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**Using the Theory of Planned Behaviour and Prototype Willingness Model to
Target**

Binge Drinking in Female Undergraduate University Students

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Abstract

The current study investigated whether binge drinking in female undergraduates could be reduced by the mere measurement effect (MME), and by altering binge drinker prototypes from the prototype willingness model (PWM). Whether willingness added to the Theory of Planned Behaviour (TPB) was also explored. Female undergraduates aged 17-25 (N=122) were randomly allocated to a prototype manipulation, mere measurement, or control group, and completed two online questionnaires separated by 14-21 days. Controlling for past behaviour, MME group consumed less alcohol than the control group, and this effect was more extreme for those who previously consumed more alcohol. However, the prototype manipulation had no effect. The TPB variables were predictive of intentions and behaviour, but willingness was not. Despite limitations, the MME could be utilised to reduce binge drinking in female undergraduates. The TPB appears to model binge drinking in female undergraduates better than the PWM, implying that binge drinking can be a reasoned behaviour.

Key words:

Theory of planned behavior, prototype willingness model, mere measurement effect, binge drinking, university students

1 Introduction

Alcohol can have adverse effects, and the risk of harm, disease or injury increases both with the amount consumed, and over time (National Health and Medical Research Council: NHMRC, 2009). Yet Australians have high rates of alcohol consumption, with almost 83% having consumed alcohol at some stage, and 8% consuming alcohol daily (Australian Institute of Health and Welfare: AIHW, 2008).

Binge drinking occurs when an excessive amount of alcohol is consumed on a single occasion (Norman, Bennett, & Lewis, 1998; Norman & Conner, 2006). Whilst number of standard drinks that constitutes a binge drinking session is not strictly defined, the U.S. Substance Abuse and Mental Health Services Administration (SAMHSA) take binge drinking to mean consuming ‘five or more drinks on the same occasion on at least one day in the past 30 days’ (2009, p. 31), and many studies have also applied this definition (e.g. Johnston & White, 2003; Lee et al., 2011; Miller, Naimi, Brewer, & Jones, 2007). Similarly, the Australian Health Guidelines recommend that consuming ‘no more than four standard drinks on a single occasion reduces the risk of alcohol-related injury arising from that occasion’ (NHMRC, 2009, p. 3). These guidelines are equivalent for males and females, because although the same amount of alcohol tends to have a greater effect on women than men, men are more likely to engage in risk-taking behaviour as a result of alcohol consumption (NHMRC, 2009).

Young adults (Norman, et al., 1998; Norman & Conner, 2006), and especially undergraduates (Slutske, 2005) have a tendency towards binge drinking, thus putting themselves at further risk of alcohol-related harm. University life can provide a social setting that facilitates excessive alcohol consumption (Roche & Watt, 1999), which appears to lead to higher binge drinking rates in undergraduates than other young adults (Gill, 2002; Slutske,

2005; SAMHSA, 2009). The rate of binge drinking and general alcohol consumption in females has been on the increase, and now appears to be similar to that of males (NHMRC, 2009; Johnston & White, 2004). This trend suggests that for females, alcohol-related health campaigns have been ineffective, and research is needed to understand and reduce binge drinking in female undergraduates.

Social cognition models within health psychology focus on understanding the cognitive determinants of social behaviours, because they are thought to be more modifiable than other behavioural factors (Conner & Norman, 1996). One model that has particularly widespread use and acceptance is the theory of planned behaviour (TPB), which arose out of the theory of reasoned action (TRA).

1.1 The Theory of Planned Behaviour

The TRA was developed by Ajzen and Fishbein (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) to explain health behaviours, and presupposes that behaviour is planned and intentional. The TRA suggests that the immediate determinant of volitional behaviour is intention, which can be understood as readiness to engage in a behaviour (Fishbein & Ajzen, 2010), or to pursue certain behavioural goals (Ajzen, 1985). The TRA also includes two determinants of intentions; attitudes and subjective norms. Attitudes towards a behaviour are considered overall favourable or unfavourable evaluations of that behaviour (Ajzen & Fishbein, 1980), whereas subjective norms are perceptions of social pressures to perform or not perform a behaviour (Ajzen & Fishbein, 1980).

Despite intentions, there may be both internal and external barriers to carrying out behaviours. Perceived behavioural control (PBC) was added to the TRA, to account for behaviours that are not completely under volitional control, and the model became the TPB (Ajzen, 1991). PBC was included in the TPB both as a predictor of intention along with

attitudes and subjective norms, and as a proximal determinant of behaviour. Under the TPB, a greater sense of control over a behaviour is generally associated with stronger intentions to engage in or abstain from that behaviour (Fishbein & Ajzen, 2010). Whilst actual control is very difficult to measure, PBC should be a behavioural predictor insofar as perceptions of control are indicative of actual control (Fishbein & Ajzen, 2010).

The TPB has predicted a wide range of behaviours including alcohol related outcomes (Conner, Warren, Close, & Sparks, 1999; Norman & Conner, 2006; O'Callaghan, Chant, Callan, & Baglioni, 1997). However, the TPB tends to better predict intentions than behaviour (Armitage & Conner, 2001; Johnston & White, 2003), a difference that has been termed the 'intention-behaviour gap'. The intention-behaviour gap is particularly noticeable for health-risk behaviours, where individuals may engage in risky behaviours without ever intending to. It has been argued that the TPB does not adequately account for the somewhat unplanned nature of health risk behaviours and therefore does not accurately predict these behaviours (Gibbons, Gerrard, Blanton, & Russell, 1998). Risk taking is often unplanned and sometimes the costs and benefits are not weighed up (Gibbons, Houlihan, & Gerrard, 2009). Resulting behaviours may therefore occur despite intentions otherwise.

1.2 The Prototype Willingness Model

The prototype-willingness model (PWM) was developed by Gibbons, Gerrard and colleagues (Gibbons & Gerrard, 1995; Gibbons, et al., 1998) to also account for non-intentional and health risk behaviours and thus more comprehensively explain behaviour. The PWM is a dual process model that consists of a reasoned pathway and a heuristic pathway (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008). Under the PWM, decisions that involve deliberation utilise the reasoned pathway (Gerrard, et al., 2008). The reasoned pathway is very similar to the TRA, and includes attitude and subjective norms as predictors

of intention, which in turn predicts behaviour (Gerrard, et al., 2008). However, the reasoned pathway does not include PBC or self-efficacy.

Although under the TPB Fishbein and Ajzen stipulate that greater sense of control leads to stronger behavioural intentions, the role of PBC is less clear cut with regards to health risk behaviours. Gibbons et al. (2009) argued that for health risk behaviours, opportunity is more important than a sense of control over the behaviour given that health risk behaviours do not usually represent goal states.

The heuristic pathway encompasses behaviours that are not necessarily thought out or planned. The heuristic pathway includes two variables; willingness, and prototype perceptions. Willingness is the proximal heuristic determinant of behaviour and is considered independent from intentions (Gerrard, et al., 2008; Gibbons, et al., 1998). Although an individual may not always plan to engage in a particular behaviour, there may be some circumstances under which they are willing to take the risk. In this way, willingness explains how risk-taking behaviour can occur without the appropriate intentions.

Prototype perceptions are images associated with the type of person who engages in a particular behaviour (Gibbons, Gerrard, Lando, & McGovern, 1991). Under the PWM, these images affect willingness to engage in the behaviour, and subsequently actual behavioural engagement. There are two aspects to prototype perceptions: similarity and favourability. The more similar the individual feels to the prototype, and the more (relatively) favourably the individual considers the prototype, the more willing the individual will be to engage in the behaviour. Many studies have found that behaviours are determined by prototypes over and above the TPB variables (e.g. Norman, Armitage, & Quigley, 2007; Ravis, Sheeran, & Armitage, 2006). Prototypes do not necessarily represent goal states, as individuals tend to hold risk-taking prototypes that are more negative than their self concepts (Gerrard, et al., 2002). However, prototypes can still be motivational, as some individuals, particularly

adolescents or young adults, may be willing to take the risk for behaviours that are associated with socially accepted and (relatively) favourable images (Gerrard, et al., 2002).

Despite much correlational research into the PWM, very few studies have utilised it to attempt to change behaviour. Blanton et al. (2001) investigated the impact of manipulating prototypes on willingness to have unsafe sex in students. The manipulation consisted of a bogus newspaper report that described those who engaged in unsafe sex as selfish and irresponsible. The prototype manipulation was successful in reducing willingness, although actual behaviour was not measured. Another prototype manipulation study targeted tanning booth use in students (Gibbons, Gerrard, Lane, Mahler, & Kulik, 2005). Those who were shown UV photographs of their faces engaged in less tanning booth use in the three to four week follow-up.

To date no PWM-based manipulation studies targeting binge drinking have been recorded. Time-consuming and multi-session alcohol interventions (e.g. Gerrard, et al., 2006) are not very practical or cost effective for targeting binge drinking given its prevalence amongst university students (SAMHSA, 2009). It would therefore be useful to explore whether a brief binge drinker prototype manipulation could reduce the proportion of binge drinkers and levels of alcohol consumption in female undergraduates.

1.3 The Mere Measurement Effect

Merely completing behavioural intention questions can bring about behavioural changes (Godin, Sheeran, Conner, & Germain, 2008). This effect is commonly known as the mere measurement effect (MME). Intention measures increase the accessibility of previously formed attitudes relating to the behaviour, leading to behavioural outcomes that are generally more consistent with the individual's attitudes (Morwitz & Fitzsimons, 2004). Gerrard, et al. (2002) found that binge drinker prototypes did not represent goal states, as these images were

more negative than the individuals' self images. If individuals hold negative views of binge drinking, then completing binge drinking intention measures may result in a reduction in binge drinking.

The MME has been predominantly studied in marketing and consumer research (e.g. Dholakia & Morwitz, 2002; Morwitz & Fitzsimons, 2004), however there has been recent research involving health behaviours. For example, Godin et al. (2008) reported that participants who completed a TPB-based questionnaire on blood donation were more likely to donate blood 6 and 12 months later than those who did not complete the questionnaire. The MME has never been investigated with regards to binge drinking before. However, if female undergraduates view binge drinking somewhat negatively, then the MME may lead to reduced binge drinking for those individuals.

1.4 Study Aims and Hypotheses

Binge drinking in undergraduates has health and social consequences. With female binge drinking on the rise, research is needed to better understand the reasons for binge drinking amongst females, so that interventions to reduce binge drinking in females are theoretically and empirically driven. Whilst the TPB can explain the planned aspects of decisions surrounding binge drinking, the PWM may help to explain the unplanned or heuristic elements of such a decision. In the current study, the TPB variables were therefore expected to predict binge drinking intentions and behaviour. Those with more favourable attitudes and subjective norms, and stronger PBC were predicted to have stronger binge drinking intentions, and those with stronger binge drinking intentions and stronger PBC were expected to be more likely to engage in binge drinking. However, willingness was expected to explain additional variance in binge drinking behaviour above the TPB variables, such that those more willing to engage in binge drinking would be more likely to actually engage in binge drinking. If willingness is predictive of binge drinking behaviour, it would suggest that

there is an unplanned element to binge drinking in females, unlike the previous assumptions of the TPB.

The current study also attempted to reduce binge drinking by utilising both a TPB based MME, and binge drinker prototypes. Although the manipulations were directed at reducing the proportion of binge drinkers, it is also possible that the manipulations will affect total alcohol consumption in individuals. Whether the MME is sufficient to reduce binge drinking in female undergraduates was explored. Those who completed TPB questions relating to binge drinking were expected to (a) be less likely to binge drink, and (b) consume less alcohol two weeks later compared to those who did not complete such questions. In addition, the effects of a novel prototype manipulation were tested. Those who participated in a brief manipulation to increase negative binge drinker prototype perceptions were expected to (a) be less likely to engage in binge drinking, and (b) consume less alcohol two weeks later than those who only completed TPB questions relating to binge drinking.

2 Elicitation

An elicitation survey was conducted to (a) gauge understanding of both the standard drink measure and the concept of binge drinking to be utilised in the main study; and (b) develop a manipulation that would be likely to alter binge drinker prototypes within the target population. Eleven female first year psychology students participated in the elicitation survey, which was conducted online.

Participants were asked about personal alcohol consumption, understanding of and confidence in using the standard drink measure of alcohol, and understanding of what it means to engage in binge drinking. Although the majority of participants were aware of the standard drink measure, they tended to find this measure confusing to apply to their own alcohol consumption. Therefore, to increase the accuracy of reported alcohol consumption,

the main study included a standard drink definition and a diagram of standard drink units contained in common alcoholic drinks, adapted from the NHMRC guidelines (2009).

Participants then received a prototype description, adapted from Gibbons et al. (1995, p. 87), and definitions of binge drinking and standard drinks. Participants were asked about the saliency of the binge drinker image and positive or negative associations with this image, whether they felt that their binge drinking behaviour is influenced by anyone and if so who, and if anything else would influence their alcohol consumption.

The binge drinker image appeared to be very salient, as ten out of eleven participants were aware of what binge drinking involved. However, there appeared to be slight confusion between binge drinking (e.g. consuming an excessive amount of alcohol on a single occasion) and drinking frequently (e.g. drinking a small number of drinks each day).

When asked how many standard drinks constitute a binge drinking occasion, seven participants indicated between four and six. The responses seemed in accordance with the NHMRC guidelines (2009), and other studies (Johnston & White, 2003; C. M. Lee, et al., 2011; Miller, et al., 2007). Therefore, the binge drinking definition of consuming five or more standard drinks on a single occasion was retained for the current study.

Participants described the type of person who engages in binge drinking, for example, as 'messy', 'bad hygiene', 'young teenagers', 'uneducated', 'out of control', 'immature', and 'low in self esteem'. These findings suggest that the typical binge drinker is perceived negatively. Words were chosen from these descriptions to create the negatively framed binge drinker prototype manipulation that was relevant to the sample.

3 Method

3.1 Design

The preliminary sample was 159 first year university students. However, data from males ($N=18$), those over 25 ($N=8$), and those with incomplete surveys ($N=11$) were excluded to give a more specific and uniform sample. The final sample was 122 females, aged between 17 and 25 (mean= 19, $SD= 1.5$). The majority (82%) lived with their parents.

Participants completed two questionnaires online, separated by two to three weeks. This time frame was short enough for TPB measures to still be predictive of behaviour, as recommended by Ajzen and Fishbein (1980), but gave participants enough time to engage in the target behaviour. Participation was anonymous and in exchange for course credit. This study had ethics approval from the University Human Research Ethics Committee.

3.2 Measures

Participants were randomly allocated to one of three conditions: (1) a manipulation group, (2) a mere measurement group, or (3) a control group. Each group completed the same demographics and a behaviour component. Group 1 completed a binge drinking prototype manipulation and a TPB component, group 2 completed an alternative prototype task on bottled water consumption and a TPB component, and group 3 completed an unrelated task based on a bottled water article only. Questionnaires were first piloted to ensure that all items were clear.

3.2.1 Prototype component.

Participants in the manipulation and mere measurement groups were presented with a detailed prototype description, adapted from Gibbons et al. (1995, p. 87): ‘The following questions concern your images of people. What we are interested in here are your ideas

about typical members of different groups. For example, we all have ideas about what typical movie stars are like or what the typical grandmother is like... We are not saying that all movie stars or all grandmothers are exactly alike, but rather that many of them share certain characteristics.' The manipulation and mere measurement groups completed prototype questions about either the 'type of person who engages in binge drinking' or the 'type of person who consumes bottled water'.

The prototype manipulation group were presented with bogus survey results about perceptions of the typical binge drinker. Blanton et al. (2001) previously manipulated behaviour with a bogus newspaper article, in which the typical person who engaged in unprotected sex was portrayed negatively. The bogus results in the current study indicated that other first year students viewed the typical binge drinker very negatively. The descriptive words and reference group used for the manipulation were developed from the responses of an elicitation survey.

3.2.2 Theory of planned behaviour component.

TPB variables were measured directly on a seven-point likert scale and informed by Ajzen and Fishbein (1980). These items were adapted from those that Norman et al. (2007) applied to binge drinking. Five semantic differentials were used to assess attitudes (engaging in a binge drinking session in the next 2 weeks would be: e.g. *bad/good*, *harmful/beneficial*, $\alpha = .815$). Subjective norms were assessed with two items (e.g. most people who are important to me would *approve/disapprove* of me engaging in a binge drinking session in the next 2 weeks, $\alpha = .628$). Two PBC items were included (e.g. whether or not I engage in a binge drinking session in the next 2 weeks is under my control: *strongly disagree/strongly agree*, $\alpha = .185$, see results section). Two self-efficacy measures were included to increase the internal reliability of PBC, as recommended by Ajzen (2002) (e.g. if I wanted to, I could

easily engage in a binge drinking session in the next 2 weeks: *strongly disagree/strongly agree*, $\alpha=.927$). Intention was also measured with two items (e.g. do you intend to engage in binge drinking in the next 2 weeks? *definitely/definitely not*, $\alpha= .833$).

In addition, three typical willingness items were used that have successfully assessed willingness to consume alcohol in undergraduates in previous research (e.g. Blanton, Gibbons, Gerrard, Conger, & Smith, 1997). These items were based on a hypothetical scenario, to reduce social desirability bias (Gibbons, et al., 1995) (Suppose you were with some friends at a party and one of them offered you some kind of alcoholic drink. How willing would you be to: *take it and try it? / say “no thanks”? / leave the situation?* $\alpha=.779$).

3.2.3 Alternative control task.

Those in the control group only also completed an unrelated task based on a newspaper article about bottled water consumption (J. Lee, 2008). Participants read the article and answered a series of comprehension questions.

3.2.4 Behaviour component.

Behaviour was measured for all groups at the end of the baseline questionnaire, and also as the sole component of the follow-up. Participants were provided with a pictorial representation of the standard drinks contained in common alcoholic beverages, adapted from the Australian NHMRC alcohol guidelines (2009). Participants indicated whether or not they had consumed any alcohol in the past 14 days, and if so on how many occasions. For each occasion that alcohol was consumed, participants then indicated how many standard drinks they had consumed on that occasion. The behaviour component included items about bottled water consumption to mask the experimental design.

4 Results

4.1 Outcome Measures

Participants were divided into two groups; those who had consumed five or more standard drinks on at least one occasion in the 14 days prior to the follow-up, and those who had consumed at most four standard drinks, based on the NHMRC guidelines (2009), and the elicitation survey. This dichotomised measure was used as an outcome variable, indicating the likelihood that participants would engage in binge drinking at the follow-up. A similar measure was developed for baseline consumption, to be used as an indicator of past behaviour. At the baseline, 29.5% of participants had engaged in binge drinking at least once in the previous 14 days, although 41% had not consumed any alcohol.

The manipulation, whilst targeting binge drinking, may also affect overall alcohol consumption. A measure of total alcohol consumption at the follow-up was therefore created as an additional outcome variable for determining MME and manipulation effects. The alcohol frequency measure was also calculated for baseline consumption to be used as a past behaviour measure. In the 14 days prior to the baseline, participants consumed between zero and 61 standard drinks, with an average per person of 6 drinks ($SD=9.7$).

4.2 Descriptive Statistics

All participants from the manipulation and mere measurement groups ($N=80$) completed TPB and willingness items. Apart from PBC, all other variables had acceptable reliability coefficients.

The PBC items had low reliability ($\alpha=.657$). Further analysis of the item-total statistics revealed that one of the PBC measures did not correlate very highly with the other three items (corrected item-total correlation=.108). Removing this item increased the

reliability to $\alpha = .817$, which is more acceptable, and less likely to compromise the PBC construct.

All the TPB variables, behaviour variables and willingness were significantly correlated with each other, except for willingness, which did not correlate with whether or not participants engaged in binge drinking at the follow-up.

4.3 Predicting Binge drinking Intentions

A simultaneous multiple regression was conducted with subjective norms, attitude and PBC as predictors of intention. Together, these variables significantly accounted for 55.2% of the variance in intention, $F(3,76) = 31.20, p < .001$, and were all significant independent predictors. Those with more positive subjective norms and attitudes and stronger PBC tended to have stronger intentions to binge drink, controlling for the other TPB variables. Subjective norms accounted for the highest proportion of variance in intention.

4.4 Predicting Binge drinking Behaviour

Two steps in a hierarchical logistic regression were used to predict whether or not participants engaged in binge drinking from (a) intention and PBC, and (b) willingness (see Table 1).

Intention and PBC significantly predicted whether or not participants engaged in binge drinking, $\chi^2(2, N = 80) = 24.65, p < .001$, and accounted for 40.4% of variance (based on the Nagelkerke R^2). Intention was a significant independent predictor of behaviour, $\beta = .276, \text{Wald } \chi^2(1, N = 80) = 7.617, p = .006$, such that those with stronger intentions were more likely to binge drink; but PBC was not.

Adding willingness to the regression did not produce a significant step in the model, $\Delta\chi^2(1, N = 80) = 1.65, p = .200$. Intention remained a significant independent predictor, $\beta = .329, \text{Wald } \chi^2(1, N = 80) = 8.585, p = .003$.

----Table 1-----

4.5 Manipulation and Mere Measurement Effects

Participants who abstained from alcohol in the 14 days prior to the baseline questionnaire were excluded from the manipulation and MME analyses, leaving a sample of 72. Two dummy coded variables were formed with the mere measurement group as the reference. The manipulation and control groups became the first and second comparison groups respectively.

Firstly, the effects of the MME and manipulation on the proportion of binge drinkers at the follow-up were analysed using hierarchical logistic regression. Secondly, the MME and manipulation effects on the total number of standard drinks consumed were analysed using a hierarchical multiple regression.

A one-way ANOVA showed that at the baseline, after excluding abstainers, total alcohol consumption did not significantly differ between groups, $F(2,69) = 0.469, p = .627$.

4.5.1 Experimental effects on proportion of binge drinkers.

Past binge drinking was entered in the first block of a hierarchical logistic regression, and significantly explained 18.2% (Nagelkerke R^2) of the variance in whether participants engaged in binge drinking, $\chi^2(1, N = 72) = 10.34, p = .001$. Adding the experimental dummy variables in the second block did not significantly add to the variance explained, $\Delta\chi^2(2, N = 72) = 4.535, p = .104$. The third block tested interaction effects between the

dummy coded variables and past binge drinking, which although close was also not significant, $\Delta\chi^2 (2, N = 72) = 5.958, p = .051$. None of the variables were significant independent predictors at this step.

4.5.2 Experimental effects on total alcohol consumption.

Multiple regression analysis was used to determine whether the manipulation or MME had any influence on the total number of drinks consumed in the 14 days prior to the follow-up, whilst controlling for past consumption (see Table 2).

Past alcohol consumption significantly predicted follow-up alcohol consumption in the first step, $F(1,70) = 47.522, p < .001$, and accounted for 40.4% of the variance in behaviour. The second step which added the dummy coded MME and manipulation variables did not significantly add to the model, $\Delta R^2 = .038, \Delta F(2,68) = 2.293, p = .109$, and the manipulation variable was not significant. However, the MME variable was a significant independent predictor of behaviour, $\beta = .241, t(68) = 2.140, p = .036$.

Controlling for past behaviour, those in the mere measurement group tended to consume less alcohol at the follow-up than those in the control group.

Past behaviour-group interactions were added in the third step of the model, and together accounted for a significant amount of additional variance in behaviour, controlling for main effects, $\Delta R^2 = .126, p = .013$. The interaction between past behaviour and the mere measurement dummy variable was significant, $\beta = .552, t(66) = 3.105, p = .003$, such that amongst those who previously consumed more alcohol, there was a greater reduction in binge drinking for those in the mere measurement group relative to the control. In comparison, there was little difference in alcohol consumption rates between these groups at the follow-up for those who previously consumed less alcohol.

----Table 2----**5 Discussion**

The current study was the first known to attempt to reduce binge drinking in undergraduates by (a) using the TPB to induce a MME, and (b) applying a prototype-based manipulation. The study also investigated the TPB in relation to binge drinking behaviour, and whether willingness explained additional variance in the model.

The MME was supported in the current study. Although there was no reduction in the proportion of binge drinkers, there was a significant reduction in total alcohol consumption, especially for those who previously consumed more alcohol. This is in contrast to Sandberg and Conner (2009), who found no past behaviour-MME interaction on cervical screening attendance. However, MME research in relation to health behaviours has been limited.

The MME occurs when measuring behavioural intentions results in behavioural changes. Measuring intentions increases the accessibility of previously formed attitudes towards a behaviour, which then leads to changes in behaviour that are more consistent with these attitudes (Morwitz & Fitzsimons, 2004). It therefore appears that individuals in the current study held negative attitudes towards binge drinking. This is plausible, given that the elicitation participants held negative opinions of binge drinking, and Gerrard et al. (2002) found that individuals who consumed alcohol held negative images of binge drinkers compared to their self images. However, the MME should be explored in relation to binge drinking with follow-up research and replication, to rule out alternative explanations such as unreliable behavioural measures.

The prototype manipulation was unsuccessful at reducing the proportion of binge drinkers and the total amount of alcohol consumed, controlling for possible MME. There has been limited previous research utilising the PWM to reduce risk-taking behaviours, and none

targeting binge drinking. However, other brief prototype interventions (Blanton, et al., 2001; Gibbons, et al., 2005) have been successful, suggesting that altering prototypes can result in behaviour change in certain circumstances. Binge drinking is very common amongst undergraduates and young adults, and adolescents have been reported to have very strong binge drinker stereotypes (Snortum, Kremer, & Berger, 1987). It is therefore possible that binge drinking is less malleable than other health behaviours.

Prototype manipulations may not be relevant for female binge drinkers. Given that willingness did not help to explain binge drinking in the current study, it is possible that female undergraduate binge drinkers do not consider the binge drinker prototypes when choosing to binge drink. Further research could investigate whether the manipulation used effectively reduces binge drinking in a male population.

There may be other aspects of prototype perceptions that have more influence over behaviour. Future studies could focus on decreasing perceptions of similarity to the binge drinker prototype, as prototype similarity may be more influential on behaviour than favourability (Hyde & White, 2009; Norman, et al., 2007; Ravis, et al., 2006). Additionally, Zimmermann and Sieverding (2011) recently investigated the dimensions of drinker prototypes, and found that those who held more hedonistic and social drinker prototypes both intended to drink more and were more willing to consume excessive alcohol; whereas responsibility was unrelated to intention and willingness. The current study may have been targeting binge drinker prototypes that were not relevant to the target population, and studies should build on the current study and the work of Zimmermann and Sieverding to develop a way to reduce excessive drinking amongst undergraduates.

As expected, attitudes, PBC and subjective norms were all significant independent predictors of binge drinking intentions, explaining 55.2% of the variance in intentions, which was more than reported in Armitage and Conner's (2001) meta-analysis, but less than other

studies investigating binge drinking (Johnston & White, 2003; Norman, et al., 2007). The strongest independent predictor of intentions was subjective norms. Quine et al. (1998) noted that subjective norms rather than attitudes tend to predict intentions for behaviours performed in public or around others. The social nature of binge drinking may make it more susceptible to social influences, and the individual's personal attitudes may play a less important role when forming binge drinking intentions.

PBC unexpectedly did not predict binge drinking behaviour, yet other alcohol-related studies have found similar results (Armitage, Conner, Loach, & Willetts, 1999; Glassman, Braun, Dodd, Miller, & Miller, 2010; Jamison & Myers, 2008). Fishbein and Ajzen (2010) note that PBC is not relevant when the behaviour is under volitional control. In addition, Gibbons et al. (2009) argue against the relevance of PBC to health risk behaviours, given that these behaviours don't often represent goals. Gibbons et al. noted that health-risk behaviours depend more on opportunity than a sense of control over behaviour.

Willingness was not a significant independent predictor of behaviour after controlling for intentions and PBC, which is contrary to previous research into other behaviours (e.g. Hukkelberg & Dykstra, 2009; Ravis, et al., 2006). If binge drinking is better explained by the TPB than the PWM, then this implies that for females, binge drinking is a reasoned rather than unplanned behaviour, which has consequences for how risk-taking behaviours are conceptualised. Future studies may wish to focus on TPB variables to attempt to reduce binge drinking in female undergraduates.

The current study consisted of only female participants, which may explain why willingness was not predictive of binge drinking over the TPB variables. Zimmermann and Sieverding (2010) recently found that willingness was predictive of social drinking for males, but not for females. Social drinking in female participants was only predicted by the TPB and therefore appears to be a planned behaviour, which Zimmermann and Sieverding suggest

may be the result of either gender differences in alcohol consumption, or the traditional social drinker images that are masculine and of a risk-taking nature. The current study therefore supports the findings of Zimmermann and Sieverding; and suggests a gender difference in the decision-making process surrounding binge drinking. To further support this claim, more research with a focus on the determinants of binge drinking in male undergraduates is warranted.

There were some general methodological limitations to the current study. Self-report measures of behaviour such as those used in the current study tend to be susceptible to social desirability bias, which can lead to under-reporting of socially undesirable behaviours such as binge drinking (Davis, Thake, & Vilhena, 2010). However the TPB is a good predictor of both actual and self-reported behaviour (Armitage & Conner, 2001). It is difficult to gain accurate objective measures of alcohol consumption, and self-report provides a practical alternative.

Neither the prototype manipulation nor MME were successful in reducing the proportion of binge drinkers. By dichotomising the binge drinking outcome measure, it is likely that power was lost compared to similar continuous variables (such as total alcohol consumption), as is the nature of simplifying the data. Although creating a dichotomous binge drinking outcome variable was necessary for the analyses, further research with alternative outcome measures may be useful to better understand the MME, and the prototype manipulation null-effects.

The current study targeted binge drinking in female psychology undergraduates from an Australian university. The pattern of results may be different for male undergraduates, as gender differences in both patterns of alcohol consumption (AIHW, 2008) and beliefs (NHMRC, 2009; Zimmermann & Sieverding, 2010) have been reported. In addition, only 29.5% of participants engaged in binge drinking in the two week period, which was less than

reported in another Australian study (Johnston & White, 2003), the U.S. (Keeling, 2002) and the UK (Norman, et al., 2007). Thirty-nine percent of participants consumed no alcohol at the baseline, which was a higher proportion of abstainers than reported in a New Zealand study (Kypri, et al., 2009). These sample differences may contribute to the results found and therefore may limit the extent to which the results can be generalised.

Despite the limitations, the current study was an important and novel investigation into binge drinking in undergraduates, and has identified possible avenues for interventions. It was found that brief prototype manipulations are ineffective for reducing binge drinking and future research could utilise perceived similarity instead of favourability. This finding also implies that perceptions of the typical binge drinker are not as malleable as other prototypes, such as those surrounding tanning booth use (Gibbons, et al., 2005).

The current study showed that alcohol consumption can be reduced quickly and efficiently in those who consume large amounts of alcohol merely by completing TPB questionnaires about binge drinking. Other studies have found the MME to last for up to one year (Dholakia & Morwitz, 2002; Godin, et al., 2008), which further emphasises the importance of MME interventions. However, more research is needed to confirm both the robustness and cause of this effect. Binge drinking in undergraduates should be targeted, considering that they tend to binge drink more than other young adults (Slutske, 2005).

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Table 1

Logistic regression: Predicting binge drinking behaviour with an extended TPB

Block	Variable	B (log OR)	SE	Wald	χ^2	$\Delta\chi^2$	p
1	Intention	.276	.100	7.617			.006
	PBC	.143	.090	2.517			.113
	Constant	-5.520	1.555	12.594			<.001
					24.645		<.001
2	Intention	.329	.112	8.585			.003
	PBC	.166	.094	3.103			.078
	Will	-.109	.087	1.560			.212
	constant	-4.803	1.596	9.058			.003
					26.290		<.001
					1.645		.200

Note. N= 80. B= Unstandardised regression coefficient, OR= odds ratio, SE= standard error, χ^2 = chi squared, $\Delta\chi^2$ = change in chi squared, PBC= perceived behavioural control, Will= willingness BDT1= past binge drinking behaviour (dichotomous).

Model	Variables	β	t	R^2	ΔR^2	p
Block 1	Past behaviour	.636	6.894			<.001
				.404		<.001
Block 2	Past behaviour	.634	6.955			<.001
	Dum12	.136	1.202			.234
	Dum32	.241	2.140			.036
				.442		<.001
				.038		.149
Block 3	Past behaviour	.503	2.723			.008
	Dum12	.160	1.060			.293
	Dum32	-.165	-.999			.321
	Dum12xPB	-.077	-.412			.682
	Dum32xPB	.552	3.105			.003
				.568		<.001
				.126		.013

Table 2

Multiple regression: Experimental effects on total alcohol consumption at the follow-up

Note. N=72. β = standardised regression coefficient, Past behaviour= total past alcohol consumption, Dum12= comparison between group 1 (manipulation) and 2 (mere measurement), Dum32= comparison between group 3 (control) and group 2 (mere measurement), Dum12xPB = interaction between Dum12 and past behaviour, Dum32xPB= interaction between Dum32 and past behaviour.

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Todd and Mullan identified the research questions. Todd conducted background literature research, designed the study, collected the data and analysed the results. Todd and Mullan interpreted the results. Todd wrote the first draft of the manuscript and Todd and Mullan edited the manuscript and provided final approval.

Conflicts of interest:

Both authors declare that they have no conflicts of interest.