Do gender and year of study affect the ability of the theory of planned behaviour to predict binge drinking intentions and episodes?

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Abstract

Background: The present study tested the utility of the Theory of Planned Behaviour (TPB), augmented with anticipated regret, as a model to predict binge drinking intentions and episodes among female and male undergraduates and undergraduates in different years of study.

Method: Undergraduate students (N = 180, 54 males, 126 females, 60 per year of study) completed baseline measures of demographic variables, binge drinking episodes (BDE), TPB constructs and anticipated regret. BDE were assessed one-week later.

Results: The TPB accounted for 60% of the variance in female undergraduates' intentions and 54% of the variance in male undergraduates' intentions. The TPB accounted for 57% of the variance in intentions in first year undergraduates, 63% of the variance in intentions in second year undergraduates and 68% of the variance in intentions in final year undergraduates. Follow-up BDE was predicted by intentions and baseline BDE for female undergraduates as well as second and final year undergraduates. Baseline BDE predicted male undergraduates' follow-up BDE and first year undergraduates' follow-up BDE.

Conclusion: Results show that while the TPB constructs predict undergraduates' binge drinking intentions, intentions only predict BDE in female undergraduates, second and final year undergraduates. Implications of these findings for interventions to reduce binge drinking are outlined.

Keywords: gender, year of study, alcohol, binge drinking, TPB, regret

Introduction

Binge drinking is a pattern of heavy alcohol consumption characterised by drinking more than medically recommended guidelines on a single occasion; in the UK guidelines are expressed using units of alcohol, where a unit of alcohol is 10ml of pure alcohol. Although there is evidence that people in the UK are unclear what binge drinking means (Cooke et al., 2010; Lovatt et al., 2016), medical guidelines (NHS, 2011) define binge drinking as consuming more than 8 units of alcohol in a single session for men, or consuming more than 6 units of alcohol in a single session for women. Binge drinking is most prevalent among people aged 25 and under and is common among UK undergraduates (Davoren et al., 2016). In 2010/11, binge drinking cost the National Health Service and UK Police force a combined £21 billion (Home Office, 2012); binge drinking was linked to 1 million alcohol-related violent crimes (Chaplin et al., 2011) and 1.2 million alcohol-related hospital admissions (Health & Social Care Information Centre, 2012). Given the consequences associated with binge drinking it is critical to identify variables that predict binge drinking to identify targets for intervention.

The theory of planned behaviour

Ajzen's (1991) Theory of Planned Behaviour (TPB) is a model that has been frequently used to predict health behaviours. The TPB posits that the proximal determinant of any behaviour is a person's intention to perform that behaviour (i.e., 'I intend to engage in binge drinking'), with individuals who express positive intentions more likely to perform the behaviour than individuals who express negative intentions. The TPB identifies three predictors of intentions: attitudes, subjective norms and perceived behavioural control (PBC). Attitudes are evaluations of behavioural performance ('For me to engage in binge drinking would be enjoyable-unenjoyable'); subjective norms reflect perceptions of social approval for engaging

in behaviour ('Most people I know would approve of me engaging in binge drinking'), while PBC represents perceptions of control over behaviour performance. Ajzen (2002) states that PBC can be viewed as a combination of self-efficacy, one's perception of confidence in performing behaviour ('I am confident I can engage in binge drinking), and perceived control, one's perceptions of external barriers to behavioural performance ('Engaging in binge drinking is under my control'). To the extent that PBC is an accurate reflection of control over behavioural performance it can also predict behaviour.

Several studies have applied the TPB to predict binge drinking in UK undergraduates (Cooke & French, 2011; Cooke et al., 2007; Elliot & Ainsworth, 2012; French & Cooke, 2012; Norman, 2011; Norman & Conner, 2006; Norman et al., 2007; Norman et al., 2012). Results from these studies support the model's predictions. Moreover, Cooke et al.'s (2016) meta-analysis of studies applying the TPB to alcohol consumption showed that the TPB predicts binge drinking effectively. They found attitudes ($r_+ = 0.74$) and self-efficacy($r_+ = 0.50$) had large-size relationships with intentions and that subjective norms ($r_+ = 0.48$) and PBC ($r_+ = 0.44$) had medium–sized relationships with intentions. Intentions had a large-sized relationship with binge drinking ($r_+ = 0.52$) while self-efficacy ($r_+ = 0.33$) and PBC had medium-sized relationships with binge drinking ($r_+ = .31$). Overall, results support the utility of the TPB as a model to predict binge drinking intentions and episodes.

However, it has been argued that the TPB fails to fully capture emotional aspects of binge drinking, such as joy and regret (Carrera et al., 2012). In general, research has shown that the TPB benefits from including measures of emotion. For example, Sandberg and Conner's (2008) meta-analysis showed that anticipated regret, perceiving that one would feel regret at not performing a behaviour (Richard et al., 1995), added, on average, 7% to the variance accounted for in intentions by TPB variables. To date, three studies using the TPB to predict alcohol consumption have also measured anticipated regret: Ajzen and Sheikh (2013)

found regret predicted intentions to avoid, and intentions to drink, alcohol, Carerra et al. (2012) found no effect of regret on intentions to drink alcohol, while Cooke et al. (2007) found regret predicted intentions to avoid binge drinking better than TPB variables. Given variation in results, a further test of the role of anticipated regret as a predictor of binge drinking intentions is needed.

Gender differences in binge drinking

Men are more likely to engage in binge drinking than women (Health & Social Care Information Centre, 2013) and frequently performing a behaviour typically leads to behaviour being more under habitual versus intentional control; Ouellette and Wood (1998) noted that the past behaviour-future behaviour relationship was higher for *frequently* performed behaviours compared to *infrequently* performed behaviours. Conversely, they found that the intention-future behaviour relationship was higher for infrequently versus frequently performed behaviours. Thus, because binge drinking is performed *more* frequently by men than women, it is likely that the TPB will be a better model for women's binge drinking behaviour, because women engage in binge drinking (relatively) infrequently. In contrast, as men engage in binge drinking (relatively) frequently their binge drinking intentions and behaviour, may be better accounted for by habitual factors (i.e., past binge drinking behaviour) than the TPB. Existing research has rarely examined the impact of gender on TPB relationships for alcohol consumption. To date, only Zimmermann and Sieverding (2010) have considered this issue. They found that self-efficacy predicted female and males' intentions and that subjective norms predicted women's, but not men's, intentions. In a female only sample, Todd and Mullan (2011) found that subjective norms were the best predictor of intentions. In a male only sample, Kim and Hong (2013) found that subjective norms and PBC were better predictors of intentions compared to attitudes. Thus, as no studies have compared the prediction of the TPB for binge drinking among female and male

undergraduates, it is unclear if there are differences in the effectiveness of the TPB as a model to predict binge drinking intentions and episodes.

Year of study and binge drinking

In a sample of almost 6000 undergraduates recruited from a UK university Bewick et al. (2008) found that first year undergraduates consumed more alcoholic units than undergraduates in other years of study. Similarly, a study conducted by Ferrer et al. (2012) in the USA found that undergraduates reported higher consumption in their first year compared to their second year. Ferrer et al. argued that results reflected different pressures at different points of the degree. For first years, the pressure is to make new friends, a process that is often by facilitated by binge drinking, while second years are more focused on academic achievement. As noted above, when a behaviour is performed more frequently, it is likely to become under habitual control. Therefore, the TPB is likely to be a better model of binge drinking intentions and episodes in later years of study versus earlier years of study. As no previous research study has applied the TPB to predict binge drinking in different years of study it is unclear how, or if, year of study affects TPB relationships for binge drinking.

Study Hypotheses

The present study tests four hypotheses. Hypothesis 1 is that subjective norms would be a better predictor of binge drinking intentions for female versus male undergraduates. Hypothesis 2 is that the TPB would account for more variance in binge drinking episodes among female undergraduates compared to male undergraduates. Hypothesis 3 is that different TPB variables would predict binge drinking intentions in different years of study. Hypothesis 4 is that the TPB would account for less variance in binge drinking episodes among first year undergraduates' relative to second year and final year undergraduates.

Method

Participants

The study received institutional review board approval from a university in central England. One hundred and eighty undergraduates aged 18-42 (M= 20.15, SD = 3.16) were recruited. Participants were recruited from a university in central England via a student participation system and posters and also via the social networking site Facebook. Information about the study focused on university students' alcohol consumption, although no eligibility criteria were implemented. Sixty participants were recruited from each year of study (first, second, final[1]). Overall, 70% of participants were female and 30% male. Seventy-five percent of participants studied psychology, 12% studied business, and 5% studied science, with other undergraduates studying a range of subjects. 67% of participants lived off campus and 33% of participants lived on campus.

Design and Procedure

A prospective design was used. All participants gave informed consent prior to taking part in the study and confidentiality was maintained by asking students to generate a personal information code that protected their identity but allowed the researchers to match data at baseline and one week follow-up. Initially, participants were emailed the baseline questionnaire to complete and return. The questionnaire began with a series of items assessing participant age, gender, subject and year of study. Participants were next asked to outline their past alcohol consumption and the other baseline measures listed below. One week later participants were emailed the follow-up questionnaire. After completing the follow-up questionnaire all participants were emailed a debrief sheet explaining the purpose of the study. First and second year students received course credit for their participation.

Baseline Measures

[1] The university where data was collected encourages undergraduates to take a placement year to gain work experience. Undergraduates return after this year to complete a final year of study that is, effectively, the third year of their degree programme.

Initially, participants were asked to report how many units of alcohol they drank on each day in the previous week and then summing the values together. To help with this calculation the questionnaire included a chart showing the amount of alcohol units in a particular drink (e.g., a pint of ordinary strength beer (Carling Black label, Fosters) = around 2 units). The information was repeated in the footers of each page of the questionnaire. Participants were also provided with a definition of 'binge-drinking': '**Binge drinking'** is defined as drinking at least twice the daily 'sensible' drinking guidelines alcoholic units in a single session, which equals **more** than **6 units for women** and **more** than **8 units for men.**

TPB variables were measured using items from Cooke et al. (2007) or Norman and Conner (2006). All items used a five-point response scale. *Attitudes* were measured by responses to the stem 'Drinking 6(Female)/ 8(Male) units or more in a single session in the next week would be...' on five bipolar scales e.g., 'foolish-wise' (alpha = 0.79). *Subjective norms* were measured using two items e.g., 'People who are important to me think I *Should-Should not* engage in binge drinking behaviour in the next week' (alpha = 0.81). *PBC* was measured by four items e.g., 'How much control do you have over whether or not you engage in a binge drinking session over the next week?' (alpha = 0.77). *Self-efficacy* was measured using four items e.g., 'For me engaging in a binge drinking session over the next week would be Easy/Difficult', (alpha = 0.86). *Intentions* were measured using four items e.g., 'I will try to drink less than 6 (females)/ 8 (males) units in a single session in the next week' (alpha = 0.82). *Anticipated regret* was measured using two items e.g., 'In the next week I would feel regret if I drank more than 6(Female)/ 8(Male) units in a single session' (alpha = 0.75).

Follow-up measures

At one week follow-up, alcohol consumption was measured as the quantity of units consumed by participants on each day of the week following completion of questionnaire. The measure was identical to that used to measure baseline alcohol consumption.

Binge drinking episodes (BDE)

Unit values were used to create an index of binge drinking episodes (BDE) for each timepoint. To create the index the following conversions were applied, based on the binge drinking definitions mentioned above (i.e., binge-drinking is defined as drinking more than six units in a single session for females/more than eight units in a single session for males). Any day participants drank more units than these cut-offs was converted into a value of one (i.e., the presence of a binge drinking episode), while days where they drank units less than or equal to the cut-off were converted into a value of zero (i.e., the absence of a binge drinking episode). Finally, values were summed to produce an index that ranged from zero to seven.

Analyses

Data analysis proceeded in three stages. First, we compared mean scores for study variables by gender and year of study. Independent group t-tests were used to compare results by gender and oneway ANOVAs were used to compare results by year of study. Second, we compared prediction of binge drinking intentions and episodes for female and male undergraduates using hierarchical linear regressions. In these analyses, baseline BDE was entered at step 1, TPB variables were entered at step 2, with anticipated regret added at step 3. Finally, we compared prediction of binge drinking intentions and episodes for first, second and final year undergraduates using hierarchical linear regressions. In these analyses, baseline BDE was entered on step 1, with TPB predictors entered on step 2. All analyses were performed in SPSS 21.

Results

Mean scores for study variables according to gender and year of study

Table 1 displays the mean scores for study variables according to gender and year of study. Male undergraduates had significantly higher binge drinking intentions (M = 3.16, SD = 0.10)

than female undergraduates (M = 2.73, SD = 1.22; t(177) = 2.33, p = 0.02, d = 0.50). Male undergraduates also had significantly higher attitudes (M = 2.94, SD = 0.68; M = 2.66, SD = 0.83; t(177) = 2.21, p = 0.03, d = 0.37) and significantly higher self-efficacy (M = 4.14, SD = 0.84; M = 3.72, SD = 1.19; t(177) = 2.72, p = 0.01, d = 0.41) than female undergraduates. In addition, males reported significantly more follow-up BDE than females (Male M = 1.12, SD = 1.02; Female M = 0.71, SD = 0.94; t(177) = 2.64, p = 0.01, d = 0.42). In contrast, there was no difference in baseline BDE between female and male undergraduates. Year of study analyses showed that there were no significant differences in baseline BDE, follow-up BDE or any other study variables due to year of study.

Predicting binge drinking intentions for female and male undergraduates

All predictor variables significantly correlated with intentions for females and males, so they were included in regression analyses. Table 2 contains the results of regression analyses predicting intentions for female and male undergraduates. For brevity, results are only reported for the final step of analyses. Regret (beta = 0.30, $p < 0.001$) and self-efficacy (beta = 0.27, p = 0.001) were significant predictors of female undergraduates' binge drinking intentions. The model accounted for 59% of the variance. Results for male undergraduates showed that self-efficacy (beta = 0.33, p = 0.02) was the only significant predictor of male undergraduates' binge drinking intentions. The model accounted for 54% of the variance.

Predicting follow-up BDE for female and male undergraduates

Table 3 contains results of regression analyses predicting follow-up BDE for female and male undergraduates. Results for female undergraduates show that baseline BDE (beta = 0.44, $p <$ .001) and intentions (beta = 0.24, p = .01) were significant predictors of follow-up BDE, with the model accounting for 43% of the variance. In contrast, results for male undergraduates

show that only baseline BDE was a significant predictor (beta = 0.57, $p < .001$) of follow-up BDE, accounting for 47% of the variance.

Predicting binge drinking intentions for first, second and final year undergraduates

All predictor variables significantly correlated with intentions for undergraduates in all years of study, apart from PBC in the first year sample (r = 0.23, $p = 0.08$). Given the desire to compare the same set of predictors across year of study, PBC was retained in the first year model. For brevity, only the final step of analyses is reported. In *first* years, regret was the only significant predictor (beta = 0.42, $p = 0.01$) of first year undergraduates' binge drinking intentions, with the model accounting for 57% of the variance. In *second* years, self-efficacy (beta = 0.36, $p = 0.01$) and attitudes (beta = 0.33, $p = 0.01$) were significant predictors of second year undergraduates' binge drinking intentions. The model accounted for 61% of the variance. In *final* years, anticipated regret (beta = 0.30, $p = 0.02$), PBC (beta = 0.28 $p = 0.01$) and self-efficacy (beta = 0.27, $p = 0.02$) predicted final year undergraduates' binge drinking intentions, accounting for 66% of the variance.

Predicting follow-up BDE for first, second and final year undergraduates

Table 5 contains results of regression analyses predicting follow-up BDE for first, second and final year undergraduates. Results for final and second year undergraduates were similar. Baseline BDE significantly predicted future consumption (for final years beta = 0.59, $p < 0.001$; for second years beta = 0.34, $p = 0.01$) and intentions also significantly predicted future consumption (for final years beta = 0.30, $p = 0.03$; for second years beta = 0.37, $p = 0.02$). The model was a better at accounting for variance in final years ($R^2 = 0.60$) compared with second years ($R^2 = 0.31$) follow-up BDE. In contrast, results for first years show that only baseline BDE (beta = 0.59, $p < 0.001$) significantly predicted follow-up BDE, accounting for 54% of the variance in follow-up BDE.

Discussion

In summary, the present study found that gender and year of study affect how the TPB predicts binge drinking intentions and episodes. For female undergraduates, anticipated regret and self-efficacy predicted intentions. For male undergraduates, only self-efficacy predicted intentions. These results do not support Hypothesis 1, which predicted that subjective norms would be a better predictor of binge drinking intentions for female versus male undergraduates. Female follow-up BDE was predicted by intentions and baseline BDE whereas only baseline BDE predicted male undergraduates' follow-up BDE. These results support Hypothesis 2, which predicted that the TPB would account for more variance in binge drinking episodes among female undergraduates compared to male undergraduates. For first year undergraduates, anticipated regret predicted intentions, attitudes and self-efficacy predicted intentions for second year undergraduates, while anticipated regret, PBC and self-efficacy predicted intentions for final year undergraduates. These results support Hypothesis 3, which predicted that different TPB variables would predict binge drinking intentions in different years of study. Baseline BDE predicted follow-up BDE for first year undergraduates. Intentions and baseline BDE predicted second and final year undergraduates' follow-up BDE. These results support Hypothesis 4, which predicted that the TPB would account for less variance in binge drinking episodes among first year undergraduates' relative to second year and final year undergraduates.

Gender results

Self-efficacy was the only TPB variable to predict intentions among female and male undergraduates, partially replicating Zimmermann and Sieverding's (2010) results. However, unlike Zimmermann and Sieverding, we did not find that subjective norms predicted female intentions. These results also differ to those reported by Todd and Mullan (2011), in a female only sample, and Kim and Hong (2013), who recruited an all male sample.

Two explanations for these differences are (i) the variables measured in this study differed to those measured in past studies and (ii) the samples recruited in previous studies differ to the samples recruited in this study. First, the current study included anticipated regret and self-efficacy as additional predictors of intentions. Only Zimmermann and Sieverding measured self-efficacy, and none of the past studies included regret. Therefore, the present results may differ to past findings because, for example, it may be that case anticipated regret is a better predictor of female binge drinking intentions than TPB variables. Consistent with this idea, Cooke et al. (2007) found that anticipated regret was the best predictor of intentions to limit binge-drinking in a majority female sample. Moreover, qualitative research shows that men and women both anticipate women experiencing more negative consequences of binge drinking than men (de Visser & McDonnell, 2012) and this could explain why regret predicted female, but not male, intentions. Second, the samples recruited in previous studies differed from the current study: Kim and Hong (2013) recruited a sample of male office workers, Todd and Mullan (2011) recruited a sample of female undergraduates, while Zimmermann and Sieverding (2010) recruited a sample of young people, who were mostly undergraduates. A key difference between the samples in the current study and those of Zimmermann and Sieverding's is that their samples significantly differed in past alcohol consumption and subjective norms, whereas our samples did not differ in either variable. The lack of difference in BDE between our female and male samples could have led to similar subjective norms for females and males; if binge drinking experiences are similar between men and women then differences in perceptions for approval of binge drinking are less likely. This lack of gender difference in both BDE and subjective norms in the current study may have reducing prediction of intentions by subjective norms.

Due to the TPB being a better model for behaviours that are under intentional control (Ouellette & Wood, 1998), it was predicted that the TPB would be a better model for

predicting follow-up BDE in females due to BDE being less frequent among females than males. Regression analyses support this prediction. The TPB accounted for twice as much variance in follow-up BDE, after controlling for past alcohol consumption, among female undergraduates compared with male undergraduates. Thus, for male undergraduates, BDE seem to be more of a habitual behaviour than one under intentional control. Indeed, as baseline BDE was the only variable to predict follow-up BDE among male undergraduates it could be argued that the TPB lacks utility for predicting male undergraduates' BDE. Results for female undergraduates partially replicate Zimmerman and Sieverding's results from their female-only sample; they found that intention predicted alcohol consumption, but that past consumption did not. This may be due to lower past consumption in their female sample relative to the current female sample. Overall, results from the current study show that baseline BDE is the best predictor of follow-up BDE for both female and male undergraduates and reflect the fact that past behaviour is often the best predictor of future behaviour (Ouellette & Wood, 1998).

Year of study results

The TPB accounted for 9% more variance in final year undergraduates' binge drinking intentions than first year undergraduates' binge drinking intentions, highlighting differences between undergraduates in different years of study. Year of study also affected the pattern of prediction for several TPB variables. For example, attitudes were a significant predictor of intentions only in second year undergraduates. In addition, PBC only predicted intentions in final year undergraduates. Finally, self-efficacy was a significant predictor in second and final year undergraduates. These results suggest that the TPB has utility for predicting binge drinking intentions across year of study because the theory contains variables that are important at different points of a degree course.

In addition, year of study clearly affected the relationship between anticipated regret and intentions, with significant prediction in first year and final years, but not second years. Ferrer et al. (2012) characterises the first year of study as a time of increased opportunities to socialise, an increased need to socialise to make new friends and, decreased responsibility, with first year grades not counting towards final degree classification. Thus, regret may predict first years' intentions because their greater experience of binge drinking (relative to undergraduates in other years of study) provides them with greater awareness of the consequences of binge drinking. Alternatively, it may be that first year undergraduates interpret questions about regret with reference to the idea of missing out on social occasions, which are linked to binge drinking.

Given that undergraduates typically consume less alcohol as they progress through university (Bewick et al., 2008) one would expect that regret would become *less* predictive of intentions as undergraduates progress through university as undergraduates would have less experience of the negative consequences of binge drinking and established social networks. Consistent with this idea, we found that regret did not predict second years' intentions, however, regret did predict final year intentions. It may that with final year work counting for a large percentage of undergraduates' overall degree classification, binge drinking may be a rare event, as undergraduates focus on achieving the best possible degree. As a result, when undergraduates get the opportunity to drink they may engage in particularly extreme drinking which leads to regret at the consequences. Alternatively, asking about regret may make final year undergraduates focus on the fact that they are coming to the end of their degree.

Our results support our prediction that the TPB would account for less variance in first year undergraduates' binge drinking episodes than second, or final, year undergraduates' binge drinking episodes. After controlling for baseline BDE, TPB variables made a non-significant contribution to the prediction of follow-up BDE for first year undergraduates. In

contrast, TPB variables made a significant contribution to the prediction of follow-up BDE for both second and final year undergraduates. Results are consistent with past research showing that intentions predict *frequently* performed behaviours less well than *infrequently* performed behaviours (Ouellette & Wood, 1998). However, it should be noted that while first year students reported higher baseline BDE scores there were no significant differences between baseline BDE in different years of study. Thus, the present study did not replicate Bewick et al.'s (2008) results. This variation in results could reflect differences in how alcohol consumption was measured in the two studies: Bewick et al. reported units of alcohol consumed as opposed to binge drinking episodes. Nevertheless, future studies predicting alcohol consumption across year of study should compare results with existing results to confirm the presence of differences in alcohol consumption between years of study.

Implications for interventions

The present study shows that different variables predict binge drinking intentions and episodes for female and male undergraduates. Interventions to reduce female and male undergraduates' binge drinking intentions should focus on increasing self-efficacy. For example, digital interventions (such as text messages or smartphone APPs) could be used to deliver messages promoting self-efficacy to avoid injury or other negative outcomes of binge drinking by drinking within government guidelines. In addition, interventions to reduce female undergraduates' binge drinking intentions could target anticipated regret; Kingsbury et al. (2015) found that if undergraduates received a message highlighting how alcohol consumption could lead to a social loss (i.e., vomiting over an attractive member of the opposite sex), then intentions to consume alcohol were reduced.

The differences in the prediction of binge drinking intentions for first, second and final years show that interventions need to be tailored to suit the target population. For first year undergraduates regret was the best predictor of intentions. Therefore, interventions that

highlight the negative consequences of binge drinking may modify intentions (see above discussion of modifying female undergraduates' intentions by highlighting regret cf. Kingsbury et al., 2015). In later years, attitudes, self-efficacy and PBC predict intentions, suggesting that interventions targeting these variables would be effective in reducing binge drinking intentions in these groups. Digital interventions, such as text messages and smartphone APPs could be used to transmit messages emphasising the negative outcomes of binge-drinking, encouraging undergraduates to be confident about avoiding injury and to avoid negative health outcomes by remaining in control of one's drinking behaviour.

Strengths and weaknesses

A strength of the paper is that it shows that TPB variables can vary in their importance as predictors due to year of study. For example, self-efficacy predicts intentions better in later years of study, suggesting that self-efficacy may change over time at university. Additionally, intentions did not predict BDE in first years but did predict BDE in second and final years. This suggests that engaging in BDE becomes more of a planned behaviour as undergraduates progress through university. Another strength of the present paper is the novelty of comparing results for the TPB by gender and year of study. A final strength of the present study is that equal numbers of undergraduates in each year of study were recruited.

We acknowledge several limitations of the present study. We were unable to recruit equal numbers of female and male participants. Recruiting fewer men than planned may affect the ability of the study to generalize to other populations, as we may have recruited a sample of men who consume less alcohol than expected. We also acknowledge that the number of participants per year of study may be considered a small sample, which may limit the generalizability of the results. Finally, we used self-report measures of alcohol consumption, which may be subject to memory biases such as over or under-reporting.

Conclusion

In conclusion, the present study shows that gender and year of study affect the size and pattern of TPB relationships regarding binge drinking intentions and episodes. Longitudinal research, measuring TPB variables and alcohol consumption throughout undergraduates' time at university is needed to confirm these results, but, they suggest that more attention should be paid to sample characteristics when developing TPB studies on alcohol consumption.

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Table 1. Descriptive statistics for study variables by gender and year of study

Variable	Female (N = 126) M (SD)	Male (N = 54) M (SD)	t (p)	First Year (N = 60) M (SD)	Second Year (N = 60) M (SD)	Final Year (N = 60) M (SD)	F (p)
Attitude	2.66 (0.83)	2.94 (0.68)	2.21 (0.03)	2.75 (0.83)	2.76 (0.72)	2.73 (0.85)	0.03 (0.97)
Subjective Norm	2.15 (1.15)	2.63 (1.02)	0.67 (0.50)	2.50 (1.14)	2.60 (1.24)	2.53 (0.94)	0.13 (0.88)
PBC	1.80 (0.91)	1.79 (0.66)	-0.07 (0.94)	1.82 (0.88)	1.94 (0.99)	1.64 (0.60)	2.00 (0.14)
Self-efficacy	3.72 (1.19)	4.14 (0.84)	2.72 (0.01)	3.91 (1.03)	3.76 (1.16)	3.86 (1.15)	0.29 (0.75)
Intention	2.73 (1.22)	3.16 (0.10)	2.33 (0.02)	2.93 (1.19)	2.87 (1.28)	2.78 (1.14)	0.26 (0.77)
Anticipated Regret	3.41 (1.37)	3.81 (1.13)	2.03 (0.05)	3.43 (1.40)	3.58 (1.32)	3.58 (1.23)	0.28 (0.76)
Baseline BDE	0.88 (1.05)	1.04 (1.08)	0.90 (0.37)	1.07 (1.15)	0.80 (1.02)	0.92 (1.01)	0.95 (0.39)
Follow-up BDE	0.71 (0.94)	1.12 (1.02)	2.64 (0.01)	0.78 (0.92)	0.78 (1.04)	0.94 (1.01)	0.55 (0.58)

Note. Baseline BDE = Baseline number of binge-drinking episodes calculated over the course of a week where >= 6 units is coded as a binge-drinking episode for female undergraduates and >=8 units is coded as a binge-drinking episode for male undergraduates. Follow-up BDE = Follow-up number of binge-drinking episodes calculated over the course of a week where >= 6 units is coded as a binge-drinking episode for female undergraduates and >=8 units is coded as a binge-drinking episode for male undergraduates.

Table 2. Hierarchical multiple regression predicting intentions for female and male undergraduates

		Female (N=126)			Male (N=56)		
Step	Variable	Beta	Beta	Beta	Beta	Beta	Beta
1	Baseline BDE	0.49***	0.13	0.13	0.41**	0.07	0.06
2	Attitudes		0.32***	0.14		0.30*	0.27
	Subjective norms		0.11	0.11		0.02	0.03
	PBC		0.07	0.11		0.21	0.21
	Self-efficacy		0.34***	0.27**		0.36*	0.33*
3	Regret			0.30***			0.12
R^2		0.24	0.54	0.59	0.17	0.52	0.54
ΔR^2		0.24***	0.30***	0.05***	0.17**	0.36***	0.02
Model F		38.51***	28.32***	28.14***	10.54**	10.55***	9.02***

Note. *p< 0.05 **p<0.01 ***p<0.001

Table 3. Hierarchical multiple regression predicting alcohol consumption for female and male undergraduates

		Female (N = 126)		Male (N = 56)	
Step	Variable	Beta	Beta	Beta	Beta
1	Baseline BDE	0.60***	0.44***	0.66***	0.57***
2	Intention		0.24*		0.20
	PBC		0.14		0.03
	Self-efficacy		0.01		0.01
R^2		0.35	0.43	0.43	0.47
ΔR^2		0.35***	0.08**	0.43***	0.04
Model F		67.42***	22.62***	39.56***	10.90**

Note. *p< 0.05 **p<0.01 ***p<0.001

Table 4. Hierarchical multiple regression predicting intentions for first year, second year and final year undergraduates

		First years (N = 60)			Second years (N = 60)			Final years (N = 60)		
Step	Variable	Beta	Beta	Beta	Beta	Beta	Beta	Beta	Beta	Beta
1	Baseline BDE	0.61***	0.36*	0.25	0.38**	0.05	0.06	0.41**	-0.05	0.04
2	Attitudes		0.22	0.03		0.37**	0.33*		0.25	0.03
	Subjective norms		-0.00	0.04		0.14	0.14		0.10	0.14
	PBC		0.09	0.13		0.06	0.06		0.31*	0.28*
	Self-efficacy		0.27*	0.14		0.40**	0.36*		0.35**	0.27*
3	Regret			0.42*			0.14			0.30*
	R^2	0.37	0.51	0.57	0.15	0.60	0.61	0.17	0.63	0.66
	ΔR^2	0.37***	0.14*	0.06*	0.15**	0.45***	0.01	0.17**	0.46***	0.03*
	Model F	33.63***	11.31***	11.61***	10.04**	15.95***	13.88***	11.62**	18.09***	17.33***

Note. *p< 0.05 **p<0.01 ***p<0.001

Table 5. Hierarchical multiple regression predicting alcohol consumption for first, second and final year undergraduates

		First years (N = 60)		Second Years (N = 60)		Final Years (N = 60)	
Step	Variable	Beta	Beta	Beta	Beta	Beta	Beta
1	Baseline BDE	0.70***	0.59***	0.45***	0.34*	0.72***	0.59***
2	Intention		0.09		0.37*		0.30*
	PBC		0.11		0.15		-0.00
	Self-efficacy		0.13		-0.15		0.03
R^2		0.49	0.54	0.20	0.31	0.52	0.60
ΔR^2		0.49***	0.05	0.20***	0.11*	0.52***	0.08*
Model F		56.46***	16.24***	14.86***	6.18***	62.02***	20.60***

Note. *p< 0.05 **p<0.01 ***p<0.001