variables, aside from readiness to change (which will be discussed later), were examined in this research, so hypotheses regarding their relative influence on outcomes cannot be tested.

The influence of social desirability bias has been demonstrated to influence the accuracy of self-report alcohol measures (as discussed previously). Social desirability bias is particularly applicable to heavy drinkers. If, in the current study, heavy drinkers have underreported their level of consumption, there is a possibility that they have been identified (incorrectly) as being eligible for the intervention component and been included
in this phase of the research. While this may appear to be a benign statement, both BASICS and e-CHUG are explicitly designed for moderat consumers; there is a possibility, then, that the unexpected outcome data may reflect a more problematic pattern of consumption and need for a more comprehensive style of intervention, rather than some deficit in the assessed intervention programs themselves.

5.4.14 Explanation of Treatment Group Results – Analysis Issues.

The total sample size in the current study was only 37. The small sample will have undoubtedly resulted in low power thus limiting the capacity of the analyses to identify significant changes in AUDIT scores across time. This observation is particularly applicable to the BASICS group who demonstrated reductions in AUDIT scores across time, but the trend was not statistically significant. With a larger sample size it may be hypothesised that this change would have been significant. However, even with improved power, the e-CHUG group would still have demonstrated increases in AUDIT scores.

Again, as with the proposed explanations for the control group reduction in the AUDIT, the hypotheses presented here, in an attempt to explain the ineffectiveness of the interventions in producing significant change in AUDIT scores, are not fully satisfactory. While each explanation may in part give reasons for the observed findings, none fully accounts for the lack of change.

5.4.2 Change in SOC Over Time.

The hypothesis that participants in both experimental conditions, e-CHUG and BASICS, would significantly increase their readiness to change, as measured by the RTCQ, from baseline to post-intervention, when compared to controls was not supported by the data. As both e-CHUG and BASICS utilise motivational components, such as normative
feedback, it was anticipated that motivation to change would be increased over the course of the intervention-follow up period. Indeed, many studies have demonstrated the effectiveness of both brief face-to-face and online interventions in increasing readiness to change (e.g. Amaro et al., 2010; Murphy et al., 2010; Saitz et al., 2007). Analysis indicated that there was no significant change in SOC for any group across the three time periods.

Although the impact of an e-CHUG intervention on readiness to change has not been examined in the literature, the observed stability of motivation to change over the course of the intervention-follow up period is perhaps understandable. Although the intervention is based on motivational interviewing principles, the limitations of the online modality present a significant barrier to the effective implementation of MI techniques. Miller and Rose (2009) propose that the efficacy of MI interventions are dependent on both technical factors, such as the elicitation of change talk, and relational factors, such as the therapeutic relationship and the provision of empathic understanding. A large body of evidence supports the link between MI and change talk (e.g., Moyers & Martin, 2006), change talk and behaviour change (e.g. Strang & McCambridge, 2004), and therapist empathy and behaviour change (e.g. Gaume et al., 2008). In e-CHUG however, the elicitation of change talk is not a focus, nor can it be measured or manipulated. Similarly, the therapeutic relationship is non-existent, due to the nature of the intervention. With these observations in mind, it is perhaps unsurprising that the intervention did not significantly influence motivation.

In motivational interviewing, change talk is encouraged through the use of particular techniques and strategies, such as decisional balance exercises, personalised feedback and normative comparisons and risk analysis. Although e-CHUG utilises feedback and
comparison of individual drinking behaviours to norms, it appears that, at least in this study, the intervention is ineffective in influencing motivation to change. The finding suggests that, in line with previous research, both the therapeutic relationship and the act of verbalising intention to change are integral aspects of increasing motivation and subsequent behaviour change. As e-CHUG does not allow for the facilitation and active reinforcement of change talk, it potentially limits its efficacy; as stated by Miller and Rose (2009) “As commitment language emerges, behaviour change is more likely to occur” (p.7). In contrast however, a small body of research has demonstrated the effectiveness of computerised and post-mailed feedback interventions in changing harmful drinking behaviour (see Larimer & Cronce, 2002; Raskin-White, 2006); obviously these interventions were not administered by clinicians nor did they monitor change talk, however they did result in change.

While the lack of intervention effect on motivation to change may be expected in a computerised intervention, the stability of motivation to change in the BASICS group is more perplexing. Motivational interviewing is at the core of the BASICS intervention; the clinician actively adapts their clinical style, and in-session techniques are used or discarded, or emphasised or de-emphasised, according to the motivational stage of the client (Dimeff, Baer, Kivlahan, & Marlatt, 1999). All steps are taken to reduce resistance and resolve ambivalence, in order to increase the client’s motivation to change current harmful drinking behaviours. Indeed, a large body of research exists that demonstrates the effectiveness of the BASICS intervention in increasing readiness to change (Amaro et al., 2010). With this in mind, it is difficult to explain the lack of significant change in readiness to change over time, as seen in the current research. It is possible that therapist based factors, such as improper use of MI techniques or limited rapport, reduced the efficacy of the BASICS intervention in
influencing motivation to change. Although this suggestion is unlikely (the clinician was experienced in the administration of the BASICS, has received training in MI, and has worked extensively in the drug and alcohol treatment field), no treatment integrity measures were used in the current research and, as such, therapist based factors cannot be assessed.

Another possibility relates to the measurement of motivation. As commentators such as Murphy and colleagues (2010) have identified, motivational interventions may increase motivation immediately following the treatment, which in turn leads to reductions and stabilisation of drinking behaviours. After drinking is stabilised, motivation to change may return to baseline levels, or lower, as the negative consequences associated with previous high levels of consumption have been eliminated. In this scenario, data may incorrectly suggest that the intervention either had no effect on motivation or actually served to reduce it. Indeed, this theory may account for the data relating to the BASICS group; it is possible that immediately post-intervention, motivation to change increased leading to changes in drinking behaviour; however once drinking behaviour had actually been changed (see BASICS outcome variable changes below), participants’ comfort with the amended drinking behaviours was established and, as such motivation to change was reduced.

Interestingly, even the control group, which demonstrated the only significant, and largest, change in AUDIT scores across time, did not report any significant changes in readiness to change. If we accept that the reported changes in AUDIT scores for this group reflect actual changes in drinking behaviour, the stability of readiness to change scores challenges a basic tenet of the TTM: that motivation to change is a necessary precursor and
determinant of actual behaviour change. While this position is broadly supported in the literature, the available evidence is mixed; motivation to change does not always predict behaviour change, nor is it an essential precursor to behaviour change. For example, Murphy and colleagues (2010), in a two part study, found that motivation to change predicted actual changes in drinking behaviour amongst university students in Study One, but not in Study Two. Similarly, in Schaus et al (2009) no improvements in readiness to change were found over the one year follow up period; however participants in the brief motivational intervention group demonstrated actual changes in alcohol use and alcohol related consequences across the same time period. With these observations in mind, we cannot simply dismiss the impact of the current interventions; the treatments may have not significantly improved motivation to change, but this does not preclude them from changing actual drinking behaviours. As stated by Murphy (2010) “BMIs may generate the theoretically predicted immediate response (increase in RTC) but that outcome may or may not translate into subsequent behaviour change, and changes in drinking may occur in the absence of changes in motivation” (p.638).

In any case, the lack of change exhibited by all three groups is most likely a function of the limited power of the current study. With such small sample sizes, inferential analyses are limited in their ability to identify treatment effects. This factor will obviously apply to all analyses presented herein.

5.4.3 Between Group Differences in Total RAPI.

The prediction that participants in the BASICS group would demonstrate significantly greater reductions in alcohol related consequences at 1-month and 3-month follow up, as assessed by the RAPI, when compared to e-CHUG and control groups was not supported by
the data. No significant between group differences in overall RAPI scores were identified at any of the assessment points.

This hypothesis was based on research indicating that alcohol related problems are positively associated with consumption; that is, the higher the consumption, the higher the frequency of alcohol related problems (e.g. Ham & Hope, 2003). In this context, it was predicted that, as the interventions reduced the frequency and quantity of alcohol consumed, the frequency of experienced negative alcohol related consequences would also decrease. However, as reported, the interventions applied in this study were associated with only either moderate, non-significant reductions in risky alcohol use (BASICS), or actually increased risky alcohol use (e-CHUG), over the assessment period. In fact, it was only the control group, who received no intervention at all, that reduced AUDIT scores over time. Therefore, if any significant differences in alcohol related consequences were to be observed, it would make sense that these would show significantly lower RAPI scores in the control group when compared to intervention groups. This outcome did not eventuate. It is possible, in light of the observed reduction in AUDIT scores without an associated reduction in consequences, that either the control group fabricated AUDIT responses (in line with social desirability bias explanations offered previously), or that high consumption does not equal frequency or severity of problems, or, alternatively, that reductions in drinking do not actually reduce consequences.

Interestingly, many studies have reported that, in spite of overall reductions in actual consumption, negative alcohol related consequences often remain unchanged (Borsari & Carey, 2000; Murphy et al., 2004). Indeed, level of alcohol use is not the only factor that influences alcohol related harms; research has demonstrated that individual characteristics,
such as sensation seeking, also impact on the likelihood of experiencing negative consequences, and such factors would obviously not respond to strictly alcohol targeted interventions (Murphy et al., 2004). With this in mind, the reported stability of RAPI scores may in fact reflect the influence of personality or other factors on negative consequences, as opposed to alcohol use.

Alternatively, this may reflect a measurement issue, rather than a theoretical or clinical problem. Devos-Comby and Lange (2008) highlight that although the RAPI is one of the most frequently utilised instruments with university populations, the measure was initially developed for use with adolescents. As such, the RAPI does not assess alcohol related consequences that are particularly relevant to this cohort, such as drink driving and unplanned sexual activity. This measurement deficit may have lead to a lack of sensitivity in assessing problematic drinking and capturing change over time. In spite of this criticism, the RAPI is commonly used in assessing changes in alcohol related consequences amongst university and college populations, which informed our decision to include this measure in the current study.

In any case, the analysis of RAPI scores was problematic. The structure of the current study disallowed an analysis of within group change over time. If an extended follow-up period had been possible, or if the initial retrospective assessment period was reduced (e.g. 1 month vs. 6 months), plotting shifts in RAPI scores would have been possible, allowing a direct examination of the impact of the interventions on alcohol related consequences. This should be noted for future studies.
5.4.4 Relationship Between SOC and AUDIT Change Scores.

The hypothesis that there would be a significant positive relationship between baseline RTC and actual changes in drinking behaviours, as measured by change scores on the AUDIT for both BASICS and e-CHUG groups was not supported by the analysis. Correlational analyses found no significant relationship between RTC and AUDIT change scores for any of the groups. Again, the outcome of this analysis may be considered likely in the context of the relatively poor performance of the interventions in achieving improvements in total AUDIT scores across time. Earlier discussions provide potential explanations for the observed inefficacy of the interventions in achieving predicted improvements in these variables.

5.4.5 Relationship Between Endorsement of Treatment Modality and AUDIT Change Scores.

It was hypothesised that the data would illustrate a significant positive relationship between preference for online treatment and AUDIT change scores for the e-CHUG group, and preference for face-to-face treatment and change scores for the BASICS group. Data indicated no significant relationships between the variables. Given the non-significant reductions in total AUDIT scores across the intervention-follow up period for both experimental groups this finding is easily explained: without demonstrating significant change in AUDIT scores across time, the likelihood of identifying a relationship between the target variables is low.

Although the limited change in total AUDIT scores across time impacted on the ability of the current study to fully explore this issue, the nature of the influence of treatment preference on treatment outcomes is an issue worth discussing. Many governing
psychological bodies, such as the Australian Psychological Society (APS) and the American Psychological Association (APA), have made best-practice policy statements highlighting the importance of client preference in selecting treatments, an ideal that is reinforced by the ethical responsibility of disclosing the nature of the proposed treatment in obtaining informed consent from a client. This emphasis on the choice of the clients implicitly suggests that treatment preference influences the efficacy of treatment itself. The research however is mixed. Early reviews, such as Glass et al. (2001) and King et al. (2005), found only small and limited effects of preference on therapy outcomes, indicating that this variable was largely unimportant in generating expected outcomes for clients. Other researchers (e.g. Swift & Callahan, 2009), however, have criticised these studies on the basis of methodological shortcomings, such as the inclusion of studies not using actual treatments (e.g. Glass et al., 2001) and the utilisation of partially randomised preference trials only (e.g. King et al. 2005). Swift and Callahan (2009) in the most recent and methodologically sound meta-analytic review of the impact of client preferences on treatment outcomes found differing results. The researchers, using data from 26 studies involving 2356 participants, compared differences in intervention outcomes between study participants allocated to a preferred treatment conditions to participants that had been allocated to a non-preferred treatment conditions. Data indicated that individuals allocated to preferred treatments were 58% more likely to demonstrate a greater treatment effect, and approximately half as likely to drop out of treatment, than those allocated to non-preferred treatment conditions (Swift & Callahan, 2009). It must be noted, however, that the analysis demonstrated only a small effect size supporting the influence of preference on outcome.
Although the results of Swift and Callahan (2009) suggest a relatively important role for preferences in treatment outcomes in general, limited research has been conducted specifically on treatments for problematic alcohol use. A thorough literature review found only two studies examining the impact of treatment preference in alcohol treatments. Adamson, Selman and Gore (2005) examined the effect of treatment preference on treatment outcomes and process variables, amongst a group of 122 participants presenting with mild to moderate alcohol dependence. Analysis found no significant differences between participants allocated to their preferred treatment and those allocated to non-preferred treatments on treatment outcomes or process variables, such as perceived effectiveness, satisfaction, rapport, engagement and number of attended sessions. Similar results have been found by McKay and colleagues (1995), who demonstrated that treatment outcomes did not differ between those that self selected treatments and those that were randomly assigned to a treatment condition, in a sample of alcohol dependent participants. Interestingly, as reported, both of these studies found no effect for treatment preference on intervention outcomes in alcohol treatments, a finding that is in stark contrast to the conclusions of Swift and Callahan (2009). Although these studies differed from the current research in that they examined alcohol dependent individuals and did not use a university sample, they present an interesting opposing stance to the proposition that, in the field of alcohol intervention, treatment preference influences treatment outcomes. The findings of the current study are limited, as discussed previously, however future research in this area should further explore the relationship between treatment preference and outcome in alcohol treatments, to establish whether the apparent relationship between these variables demonstrated in other fields applies equally to alcohol intervention. This
issue has significant implications regarding RCT research, treatment selection and the role of the client in selecting treatment approaches.

**5.4.6 Intervention Groups Only.**

In the current section, each hypothesis relating to alcohol outcomes variables for the intervention groups only will be addressed. As highlighted in the results section, the e-CHUG group did not evidence statistically significant change in any of the alcohol outcome variables. Therefore, in order to minimise repetition, proposed explanations for the apparent inefficacy of e-CHUG will be discussed at the end of the section, rather than under each hypothesis.

**5.4.6.1 Changes in Peak Alcohol Consumption Over Time.**

It was hypothesised that both BASICS and e-CHUG would demonstrate significant reductions in peak consumption levels between baseline and follow up, and that BASICS would demonstrate greater reductions in peak consumption levels compared to e-CHUG. Data analysis provided mixed support for these predictions. Although no overall differences in peak alcohol consumption across the three measurement times was found for the BASICS group, peak alcohol consumption was significantly lower at 3-month follow up than at baseline. The change was considerable with participants in this group reducing their mean peak consumption by over 6 standard drinks per session between baseline and 3-month follow up. Conversely, the e-CHUG group evidenced no overall differences in peak alcohol assumption across the three periods and no significant differences in peak alcohol consumption between baseline and 3-month follow up. While the e-CHUG group did reduce their mean peak consumption by just over 2 drinks per session between baseline and 3-month follow up, this trend was not significant; interestingly this group actually increased
their peak consumption by approximately 3.5 standard drinks from baseline to 1-month follow up. The apparent superiority of BASICS over e-CHUG in reducing peak consumption supports data from the only comparative study between the two treatments (Murphy et al., 2010), which also found BASICS to be more efficacious in reducing peak consumption than e-CHUG.

The findings relating the BASICS group support a large body of literature indicating the effectiveness of the intervention in reducing peak consumption. For example, using a sample of 363 high risk college students, Schaus and colleagues (2009) demonstrated a significant reduction in peak number of drinks per sitting at a 6-month follow up (~1.5 standard drinks), when compared to controls, using an adaptation of the BASICS program. Similarly, Martens and colleagues (2007) found participants that underwent BASICS intervention demonstrated significant reductions in peak consumption at a 6-week follow up (~1.5 standard drinks).

This is the first study known to the author that has assessed the efficacy of the BASICS program within an Australian university population. The positive results reported for this intervention, therefore, bear particular significance for Australian universities. Interestingly, it appears that the reductions in peak consumption demonstrated by the BASICS group in the current study are greater than those reported elsewhere in the literature. Although it is acknowledged that the sample size used in this study is small, and direct comparison with other studies should be conducted with caution, the outcome is promising, and provides a starting point for future Australian research, highlighting the potential utility of this intervention for Australian university populations.
Despite the reduction in peak alcohol consumption demonstrated by the BASICS groups being significant, the post intervention mean for the BASICS group was still higher than the NHMRC guidelines for high risk short term consumption (11+ for males, 7+ for females), which suggests that this group, even after a 33% reduction in peak episodic consumption rates from baseline to 3-month post intervention, were still consuming at levels that placed them at a high risk for short term harm such as injury and assault (NHMRC, 2001). However, within the harm minimisation approach to alcohol intervention, which considers any reduction in harmful alcohol use beneficial, the BASICS intervention reported in the current study should be considered successful. The risk of short term harm from alcohol grows exponentially as more drinks are consumed, so any reduction is a protective factor for this group.

Although the e-CHUG group demonstrated a reduction in peak consumption across the three assessment periods, this moderation in alcohol consumption was not found to be significant. The reduction was sufficient however to bring peak consumption rates nearer to NHMRC guidelines for risky episodic drinking behaviours (11+ for males, 7+ for females). The general pattern of reduction supports a number of other research studies in the area; for example, Walters, Vader and Harris (2007) found that participants in the e-CHUG intervention evidenced significant reductions in peak BAC (which is reflective of peak consumption), between baseline and 8 weeks follow up, compared to controls. It must be acknowledged however, that the actual reduction in peak consumption demonstrated in this study was relatively small and the reduction itself was not statistically significant. Indeed the research on the efficacy of e-CHUG in reducing peak consumption rates is mixed. As highlighted, some studies have found significant reductions in peak consumption, others
have found no change, and in some instances, some studies have reported increases in consumption following the intervention. For example, Doumas and colleagues (2011), found that mandated university students allocated to an e-CHUG intervention demonstrated no change in peak consumption rates at follow up (mean follow up = 8 months), while Hustad and colleagues (2010) found that peak consumption increased in a sample of incoming first-year college students after the e-CHUG intervention.

This picture is further complicated by the pattern of change in the e-CHUG group over the three assessment periods; peak consumption increased from baseline to 1-month, then dropped to below baseline levels at 3-month follow up. At the 1-month spike, mean consumption rates increased by 3.5 standard drinks per session from baseline. Again, this is difficult to explain with the limited data available. It is possible that this is simply a natural fluctuation in drinking behaviours, driven by specific and, importantly, unassessed environmental and social factors. In any case, the noted fluctuations in peak consumption, and more specifically the increase in peak consumption at 1 month follow up, suggest that the e-CHUG intervention was largely ineffective in moderating episodic consumption patterns for this group.

5.4.62 Changes in Estimated Drinks per Week Over Time.

The predictions that both BASICS and e-CHUG would demonstrate significant reductions in estimated weekly consumption between baseline and follow up and that BASICS would demonstrate greater reductions in estimated weekly consumption when compared to e-CHUG received mixed support. Data indicated that participants in the BASICS condition evidenced significant overall reductions in weekly alcohol consumption across the three time periods, with a significant difference between weekly consumption at baseline
and at 3-month follow up. Descriptive statistics showed a mean reduction of over 14 standard drinks per week, equating to more than a 50% reduction in mean weekly consumption from baseline to 3 month follow up. Conversely, data indicated that no significant reduction in weekly alcohol consumption across the 3 time periods was found for the e-CHUG group. Despite reducing weekly consumption by approximately 3.5 standard drinks from baseline to 3 month follow up, no significant difference in weekly consumption was found for the e-CHUG group.

The reductions evidenced by the BASICS group lend preliminary support for the efficacy of the treatment with this population, and are in line with a large body of evidence that demonstrates significant reductions in weekly consumption amongst tertiary students receiving the intervention. A large range of experimental and quasi-experimental studies have found BASICS to be an effective intervention in reducing weekly consumption across extended follow up periods (Amaro et al., 2010; Borsari & Carey, 2000; Larimer et al., 2007; Martens et al., 2007; Murphy et al., 2004; Schaus et al., 2009). Importantly, at 3 month follow up, the mean weekly consumption for the BASICS group was brought to within the ‘low risk’ category of NHMRC guidelines for long term risk associated with alcohol use (M≤28 / F≤14 standard drinks per week), indicating that the reduction has important implications for the health of the participants. Average weekly consumption, however, can be a deceptive outcome measure. For example, two individuals may report the same average weekly consumption, 21 drinks per week, but be drinking in different and, variably harmful, patterns, e.g. 3 drinks every night of the week, or 21 drinks in one night. In light of this observation, statements about the impact of the BASICS intervention and harm reduction need to be tentative. However, when we examine the BASICS data relating to
changes in weekly consumption in the context of the changes in peak consumption, we can more confidently assume that overall consumption (that is, both peak and regular) was reduced as a function of the intervention. The group demonstrated significant reductions in both peak and weekly consumption suggesting that overall consumption had been reduced, rather than participants simply minimising regular alcohol intake and increasing episodic intake.

In contrast to the BASICS group, participants in the e-CHUG group did not significantly reduce their weekly consumption. Although a reduction was observed, the difference of, on average, 3.5 standard drinks between baseline and 3 month follow up was not statistically significant. This adds to the already inconsistent literature, with regard to the efficacy of e-CHUG; as discussed previously, the research shows large variability in the impact of e-CHUG in influencing alcohol outcome variables. This pattern of variability is clear with regard to weekly consumption. For example, Walters, Vader and Harris (2007) demonstrated significant reductions in weekly consumption amongst an e-CHUG treatment group by ~5.5 drinks at 8 week follow up. Similarly, in a group of first year college students, Hustad and colleagues (2010) demonstrated a ~1 drink per week reduction in weekly consumption amongst participants receiving the e-CHUG intervention, however this reduction was non-significant. Conversely, Doumas and colleagues (2011) found that, amongst participants receiving the e-CHUG treatment, weekly consumption actually increased by ~2 drinks per week. Again, as with data pertaining to peak consumption, the available research and the findings from the current study provide a mixed picture for the efficacy of the e-CHUG intervention in influencing alcohol related outcome variables.
As stated previously, within a harm minimisation framework any reduction in alcohol consumption is constructed as a benefit; however, the changes in weekly alcohol consumption observed in the e-CHUG group are small and unlikely to have any notable impact of alcohol related consequences (as can be seem in previous RAPI analyses). That said, the observed reductions did bring the mean weekly consumption to within the ‘low risk’ category of NHMRC guidelines for long term risk associated with alcohol use (M≤28 / F≤14 standard drinks per week), as similarly noted for the BASICS group.

5.4.63 Changes in Peak BAC Over Time.

The prediction that both BASICS and e-CHUG will demonstrate significant reductions in peak blood alcohol content between baseline and follow up, and that BASICS will demonstrate greater reductions in peak BAC when compared to e-CHUG was not supported by the data. Although the reductions were non-significant, both treatment groups reduced peak BAC from baseline to 3 month follow up. This makes sense within the previously reported outcomes; peak BAC is derived from levels of peak consumption (reported above) and number of hours spent drinking, using Matthews and Miller’s (1979) formula. The broad reductions in peak BAC across the intervention follow-up period aligns with the observed reductions in peak consumption levels demonstrated by both groups.

Interestingly, the BASICS group demonstrated significant reductions in peak consumption, but not in peak BAC. In Matthews and Miller (1979) formula, the variables of gender, weight and metabolism rate are constant, whereas standard drinks consumed and time spent drinking change according to the particular situation. This raises the possibility that, during episodes of heavy consumption, individuals in the BASICS group were drinking less than at baseline but in a shorter period of time. If the assumption is correct, it must be
acknowledged that this pattern of consumption puts them at serious risk of short term harm; high levels of consumption in short periods of time, often referred to as ‘binge drinking’ in the literature, are associated with high levels of negative alcohol related consequences in tertiary populations, such as injury, unwanted sexual activity, drink driving and blackouts (Paschall & Saltz, 2007). While this is a possibility, the assumption must be considered in light of the other data; no significant increases in BAC were identified and there were no significant differences between the e-CHUG and BASICS groups on RAPI items scores at 3 months follow up, suggesting that no substantial changes in episodic drinking behaviours occurred, and, if they did, no flow on effect to alcohol consequences was apparent.

5.4.7 Explaining the Inefficacy of e-CHUG: A Comparison of BASICS and e-CHUG.

Participants in the BASICS group demonstrated significantly reductions in mean peak consumption between baseline and 3 month follow up and a significant overall reduction in mean weekly consumption between baseline and 3 month follow up, whereas e-CHUG did not evidence significant change in either of these variables across the intervention-follow up period. Similarly, although neither group demonstrated statistically significant changes in peak BAC, the observed reduction in the BASICS group was almost twice as large as the reduction reported by the e-CHUG group. Taken as a whole, these data clearly demonstrate the superiority of the BASICS intervention over the e-CHUG intervention in influencing alcohol outcome variables in this cohort. While the superiority of BASICS over e-CHUG was also demonstrated in the only other comparative study between the two treatments (Murphy et al., 2010), this observation still necessitates investigation. How do we account for the effectiveness of BASICS over e-CHUG in influencing key alcohol outcomes? There are
major differences in the structure, intensity and modality of these two interventions (as discussed in Section 5.6.3). In order to make adequate hypotheses regarding the differential effectiveness of the interventions, we must examine these key differences in detail, with regard to the research literature.

5.4.71 Normative Data.

One primary difference between the two interventions was the data with which normative comparisons were made. For the BASICS intervention, data collected from Study One of the current study was used for comparisons; participant drinking data was explored in the context of the drinking behaviours of other RMIT students. Conversely, data from the NDS Drug and Alcohol survey (AIHW, 2002) and Davey and colleagues (2002) was used for comparison with participants in the e-CHUG condition. Theory and research have indicated that the efficacy of feedback interventions is improved if the reference group is perceived by the target group as “socially proximal” (Lewis & Neighbours, 2007, p.228). It is possible that the feedback component of the BASICS intervention was more influential in increasing motivation to change and actual change in drinking behaviour, than that of e-CHUG, as the relevance of the referent group was more salient due to the comparison group being perceived as peers, rather than simply study participants. Furthermore, in-person clinician assisted feedback, when compared to self-guide computerised feedback, has been found to generally have a greater effect on normative perceptions. This has been theorised to be a core component of treatment efficacy (Doumas et al., 2011). It has been suggested that providing participants with the opportunity to explore normative data with a clinician, which allows for discussion, verification of the validity of the data and reflection on the meaning of the information, increases the salience of the data itself (Doumas et al., 2011). There is a
possibility then that, not only was the normative comparison group more salient to BASICS participants, but the process of exploring this information with a clinician, rather than independently (as in the e-CHUG group), contributed to the observed superiority of the BASICS intervention over the e-CHUG treatment.

5.4.72 Skills Training.

It may be hypothesised that the effectiveness of the BASICS intervention in producing significant reductions in both weekly and episodic consumption is related, at least in part, to the teaching of specific behavioural strategies to alter current drinking behaviours. Although e-CHUG offers a brief menu of suggestions to reduce situational intoxication (e.g. spacing alcoholic drinks with non-alcoholic drinks), no skills are actively taught and this component is minor. Conversely, the teaching of coping skills, moderation training and generalisation of strategies is an integral part of session 2 in BASICS. Cognitive-behavioural interventions for problematic alcohol use are based on the provision and direct teaching of specific skill sets designed to enable an individual to manage their own drinking behaviour (Kadden et al., 2004), and the data supporting the efficacy of these interventions is generally robust, suggesting that skill acquisition is an important aspect of reducing harmful alcohol use.

The e-CHUG intervention, in only giving a brief menu of suggestions to manage drinking situations, implicitly assumes that participants already possess the skills to reduce their drinking and that motivation and lack of accurate information are the primary barriers to reducing consumption. This assumption, while applicable to some individuals, may not accurately account for all participants involved in the intervention. Research by Carey, Henson, Carey and Maisto (2007) found that higher levels of self-regulation skills
independently predicted reductions in drinking outcomes and enhanced individual responses to a brief motivational intervention for problematic alcohol use amongst college students. The relative inefficacy of the e-CHUG intervention in the current study, therefore, may in part be due to the lack of direct teaching of necessary skills to manage drinking behaviour.

5.4.73 Motivational Interviewing Techniques.

As discussed earlier, the self-directed, computerised nature of the e-CHUG intervention limits the ability of this treatment to utilise motivational interviewing components. Although, a full revisitation of the discussion provided earlier in this section is unnecessary, it is important to flag that the presence of the clinician in the BASICS intervention, and the ability of the practitioner to utilise motivational interviewing techniques throughout the intervention, may have provided an additional benefit of this intervention over and above e-CHUG, and contributed to the apparent superiority of this treatment with this cohort.

5.4.74 Goal Setting.

A key difference between the examined interventions is the emphasis on explicit goal setting that is characteristic of the BASICS treatment protocol. Although establishing a specific goal with regard to changing drinking behaviours is not enforced, the BASICS treatment protocol strongly encourages the clinician to assist the client to articulate how they will apply the knowledge and skills developed through the treatment to their lives; the manual suggests “Get specific commitments for behavioural action steps from the student, when possible” (Dimeff et al., 1999, p.96). This most often takes the form of the individual agreeing to moderate their alcohol consumption in some way. Goal setting is believed to
assist behaviour change. Within a social-cognitive framework, it is hypothesised that when an individual sets an explicit behavioural goal, such as reducing weekly alcohol consumption, they receive behavioural and environmental feedback relating to their progress toward achieving that goal. When a discrepancy exists between the current behaviour and the desired goal, the discrepancy acts as an “impetus for discrepancy reduction” and motivates goal directed behaviour (Curtin, Stephens & Bonenberger, 2001, p.19). Research in the alcohol field, while limited, generally supports these predictions. For example, Lozano (2008), using a sample of ‘binge drinking’ college students (defined as 5+/4+ drinks on the same occasion one or more times in the past month for males and females), found that explicit goal setting in relation to alcohol consumption predicted lower frequency and quantity of alcohol use, when compared to non-goal setting participants. In the context of this research, it is possible that the importance placed on goal-setting in the BASICS intervention, and conversely, the lack of emphasis on goal setting in the e-CHUG treatment, may have played a role on the differential pattern of change in outcome variables observed in the current study.

5.4.75 Ongoing Monitoring.

Research has indicated that self-monitoring alone is an efficacious intervention for harmful alcohol consumption amongst tertiary students (Larimer & Cronce, 2007). Indeed, BASICS uses self-monitoring as a core component of the intervention. Self-monitoring of drinking behaviours is used by BASICS participants between the first and second sessions; as described previously, participants not only record number and type of drinks consumed, but also times, locations, social settings and moods, in an attempt to overt antecedents of heavy drinking behaviour, in order to better prepare participants to manage individual drinking
behaviours post-intervention. The manual suggests that, in addition to increasing awareness of personal drinking behaviours and possible triggers for heavy drinking, the act of monitoring can in and of itself reduce consumption, a phenomenon labelled reactivity (Dimeff et al., 1999). Reactivity is generally supported by the literature. In addition to between session monitoring, the BASICS protocol encourages participants to utilise self-monitoring as part of the post-intervention moderation training.

This emphasis on self-monitoring in the BASICS treatment is in contrast to e-CHUG, where no ongoing self-monitoring is utilised. A retrospective QF assessment of drinking behaviours is used initially to provide data with which to make normative comparisons, however beyond this largely flawed method of data collection (see section X for a critique) no monitoring of alcohol consumption is used. The potential benefits of monitoring discussed previously may provide additional strength to the efficacy of the BASICS intervention and partially explain the relatively poor performance of the e-CHUG intervention in the current study.

5.4.76 Role of the Clinician.

The limited efficacy of e-CHUG in influencing outcome variables may be due, in part, to the computerised nature of the intervention. In addition to providing motivational interviewing techniques (discussed previously), the therapeutic relationship, the perceived importance of the provided information and the impact on social desirability associated with the presence of a clinician may have made the BASICS intervention more efficacious in producing changes in drinking behaviours.

Although some research suggests that the clinician is largely obsolete in brief interventions, with data indicating that feedback provided in post-mailed format and online
(e.g. Johnsson & Berglund, 2005) being as effective as clinician delivered feedback, the literature generally suggests that clinician assisted feedback interventions have a greater effect on normative perceptions (Doumas et al., 2011). Murphy and colleagues (2010) suggest that clinician directed interventions, specifically BASICS, may produce greater commitment to behavioural change, when compared to electronic treatments. Indeed, Walters and colleagues (2009) conducted a study designed to assess the relative importance of components of motivational interviewing and feedback interventions; using a sample of 279 heavy drinking university students, the authors found at 6 month follow up, participants in the motivational interviewing with feedback (MIF) condition demonstrated significant reductions in alcohol consumption variables when compared to the motivational interviewing without feedback (MI) group, the feedback only (FO) group and the control (C) group. Data also found no significant differences between MI, FO and C groups on the same outcome variable. The authors concluded “the inclusion of both an in-person MI session and a feedback profile is more potent than either feedback alone or MI alone” (p.9). Taken together, this research suggests that the role of the clinician in the BASICS treatment may have contributed to its relative superiority over e-CHUG in influencing relevant outcome variables.

5.4.77 Baseline Consumption and Intensity of Intervention.

Although the data suggests the relative inefficacy of e-CHUG in influencing relevant alcohol variables in the current study, this outcome may be partly explained by the baseline drinking behaviours of the participants in relation to the intensity of the treatment. At baseline, the BASICS group reported significantly higher mean weekly consumption, when compared to e-CHUG. Research has suggested that the efficacy of brief interventions for
problematic alcohol use are moderated by baseline consumption patterns. For example, Blow and colleagues (2009) found, in a sample of 494 participants recruited from an emergency department at a major hospital, the treatment effect of the brief intervention was greatest amongst individuals who reported higher levels of alcohol misuse at baseline. The authors suggest that, due to high levels of consumption and associated problems, these individual may be more responsive to the motivational components of these interventions, which aim to develop discrepancy between current behaviour and future goals or individual standards of behaviour (Blow et al., 2009). Indeed, research with high risk drinking tertiary student populations have indicated that face-to-face motivational-feedback interventions may be more effective with heavy drinking individuals, than with more moderate drinkers (Amaro et al., 2010; Murphy et al., 2001; Walters et al., 2009) In a review of online interventions for problematic alcohol consumption amongst university populations, Elliott, Carey and Bolles (2008) conclude “...the most risky drinkers respond better to more intensive interpersonal interventions. For this subset, one can speculate that an e-intervention produces more risk reduction than no intervention, but less than a face-to-face intervention” (p.1002). This observation may have been the applicable to the current study; the BASICS group reported significantly higher mean consumption than the e-CHUG group at baseline, and, due to the intensity of the BASICS intervention, this group may have been better suited to this style of treatment and responded appropriately.

This hypothesis is further supported when we examine the baseline drinking characteristics of e-CHUG treatment groups in other studies, where e-CHUG has been demonstrated to be efficacious in modifying drinking behaviours. For example, mean weekly consumption rates range from 8.86-8.94 drinks per week amongst previously reported e-
CHUG studies (Doumas et al., 2011; Hustad et al., 2010; Walters, Vader & Harris, 2007), whereas in the current study mean weekly consumption for the e-CHUG group was 17.00 drinks per week, almost double previously reported figures. It is possible therefore that the baseline consumption patterns exhibited by the e-CHUG group necessitated a more intensive intervention, such as BASICS, to ensure adequate treatment effects.

5.4.8 Relationship Between SOC and Treatment Effect (Drinking Variables).

The hypothesis that there would be a significant negative relationship between baseline readiness to change (SOC) and change scores for peak alcohol consumption, estimated drinks per week and peak BAC for both BASICS and e-CHUG groups was not fully supported by the data. Analysis found a significant overall negative correlation between baseline SOC and peak consumption change scores, indicating that higher motivation to change was associated with greater reductions in peak consumption for all participants. However, group level analysis revealed that this relationship was significant for the e-CHUG group, but not the BASICS group; in spite of not demonstrating statistical significance, it must be noted that the analysis revealed a strong, negative correlation between RTC and peak consumption change scores for the BASICS group ($r=-.67$). No other associations were found between change scores for peak BAC and weekly consumption, and baseline SOC at either the group or entire sample level.

Motivation to change is driven, in part, by the experience of aversive consequences (a key component of the consciousness raising process of change in the TTM) and research has consistently demonstrated the association between episodes of high consumption and negative consequences. This may explain the unique relationship between motivation to change and reductions in peak drinking, as opposed to weekly consumption and peak BAC.
It may be hypothesised that, for the treatment groups, baseline motivation to change had been prompted by consequences associated with heavy drinking episodes, such as hangovers, missed lectures or interpersonal conflict. Therefore, on intervention, these behaviours were most salient for the participants and subsequently most responsive to treatment. Indeed, in attempting to motivate behaviour change, both the e-CHUG and BASICS interventions tend to emphasise the short term negative consequences of excessive alcohol consumption and the immediate benefits of moderating heavy episodic consumption. As stated in the BASICS manual, “feedback...focuses primarily on immediate and short term risks” (Dimeff et al., 1999, p.106). Similarly, the feedback profile in e-CHUG places a large emphasis on short term consequences, such as financial costs. As both interventions also adopt a harm minimisation approach to treatment, both encourage a reduction in heavy episodic consumption. The BASICS manual explicitly states that the most common directive to participants is “...to moderate their drinking and to avoid binge drinking” (p.119). In light of these observations, it is possible that baseline motivation interacts with the target of the intervention (episodic drinking) to bring about discreet change in this area. However, while we can adequately hypothesise the relationship between RTC and reductions in peak consumption, the lack of significant relationships between RTC and other alcohol outcome variables is more difficult to understand.

Interestingly, motivation to change was not significantly associated with actual change on any alcohol-related outcome for the BASICS group, however this group consistently demonstrated superior reductions on alcohol outcomes over the e-CHUG group. Although causal statements are beyond the scope of the current study, the observation suggests that the efficacy of the BASICS treatment did not depend on
participant motivation. It may be hypothesised that the treatment alone was sufficient to motivate change in and of itself, irrespective of baseline readiness. This proposition is in direct opposition to the theorised mechanisms of behaviour change espoused by the TTM, wherein RTC is seen as a “critical condition of change” (Rollnick, 1998, p.49, cited in Collins, Logan & Neighbours, 2010). These findings add to the growing body of research highlighting behaviour change in the absence of RTC already discussed in Section 7.1.1.

5.4.9 Relationship Between Endorsement of Treatment Modality and Alcohol Variable Change Scores.

The hypothesis that there would be a significant negative relationship between preference for online treatment and alcohol variable change scores for the e-CHUG group, and a significant negative relationship between preference for face-to-face treatment and alcohol variable change scores for the BASICS group was not supported by the data. No significant relationships between preference for either online or face-to-face treatment and outcome variable change scores for either treatment condition were reported.

Although no significant relationships were demonstrated, most likely due to the small sample size, a number of moderate correlations were noted and warrant a brief discussion. For the e-CHUG group, moderate negative correlations were observed between endorsement of online treatment and peak consumption changes scores and peak BAC change scores, suggesting that preference for online treatment was associated with greater change in alcohol outcomes variables, when participants were allocated to an online treatment condition. In spite of not achieving statistical significance, the pattern of these relationships broadly supports the hypothesis that treatment modality preference influences outcomes. Confusingly however, for the BASICS group, moderate positive
correlations were observed between preference for face-to-face treatment and peak BAC change scores and weekly consumption change scores. This relationship is contrary to the hypothesis; the nature of this association suggests that preference for face-to-face treatment was associated with less change in alcohol outcome variables, when participants were allocated to a face-to-face treatment condition. An extensive literature review, of both alcohol and other intervention studies, found no published research demonstrating this relationship. Can client preference for a particular treatment actually reduce the efficacy of the treatment itself?

Ultimately, no meaningful conclusions can be drawn from these data, due largely to the small sample size and resulting non-significance of the reported results, however taken together, these findings add to the mixed picture with regard to the relationship between treatment preference and treatment outcome. Future research, preferably utilising larger sample sizes, should further investigate the relationship between treatment modality preference and treatment outcomes in the alcohol field. This research holds particular importance due to the rising popularity of online treatments, and can assist in addressing questions relating to treatment efficacy.

5.4.10 Limitations.

The findings presented here must be viewed in the context of the limitations of the study. In the current section limitations relating to self-report measures, small sample sizes, brief follow up periods, measurement flaws, treatment integrity and attrition rates will be discussed, examining the potential confounding influence of these factors on the reported date.
All data used in the current study is derived from self report measures. This is problematic due to the sensitive nature of the target behaviours. As noted earlier, participants may have felt compelled to underreport many of the variables assessed, such as drinking frequency and peak consumption, in order to present a more socially acceptable picture of their current behaviours. Similarly, there may have been a compulsion to report changes or improvements in these variables over time. Research presents a mixed picture of the accuracy of self-reported alcohol use amongst college students. Although a number of studies have suggested that individuals will often minimise or underreport consumption behaviours (e.g. Davis et al., 2010), alternative studies have concluded that self report data is generally accurate (e.g. Hagman, Cohn, Noel, & Clifford, 2011; LaForge, Borsari, & Baer, 2005; Northcote, & Livingstone, 2011) and that self report assessment techniques offer a “reliable and valid approach to measuring alcohol consumption” (Del Boca, & Darkes, 2003, p.1). Research suggests that the accuracy of self-reported consumption can be enhanced through assurances of confidentiality, a strong relationship with the interviewer and the absence of punitive consequences (Sobell & Sobell, 2000; Wilson, & Grube, 1994). Although the current study attempted to address these factors through the provision of a written declaration of confidentiality and the use of computerised assessments (providing privacy and anonymity), it is possible that the data obtained through self report methods is inaccurate. Unfortunately, this is a question that plagues much research in this area; objective measures of alcohol consumption and related behaviours, such as corroborating data from peers or family members, are resource intensive, and exceeded the capacity of this study.
The small sample size and resulting poor power of the study was a significant limitation. Many of the trends noted in the data, particularly regarding improvements in alcohol related variables over time, may have been statistically significant in a larger sample. Extensive and varied recruitment methods were adopted in Study One to maximise the potential sample size in Study Two, and intensive follow up with eligible participants was used in Study Two to minimise attrition. Although providing financial and material incentives to participants may have improved retention, limited resources were available to the researchers and this approach was not possible. In spite of the limited statistical power, the current research produced encouraging data, particularly relating to the efficacy of BASICS with Australian university population, and should prompt additional research in this area.

The study was also limited by a relatively brief follow up period. Assessments occurred at 1 month and 3 months following baseline data collection. Such short follow up periods prevents any conclusive statements regarding the long term efficacy of these interventions. This limitation is particularly relevant to online treatments, such as e-CHUG; although much research has examined the efficacy of online feedback interventions, the research has generally been restricted due to brief follow up periods (Walters & Neighbours, 2005). Research in this area requires long term follow ups to examine the ability of online feedback interventions to effect enduring change, rather than simply transitory alterations to drinking behaviours. Unfortunately, time constraints and a lack of resources limited the ability of the researchers in the current study to implement a more extensive follow up period; in spite of this, the study does provide an important starting point for future Australian research.
The current research was also limited by the lack of assessment of specific alcohol variables for the control group. In light of previous research highlighting the apparent efficacy of assessment-only treatments in reducing problematic alcohol behaviours (e.g. Kypri, Langley, Saunders & Cashell-Smith, 2007), a decision was made prior to the commencement of the research that the control group would receive minimal assessment, in order to limit the potentially confounding effect of this process. If the expected outcomes had eventuated (i.e. no change in mean total AUDIT scores in the control group, and statistically significant improvement in mean total AUDIT scores in the treatment groups), this minimal-assessment approach to controls would have been satisfactory. However, with the data demonstrating the opposite of the expected effect, detailed data relating to consumption behaviours of the control group would have been particularly useful. With this data, more definitive conclusions could have been made regarding the proposed explanations of this change.

The variation in retrospective assessment periods for the RAPI was a major limitation of the current study. A planning oversight made RAPI scores at baseline, 1-month and 3-month follow up incomparable, thus making the assessment of change over time impossible. Although the examination of differences between groups at each assessment point was possible, this was a clumsy method of assessing changes in a particularly important variable. Having data relating to changes in alcohol related consequences would have provided information relating to clinically important effects of the interventions, e.g. potential reductions in harm. This data would have also allowed closer examination of the relationship between consumption variables and harm.
In examining the effect of BASICS and e-CHUG on the dependent variables, no mediation or moderation analyses were conducted. This data would have been useful, as research on the influence of variables such as RTC and baseline alcohol consumption, on the efficacy of alcohol interventions is limited (Blow et al., 2009; Capone & Wood, 2009; Turrisi et al., 2009). Understanding the nature of these relationships is essential in treatment planning and tailoring interventions to individual presentations. Future research should examine these factors as a matter of course.

Another potential limitation of the study was the proficiency of the BASICS clinician. Although subjective feedback from BASICS participants was positive, and the improvements demonstrated by this group were superior to that of the e-CHUG group, the proficiency of the clinician was not assessed. Other studies in the field have used treatment integrity measures to assess the proficiency of the clinician implementing treatment (e.g. Feldstein & Forcehimes, 2007), and several formalised measures, such as the Motivational Interviewing Treatment Integrity Code 3.0 (MITI 3.0; Moyers, Martin, Manuel, Miller, & Ernst, 2007), are available. Treatment proficiency is a major concern in clinical trials, and is particularly relevant in an intervention such as BASICS due to its reliance on MI techniques. A growing literature base on the within session processes of MI and their relationship to drinking outcomes highlights the importance of treatment proficiency. For example, using a sample of American university students (\(N = 143\), Vader and colleagues (2010), found that MI consistent clinician language was positively associated with client ‘change talk’, and that ‘change talk’ predicted positive drinking outcomes at 3-month follow up. This link between therapist behaviours and client outcomes is further reinforced by research by Moyers and colleagues (2009), who found that therapist language (MI) predicted client ‘change talk’,
and that ‘change talk’ was directly related to drinking outcomes. Without an objective measure of treatment integrity in the current study, the proficiency of the clinician and the adherence to MI language and processes within the BASICS sessions is uncertain. This raises questions as which aspects of the intervention were active (e.g. assessment, feedback or MI processes) and what components accounted for the observed changes in drinking behaviours. Despite the lack of formal assessment of treatment integrity, it must be highlighted that the clinician implementing BASICS was experienced in administering the intervention, having conducted multiple BASICS interventions prior to the commencement of the study and providing training to post-graduate psychology students; however future studies should incorporate proficiency assessments, as standard, to reduce threats to treatment validity.

The intervention component of the current study was also hindered by low rates of completion and high rates of attrition. Only 26% (24 of 90) of participants allocated to the intervention phase of the study completed the interventions. The loss of almost 74% of the originally intended sample may have affected the representativeness of the experimental groups. Although attrition analysis revealed no significant differences between those participants that volunteered for intervention but did not commence, those that commenced intervention but did not complete and those that completed the intervention on key variables, it is possible that other unassessed factors impacted on participation and treatment adherence.

The invitation procedure for Study Two may have unintentionally generated a biased sample. The use of the term “intervention”, when describing Study Two, may have lead to an overrepresentation of participants who identified their drinking as problematic and were
open to treatment. Other studies in the field have used less specific language when recruiting participants (e.g. Kypri et al., 2004), in order to minimise this potentially biasing effect. Future studies should, as a matter of course, provide general descriptions when recruiting for interventions.

Chapter 6. Summary and Conclusions

6.1 Aims and Design

The current research studies were designed to describe current drinking behaviours of a representative sample of RMIT university students, and examine the relative efficacy of a brief face-to-face and online intervention in reducing harmful drinking behaviours amongst this group. Study One utilised a large scale survey design to assess current drinking behaviours of the target group. Data from Study One was also used as a screening tool to recruit participants scoring ≥8 on the AUDIT into Study Two. Study Two utilised an RCT design, with a wait-list control group, to assess the treatment effect of the BASICS and e-CHUG interventions on harmful alcohol use, as measured by the AUDIT, and readiness to change, as measured by the RTCQ. A comparison of treatment effect between the intervention groups, without controls, was also assessed for the alcohol consumption variables of peak episodic consumption, estimated weekly consumption and peak BAC.

6.2 Summary of Findings

Data from Study One demonstrated that RMIT students drink frequently, at high rates of consumption and have experienced harm as a result. Survey data indicated that 58% of the sample drank at risky levels, according to AUDIT risk categories, however, very few volunteered for treatment. The high levels of harmful consumption evident in this
cohort support previous findings reported in the literature on drinking amongst university students and reaffirm the pressing need for effective, evidence-based alcohol interventions that are appropriate to the university setting.

Although Study Two produced a number of confusing results, for example significant improvements in alcohol outcomes in the control group over and above those of the intervention groups, and in the absence of improved readiness to change, the overall picture suggests that the BASICS intervention was effective in significantly reducing both weekly and peak levels of alcohol consumption in this group – both being the targets of the intervention and the most significant contributors to short and long term alcohol related harms. It is useful therefore, when considering the results of this study, to examine the ‘big picture’, rather than be distracted by perplexing outcomes.

6.3 Clinical Implications of Findings and Future Directions

Data derived from both Study One and Study Two has clear clinical implications for the treatment of harmful alcohol consumption in Australian universities. Survey data from Study One highlights the breadth and severity of harmful drinking behaviours amongst Australian university students; as discussed, participants in Study One drank frequently, at high rates of consumption and many have experienced harm as a result. Survey data indicated that 58% of the sample drank at risky levels, according to AUDIT risk categories, but, perhaps most troublingly, very few had sought treatment previously or volunteered for the treatment phase of the current study. In spite of this observation, data demonstrated high levels of endorsement for both the availability of, and personal likelihood of using, computerised and clinician delivered assessment, feedback and advice. These observations then raise the questions, how do we increase awareness of harmful alcohol use and
motivation to engage in treatment amongst this group, and which forms of treatment
demonstrate the greatest efficacy and effectiveness in reducing harmful alcohol
behaviours? Large scale intervention with this group appears necessary.

Study Two attempted to examine potentially appropriate treatments for this group.
In line with surveyed treatment preferences, online and face-to-face assessment and
feedback interventions were examined. As described, the BASICS treatment consistently
produced improvements across all relevant outcome variables, reducing mean total AUDIT
scores and peak BAC from baseline to 3 month follow up, and demonstrating statistically
significant reductions in peak alcohol consumption and estimated average weekly
consumption across the same period. The data suggests that the BASICS intervention was
effective in modifying harmful drinking behaviours of the target group. Contrary to
expectation however, the e-CHUG intervention did not produce significant improvements in
target variables; total AUDIT scores actually increased across the intervention-follow up
period, and although reductions were demonstrated in peak consumption, weekly
consumption and peak BAC between baseline and 3 month follow up, the reductions were
non-significant and were not as large as the improvements demonstrated by the BASICS
group. In addition, both peak consumption and peak BAC actually increased at 1-month
follow up. In comparing the two interventions, it is clear that, with this particular population
and in this particular study, the BASICS treatment proved to be superior in reducing harmful
alcohol consumption.

Taken as a whole, the intervention data reported here has several implications. As
demonstrated by the data, and supported by prior research, the BASICS intervention
appears to be effective in reducing alcohol consumption amongst Australian university
students and, as such, its availability in Australian universities should be ensured. However, as this is the first study examining the efficacy of the intervention with Australian students, further research is required to replicate these findings. In spite of this, the BASICS outcome data produced through this study is extremely encouraging, particularly in light of the small sample sizes, and provides an excellent starting point for larger controlled trials in other Australian universities. Relatedly, e-CHUG, despite producing limited improvements in alcohol variables in the current study, has potential. International research regarding the efficacy of the treatment, although mixed, has demonstrated generally positive findings. Further research with Australian populations is therefore warranted; it is essential that the performance of this intervention is clarified.

The findings relating to e-CHUG efficacy are particularly troubling when we consider the proposed advantages of the online modality for the treatment of harmful alcohol use amongst tertiary students. As described previously, online alcohol interventions appear to be highly acceptable to the target population, may encourage treatment seekers who are uncomfortable with face-to-face treatments, are easily accessible and provide a treatment that can be delivered to a large population at minimal cost. However, the data from the current study raises a significant question: Is it better to have an easily accessible and highly endorsed intervention that produces relatively minor changes in drinking behaviour (i.e. e-CHUG), or an intervention that is less accessible and more resource intensive, but produces greater improvements (i.e. BASICS)?

The answer to effective, large-scale provision of evidence-based intervention is probably not an either or approach. Recently researchers have recommended utilising a stepped-care approach to addressing harmful alcohol use amongst university populations
Stepped care is an individualised, response-directed approach to the provision of medical or psychological treatments (Borsari, Tevyaw, Barnett, Kahler, & Monti, 2007). Within this framework, individuals are initially provided with the least intensive and least restrictive treatment (in accordance with client presentation, current evidence and clinical decision making) and dependent on treatment response, the individual is either provided with an additional, more intensive treatment, or, in the case of adequate treatment response, simply monitored by the clinician (Sobell & Sobell, 2000). Treatments are linked together, in a stage-wise manner (see below), so any individual evidencing no or minimal improvement at one level of treatment is provided with the next more intensive level of intervention, in accordance with established decision-making guidelines. The use of the model is supported by current NHMRC guidelines for the treatment of alcohol problems, which encourages the use of the stepped care approach in selecting appropriate treatments (NHMRC, 2009). A graphical representation of the stepped care model is presented in Figure 8.
Within a university setting, a stepped care approach to the treatment of harmful alcohol use may take on a number of forms. One possibility may look as follows: All incoming students are administered e-CHUG (or a similar computerised, brief intervention) as part of orientation procedures. Then, after a pre-determined period (e.g. 6 weeks), e-CHUG is readministered. Dependent on the obtained follow up data, students could be categorised as ‘Responders’ (i.e. harmful alcohol use has reduced) or ‘Non-responders’ (e.g. harmful alcohol use has maintained or worsened). ‘Responders’ could be administered e-CHUG again at a later point to ensure improvements have been maintained, while ‘Non-responders’ could be ‘stepped up’ and referred to a more intensive treatment, such as BASICS. From this point onwards, the assessment-treatment-monitoring process could be continued, with interventions progressively becoming more intensive and appropriate to the level of severity. Higher level treatments may range from BASICS ‘booster’ sessions through to referrals for detoxification or pharmacotherapy for consenting students.

A number of studies have demonstrated the efficacy of utilising the e-CHUG intervention as a first line, prevention-based approach to containing harmful alcohol use amongst incoming university students (see Doumas & Anderson, 2009, and Hustad et al., 2010). Supporting this research, a number of American universities, such as the University of Texas, Columbia College and the State College of Western Colorado, have made e-CHUG mandatory for all incoming students (Longar, 2010; Phillips, 2011; Taliaferro, 2011). Research has indicated that participation in computerised brief intervention, in addition to
influencing alcohol use, may actually prompt additional help-seeking amongst university students drinking in harmful ways (Kypri et al., 2009). Indeed, utilising e-CHUG as the first stage of a stepped-care model in Australian universities may actively address some barriers to help-seeking amongst university populations. e-CHUG, used in this context, should increase problem awareness through the provision of normative data, address stigma issues through the computerised nature of delivery, and increase service knowledge by providing a menu of additional treatment options on completion, all factors that have been previously identified as obstacles to treatment seeking amongst this group. Thus, in addition to potentially influencing consumption patterns, e-CHUG may also increase subsequent treatment-seeking amongst individuals exposed to the intervention.

Despite the e-CHUG treatment failing to demonstrate any statistically significant improvements in relevant outcome variables in the current study, the intervention did reduce consumption variables, and a number of other studies have demonstrated the efficacy of the intervention in influencing alcohol consumption over and above control conditions (e.g. Doumas, 2007; Steiner, Woodall & Yeagley, 2005; Walters, Vader & Harris, 2007). As discussed, the intervention appears to have some evidence supporting its efficacy, theoretically should increase subsequent help-seeking and incorporating e-CHUG into a stepped-care model for the university setting would be relatively straightforward.

Although a number of ethical issues, such as informed consent and privacy, legal issues, such as the legal responsibility of the university in monitoring treatment response, and procedural concerns, such as the establishment of evidence-based clinical decision making guidelines, would need to be addressed prior to the widespread application of such a model in Australian universities, the potential benefits of a stepped care approach to the
large scale treatment of harmful alcohol use with university populations are significant. In a review of stepped care in psychological therapies, Bower and Gilbody (2005) highlight that, although psychological treatments are generally effective, access is poor, due, in part, to the high cost and resource-intensiveness of many interventions. This observation is particularly salient to the university setting, where resources are often scarce. The initial step of the proposed model is minimal in cost, requires little or no time from actual clinicians, maximises accessibility and would, in light of the broader literature base (e.g. Hustad, Barnett & Borsari, 2010) likely provide significant benefits for students. Additional benefits of the stepped care model include the individualised nature of treatment and its ability to respond to varying levels of severity, as opposed to a ‘one-size-fits-all’ approach, and the self-correcting nature of the model, wherein non-response is managed by progressive intensification of treatments until adequate improvement is achieved. By utilising brief, harm-minimisation interventions (as opposed to abstinence based treatments) that require little from students at the early stages of the model, motivation to engage in treatment may also be increased (Colby et al., 2004).

While the stepped care approach to treating harmful alcohol makes intuitive sense, empirical research examining the efficacy of the model is rare and findings regarding the efficacy of the approach are mixed (Bower & Gilbody, 2005; NHMRC, 2009). Although some studies have demonstrated reductions in consumption variables, increases in motivation to change (Drummond et al., 2009) and greater cost savings, when compared to minimal intervention (Bischof, Grothues, Reinhardt, Meyer, John, & Rumpf, 2008), the available evidence supporting this approach is limited. This observation is particularly accurate when the stepped care model is applied to treating harmful alcohol use in a university setting. A
literature review found only two studies. In the only study explicitly designed to examine the stepped care model, Borsari and colleagues (2007) conducted a pilot study to assess the efficacy, acceptability and retention rates of a stepped care approach to harmful alcohol use amongst students mandated to attend an alcohol treatment program. The authors used a sample of 43 students (67% male) who had been referred under the university’s Alcohol incident Referral Program. After a baseline assessment of drinking variables was conducted, all participants received a minimal 15-minute intervention examining antecedents and consequences of the incident that lead to their referral and explored the alcohol use surrounding the event. Participants were then provided with a 12 page alcohol booklet containing items such as alcohol related information and specific behavioural strategies to reduce consumption. Follow up assessments were conducted four weeks later; participants meeting criteria for risky drinking or alcohol problem severity were then randomised to either a single session, brief motivational intervention or no-assessment control condition. Four weeks after randomisation, all participants completed follow up assessments. Data indicated high levels of satisfaction with the interventions and a high level of participant retention. Although no significant between group differences on alcohol outcome variables were observed between the BMI group and control conditions, due to the small sample sizes used in the experiment, within-group reductions were observed in consumption and drinking problems, with small to moderate effect sizes noted. The authors suggest that a multi-session BMI may have produced greater reductions in target variables, rather than the single-session BMI that was administered. Although significant improvements in outcome variables were not demonstrated, the study is important in that it demonstrated the
acceptability of the stepped-care process with participants; the efficacy of alcohol
treatments has been demonstrated elsewhere.

Even within a stepped care model, interventions should still be made available on
request and be tailored to suit the target group. It is useful, therefore, to consider what
changes could be made to BASICS and e-CHUG to make them more appropriate to an
Australian population and how Australian university students may be encouraged to
complete the interventions. Based on the principal researcher’s experience in administering
and overseeing both BASICS and e-CHUG, it appears that no significant changes to the
structure or content of the interventions are necessary for their application with Australian
populations. Obvious functional alterations, relating to measurement of standard drinks and
the selection of normative data sets, are required for both e-CHUG and BASICS to be used
with Australian university students, however both interventions appear to be acceptable to
this population in their original state.

In terms of increasing Australian student’s motivation to access to these
interventions, it is useful to consider help-seeking behaviour more broadly. As noted
previously, individual help-seeking is reliant on 1) an awareness that a problem exists, 2) an
expression of the need for help, 3) the availability and accessibility of formal or informal
sources of help, and 4) the willingness to seek and engage appropriate sources of help
(Rickwood, Deane, Wilson & Ciarrochi, 2005). Broad, campus-wide advertising, in the first
instance, could be used to improve problem recognition and alert students to the
availability of these services. Aspects of social norms marketing, such as normative
information, could be used in advertising materials to promote problem recognition and
increase treatment willingness (e.g. include messages such as “The average number of
drinks per week for X university students is 3.5” as in the Walker [2002] study), with additional information provided on how to access BASICS or e-CHUG treatments. The content of advertising materials could also be changed to better target specific groups known to be at higher risk of alcohol misuse, for example males. Any advertising campaign should utilise a range of mediums (e.g. print, online, handouts, posters, orientation packs etc) to maximise dissemination of this information. Timed and direct advertising approaches could also be used to increase engagement; for example, emails with the same information and a hyperlink to the e-CHUG page could be sent to students directly at times of known heavy alcohol consumption (e.g. after exams, orientation week), thus potentially targeting them at times of high problem recognition. Any advertising material should be non-stigmatising and avoid sensationalist or fear-driven messages; research has consistently demonstrated that ‘scare tactics’, designed to elicit anxiety about substance use and its consequences, are not effective in preventing substance use or motivating change amongst young people (Prevention First, 2008).

To address barriers to the availability and accessibility of these services, and to make the expression of the need for help easier, universities could also tailor the access routes and structure of the interventions to better suit students. For example, providing anonymous, online booking options for BASICS sessions, would make help-seeking easier and may address concerns relating to direct contact with receptionists when pursuing treatment. Some studies have altered the structure of treatments and utilised peer-lead interventions to improve student access (e.g. Fromme & Corbin, 2004); indeed, the BASICS treatment assessed by Turrissi and colleagues (2009) was lead by student peers. These novel adaptations of existing treatments may serve to promote engagement with these services.
Simple approaches, such as the ones described herein, could attempt to address barriers to help-seeking amongst Australian university students and promote engagement in interventions such as BASICS and e-CHUG.

6.4 Conclusion

The strategies to improve access and the proposition of a stepped-care approach to treating harmful alcohol use in Australian universities appear to be a strong. High levels of harmful alcohol use necessitate large scale intervention with university students; however resources in Australian universities are limited. Brief face-to-face and online treatments have been found to be efficacious in influencing relevant alcohol outcomes and acceptable to the target population, and preliminary evidence and NHMRC guidelines support the use of the stepped care approach. Brief computerised screening and intervention, such as e-CHUG, could therefore be applied broadly, followed by more intensive treatments, such as BASICS, for non-responders. Although more research is required to validate the efficacy of this model in responding to the needs of consumers, the stepped-care model balances the restrictions and practicalities of large scale intervention, in terms of cost and resource usage, and the need for effective, evidence-based treatments. As stated by Hustad and Borsari (2010) “Given the ease of delivering this low-cost intervention, failure to provide an effective intervention such as PNF (personalised normative feedback) to high-risk college students is no longer an option for practitioners and college administrators” (p.18). Utilising both computerised and face-to-face treatment approaches, within a stepped care model would address both the obvious need for wide scale intervention with this group and the resource and cost restrictions currently facing Australian universities.
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APPENDIX A

Invitation to Participate in a Research Project
Project Information Statement

Discipline of Psychology
School of Health Sciences

Project Title:

Efficacy and cost effectiveness of brief alcohol interventions in tertiary education settings: Screening phase.

Principal Investigator:

Peter McPherson
Candidate for Doctor of Psychology, RMIT University
peter.mcpherson@student.rmit.edu.au
Ph: (03) 9925 7776

Supervisors:

Dr. Andrea Chester  Dr. John Reece
andrea.chester@rmit.edu.au  john.reece@rmit.edu.au
Ph: (03) 9925 3150  Ph: (03) 9925 7512

Introduction:

You are invited to participate in a research project being conducted by RMIT University. This information sheet describes the project in straightforward language, or ‘plain English’. Please read this sheet carefully and be confident that you understand its contents before deciding whether to participate. If you have any questions about the project, please contact the Principal Investigator via email or phone.

Who is involved in this research project? Why is it being conducted?

This research project is being conducted by Peter McPherson, as part of a Doctor of Psychology degree, under the supervision of Dr Andrea Chester. It is designed to compare the usefulness and cost effectiveness of two methods to reduce harmful alcohol consumption amongst Australian tertiary students. The two methods being compared are an internet program, called the Electronic Check-Up and Go (e-CHUG), and a brief face-to-face program called Brief Alcohol Screening and Intervention for College Students (BASICS). Both programs encourage individuals to draw upon their own resources to change harmful drinking behaviors. The programs have been used with tertiary students before, with positive results, but they have never been compared to each other. This project has been approved by the RMIT University Human Research Ethics Committee and is being funded by RMIT University.
Why have you been approached?

You have been approached because you have responded to an invitation to participate.

What is the project about? What are the questions being addressed?

This study has two components:

- Comparing the impact of the two programs on harmful drinking behaviours.
- Comparing the cost effectiveness of the two programs.

The study will attempt to establish, firstly, whether these programs are effective in changing harmful drinking behaviours, secondly, which of the programs is more effective in changing harmful drinking behaviours and, finally, which of the programs is most cost-effective to implement. The study aims to identify a cost-effective, useful and easily implementable alcohol intervention for use in Australian tertiary settings.

If I agree to participate, what will I be required to do?

I you agree to participate in this study, initially all you will be asked to do is complete an online questionnaire that asks about your current drinking behaviours, attitudes toward alcohol, recent alcohol-related events and academic performance. Most questions simply ask you to circle or tick an appropriate response. The questionnaire will take approximately 20 minutes to complete and you are welcome to read through the questionnaire before deciding whether or not to participate.

After completing the questionnaire, some individuals may be invited to participate in the second phase of the study. If you agree to participate you will be randomly allocated to one of three groups: an internet group, a face-to-face group or a waiting group. The waiting group will not be involved in either the e-CHUG or BASICS program until after the waiting period (about 6 months). At that time they will be able to choose which program they do.

The internet group will be required to complete e-CHUG online – this entails answering a number of questions about your drinking behaviours and should take between 20-30 minutes. The face-to-face group will be asked to attend two face-to-face sessions. Each session will go for about 55 minutes and will be led by the Principal Investigator.

Finally, all participants involved in the second phase of the study will be required to complete a second version of the original questionnaire in about 3 months, and again in about 6 months. You may be invited to complete it again at other times further in the future, but are under no obligation to do so.

What are the risks or disadvantages associated with participation?

Participating in this study should pose few, if any, risks to you outside your normal daily activities and is expected to provide many benefits. However, if you are worried about your participation, you may contact the Principal Investigator, Peter McPherson, to discuss your concerns. Contact details for other people that can help are on the card you received when you completed the questionnaire – additional cards are available on request.

If you are concerned about the project, or find participation in the project distressing, please contact Peter McPherson as soon as convenient. Peter will discuss your concerns with you confidentially and suggest appropriate follow-up, if necessary.
What are the benefits associated with participation?

Both of the programs being compared have been found to help many students. They are associated with reductions in a range of harmful drinking behaviours and alcohol related negative events.

What will happen to the information I provide?

All identifying details, such as your name, will be stored separately from the rest of the questionnaires, so your participation in this study will remain anonymous and you will not be personally identified in any publication arising from the study. The information that you provide will only be accessible to authorised individuals and will be retained in a locked filing cabinet within the Division of Psychology at RMIT University for 5 years before being destroyed. Any electronic data will be stored on a secure server. Any information that you provide can be disclosed to other parties only if (1) it is to protect you or others from harm, (2) a court order is produced, or (3) you provide the researchers with written permission to do so.

Security of the website

Users should be aware that the World Wide Web is an insecure public network that gives rise to the potential risk that a user’s transactions are being viewed, intercepted or modified by third parties or that data which the user downloads may contain computer viruses or other defects.

Security of the data

This project will use an external site to create, collect and analyse data collected in a survey format. The site we are using is SurveyMonkey.com. If you agree to participate in this survey, the responses you provide to the survey will be stored on a host server that is used by SurveyMonkey.com. No personal information will be collected in the survey so none will be stored as data. Once we have completed our data collection and analysis, we will import the data we collect to the RMIT server where it will be stored securely for a period of five (5) years. The data on the SurveyMonkey.com host server will then be deleted and expunged.

What are my rights as a participant?

Participation in this study is on a voluntary basis and you are under no obligation to be involved. You have the right to withdraw your participation at any time, without prejudice. In such a case, any unprocessed data will be withdrawn and destroyed, provided it can be reliably identified. You also have the right to have any questions regarding the study answered.

Whom should I contact if I have any questions?

If you have any questions about this study, please do not hesitate to contact Peter McPherson using the contact details provided above. Alternatively, you may contact Dr Andrea Chester on 03 9925 3150 during business hours or via email at andrea.chester@rmit.edu.au
Yours sincerely,

Peter McPherson  
B. Soc. Sci. (Psy)  
B. App. Sci. (Psy)(Hons)

Any complaints about your participation in this project may be directed to the Executive Officer, RMIT Human Research Ethics Committee, Research & Innovation, RMIT, GPO Box 2476V, Melbourne, 3001. The telephone number is (03) 9925 2251. Details of the complaints procedure are available from the above address.
Invitation to Participate in a Research Project

Project Information Statement

**Discipline of Psychology**
**School of Health Sciences**

**Project Title:**

_Efficacy and cost effectiveness of brief alcohol interventions in tertiary education settings: Intervention phase_

**Principal Investigator:**

Peter McPherson  
Candidate for Doctor of Psychology, RMIT University  
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**Why have you been approached?**

You have been approached to participate because of the online questionnaire you recently completed. As was explained at the time, one of the purposes of the questionnaire was to identify students that may be interested in the programs we are offering now. Although we know not everyone will want to be involved in the study, your questionnaire results suggest you may like to participate and may find aspects of the programs particularly useful.

**What is the project about? What are the questions being addressed?**

This study has two components:

- Comparing the impact of the two programs on harmful drinking behaviours.
- Comparing the cost effectiveness of the two programs.

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**If I agree to participate, what will I be required to do?**

If you agree to participate in this study you will be randomly allocated to one of three groups: an internet group, a face-to-face group or a waiting group. The waiting group will not be involved in either the e-CHUG or BASICS program (and, as such, will not receive any treatment) until after the waiting period (about 6 months). At that time they will be able to access and complete e-CHUG.

The internet group will complete e-CHUG online – this entails answering a number of questions about your drinking behaviours and should take between 20-30 minutes. The face-to-face group will be asked to attend two face-to-face sessions. Each session will go for about 1 hour and will be led by the Principal Investigator.

Finally, all participants will be required to complete a second version of the original questionnaire in about 3 months, and again in about 6 months. You may be invited to complete it again at other times further in the future, but are under no obligation to do so.

**What are the risks or disadvantages associated with participation?**

Participating in this study should pose few, if any, risks to you outside your normal daily activities and is expected to provide many benefits. However, if you are worried about your participation, you may contact the Principal Investigator, Peter McPherson, to discuss your concerns. Contact details for other people that can help are on the card you received when you completed the questionnaire – additional cards are available on request.

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Yours sincerely,

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