The theory of planned behaviour and binge drinking: Assessing the moderating role of past behaviour within the theory of planned behaviour

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A sample of 398 undergraduate students completed questionnaires assessing the main constructs of the theory of planned behaviour (TPB) in relation to binge drinking, as well as past binge drinking behaviour. Of these, 273 were followed up at 1 week. Regression analyses revealed attitude, self-efficacy, and perceived control (negative relationship) to be predictive of binge drinking intentions. Intention and self-efficacy were, in turn, predictive of binge drinking at 1-week follow-up. Past behaviour was found to explain additional variance in intention and behaviour. In addition, past behaviour was found to moderate the attitude–intention and intention–behaviour relationships, such that weaker relationships were observed with increasing frequency of past behaviour. The results are discussed in relation to the need to develop and test alternative measures of habit. The implications of the findings for interventions to encourage more appropriate drinking behaviour are outlined.

High alcohol consumption has been linked to increased mortality and morbidity from a range of conditions, including cardiovascular and gastrointestinal diseases (Theobald, Johansson, Bygren, & Engfeldt, 2001; White, Altmann, & Nanchahal, 2002). However, in addition to these longer-term effects, there are a range of negative consequences that may directly follow excessive drinking in a single session (i.e. binge drinking). These include car accidents (Department of Transport, 1992), non-traffic accidents (Hingson & Howland, 1993), accidental falls (Honkanen \textit{et al.}, 1983), violence (Turk, 1989), and unsafe sex (Corbin & Fromme, 2002). Despite these potential negative outcomes, binge drinking is a prevalent behaviour, particularly among young people and males (Moore, Smith, & Catford, 1994). For example, Moore \textit{et al.} reported that 31.1\% of Welsh drinkers in the 18- to 24-year-old age group engaged in a binge drinking session at least once a week. In addition, Norman, Bennett, and Lewis (1998) reported that 46.3\% of a sample of UK undergraduate students engaged in binge drinking at least once a week. While binge

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drinking may be explained by a range of socio-demographic variables, it is important to identify the key proximal (i.e. motivational) determinants of binge drinking behaviour in order to inform attempts to encourage more appropriate drinking behaviour (cf. Petratis, Flay, & Miller, 1995).

The present study considers the utility of the theory of planned behaviour (TPB; Ajzen, 1988, 1991) as a framework for predicting binge drinking among young people. According to the TPB, the proximal determinant of behaviour is the individual’s intention to engage in the behaviour. Intention is, in turn, determined by three constructs. First, is the individual’s attitude towards the behaviour, which reflects an overall positive or negative evaluation of the behaviour. Second is the individual’s perception of the social pressure from important others to perform or not perform the behaviour (i.e. subjective norm). Third is the individual’s perception of the ease or difficulty of performing the behaviour (i.e. perceived behavioural control), which is seen to cover the influence of both internal (e.g. skills) and external (e.g. constraints) control factors. Recently, a number of researchers have proposed a distinction between feelings of confidence in one’s ability to perform a behaviour (i.e. self-efficacy) and perceptions of control over performing the behaviour (i.e. perceived control), and this distinction has received considerable empirical support (e.g. Armitage & Conner, 1999a, 1999b; Armitage, Conner, Loach, & Willetts, 1999; Mansstead & van Ekelen, 1998; Povey, Conner, Sparks, James, & Shepherd, 2000; Terry & O’Leary, 1995; Trafimow, Sheeran, Conner, & Finlay, 2002; White, Terry, & Hogg, 1994).

The TPB has been successfully applied to a wide range of behaviours (for reviews, see Ajzen, 1991; Conner & Armitage, 1998; Conner & Sparks, 1996). A recent meta-analysis by Armitage and Conner (2001) indicated that the TPB is able to account for 39% of the variance in intention and 27% of the variance in behaviour. In addition, the meta-analysis revealed strong support for each of the main constructs of the TPB. Both intention ($r = .47$) and perceived behavioural control ($r = .37$) had significant average correlations with behaviour. In turn, attitude ($r = .49$), subjective norm ($r = .34$) and perceived behavioural control ($r = .43$) all correlated significantly with intention.

A number of studies have applied the TPB to the prediction of alcohol-related behaviours. Schlegel, d’Avernas, Zanna, and DeCourville (1992) reported results from a longitudinal survey of Canadian high school students consisting of two groups of non-problem drinkers and one group of problem drinkers. The TPB was able to explain between 39% and 43% of the variance in intentions to get drunk in the non-problem drinker groups with all three constructs emerging as significant predictors. However, contrary to predictions, the relationship between perceived behavioural control and intention was negative, such that low perceptions of control were associated with strong intentions to get drunk. Among the problem drinkers, the TPB explained 26% of the variance in intention, with attitude emerging as the sole significant predictor. Considering the prediction of behaviour among non-problem drinkers, the TPB explained between 30% and 39% of the variance in the frequency of getting drunk, although only intention was a significant predictor. Among problem drinkers, the TPB explained 22% of the variance in the frequency of getting drunk, with both intention and perceived behavioural control emerging as significant predictors. The relationship between perceived behavioural control and behaviour was negative, indicating that low perceptions of control were associated with an increased frequency of getting drunk.

Similar results have been reported in recent studies of UK undergraduate students. For example, Conner, Warren, Close, and Sparks (1999) in two studies reported that the TPB was able to explain between 28% and 34% of the variance in intentions to drink.
alcohol in the next 2 weeks, with all three constructs emerging as significant predictors. Again, the beta weight for perceived behavioural control was negative. Considering the prediction of alcohol use at 2-week follow-up, the TPB was able to explain between 38% and 50% of the variance, with both intention and perceived behavioural control (negative relationship) emerging as significant predictors. Armitage et al. (1999) applied an expanded version of the TPB containing separate measures of perceived control and self-efficacy to the prediction of alcohol use over a 1-week period among a sample of UK undergraduate students. The TPB explained 60% of the variance in intention, with subjective norm, self-efficacy, and perceived control (negative relationship) emerging as significant predictors. Considering alcohol use, the TPB explained 17% of the variance, although only intention was a significant predictor. McMillan and Conner (2003a) reported that the TPB was able to explain 17% of the variance in alcohol use intentions and 27% of the variance in alcohol consumption at 6-month follow-up. All three constructs were predictive of intention, and both intention and perceived behavioural control were predictive of behaviour.

To date, few TPB studies have focused specifically on binge drinking behaviour. Norman et al. (1998) conducted a cross-sectional survey of undergraduate students and found that perceived behavioural control was the sole predictor of the frequency of binge drinking. Again, increasing frequency of binge drinking was associated with lower levels of perceived behavioural control. Finally, Johnston and White (2003) found that a version of the TPB that included a measure of self-efficacy, rather than perceived control, predicted 69% of the variance in binge drinking intentions and 51% of the variance in behaviour in a sample of Australian undergraduate students. All three TPB constructs were predictive of intention, which, in turn, was the sole significant predictor of behaviour at 2-week follow-up.

Taken together, the results of the above studies confirm the predictive validity of the TPB in relation to alcohol-related intentions and behaviour among young people. However, the negative relationships found for perceived behavioural control are contrary to the majority of TPB studies that report positive relationships between perceived behavioural control and intention and behaviour (Armitage & Conner, 2001). Nevertheless, the negative relationships are consistent with work in other areas that has documented that problem drinkers have a more external locus of control than non-problem drinkers do (e.g. Donovan & O’Leary, 1978; Huckstadt, 1987; Schlegel, d’Avernas, Zanna, DiTecco, & Manske, 1987). Moreover, Eagly and Chaiken (1993) have argued that a negative relationship between perceived behavioural control and intention may be expected for negatively evaluated behaviours.

Despite the successful application of the TPB across a wide range of behaviours, a major shortcoming of the model is its inability to fully account for the influence of past behaviour on intention and future behaviour. Past behaviour is typically the strongest predictor of intention and behaviour, explaining variance over and above that accounted for by the TPB variables (see Ajzen, 1991; Conner & Armitage, 1998; Ouellette & Wood, 1998). For example, Conner and Armitage (1998) reported that the addition of past behaviour to the TPB variables explains, on average, an additional 7% of the variance in intention and 13% of the variance in behaviour. Ouellette and Wood (1998) have outlined two ways in which the past behaviour may have its impact on future behaviour. First, past performance of a behaviour may provide individuals with information that shapes their beliefs about the behaviour which, in turn, determine future behaviour (i.e. a conscious response). According to this account, the influence of past behaviour should be mediated by the TPB. Any residual impact of past behaviour is taken to indicate that the model is not
sufficient and that additional social cognitive variables need to be considered (Ajzen, 2002). Second, repeating a behaviour may lead to the formation of a habitual response, such that the behaviour comes under the control of stimulus cues and is performed automatically with little effort or conscious awareness. Under such circumstances, intentions (and other social cognitive variables) may lose their predictive validity. Thus, when past behaviour is found to have a direct effect on future behaviour over and above the influence of social cognitive variables, this is taken as evidence that the behaviour is under habitual control.

However, few models of health behaviour have attempted to formally incorporate the role of habit. One exception is the Triandis (1977) model in which behaviour is seen to be a function of intention, facilitating conditions, and habit. Importantly, Triandis argues that novel behaviours are primarily determined by intention whereas repeated behaviours are primarily determined by habit, as measured by the frequency of past behaviour. Thus, as behaviours are repeated and become more habitual, their performance should depend less on a rational statement of the individual’s intentions and more on their previous behaviour (i.e. habitual responses). In other words, past behaviour should moderate the intention–behaviour relationship such that as the frequency of past behaviour increases the strength of the intention–behaviour relationship should weaken. Repeated performance of a behaviour may lead to the behaviour being less under the influence of the controlled processes implied by the TPB and more under the influence of automatic processes that typify habitual responses (Eagly & Chaiken, 1993). Although not explicitly outlined in the Triandis model, similar arguments can be put forward in relation to the prediction of intention. Consistent with this argument, Verplanken, Aarts, and van Knippenberg (1997) have demonstrated that habit reduces the acquisition of information and the elaborateness of choice strategies in decision-making. Thus, to the extent that repeatedly performing a behaviour reduces deliberation, the TPB should be less predictive of both intention and behaviour.

In a meta-analysis of intention–behaviour and past behaviour-behaviour relations, Ouellette and Wood (1998) reported that intention was a stronger predictor than past behaviour of infrequently performed behaviours, whereas past behaviour was a stronger predictor than intention of frequently performed behaviours. This pattern of results is consistent with the Triandis (1977) model. However, there have been relatively few direct tests of the moderating role of past behaviour on the intention–behaviour relationship. Verplanken, Aarts, van Knippenberg, and Moonen (1998) found that the frequency of past behaviour moderated the relationship between intention and travel mode behaviour (i.e. car use) in line with predictions. In contrast, Kashima, Gallois, and McCamish (1993) reported an opposite pattern of results in relation to condom use, finding that individuals’ intentions to use condoms were only translated into actual condom use if they had used a condom during their last sexual encounter. Finally, Norman, Conner, and Bell (2000) examined the moderating role of past behaviour in relation to the prediction of exercise behaviour. Contrary to predictions, past behaviour did not moderate the intention–behaviour relationship.

To the best of our knowledge, only one study has examined the moderating role of habit in relation to the prediction of intention. Trafimow (2000) reported that habit moderated the attitude–intention and subjective norm–intention correlations for condom use. In line with predictions, the correlations for those reporting high levels of habit were non-significant, whereas the correlations for those reporting low levels of habit were significant. Moreover, the differences in the strength of the correlations between the two groups were statistically reliable, although the use of moderated
regression analysis would have been a more appropriate technique to test for moderation effects (Baron & Kenny, 1986).

The present study reports an application of the TPB to the prediction of binge drinking intentions and behaviour among undergraduate students over a 1-week period. It was predicted that the TPB would be predictive of binge drinking intentions and behaviour, and that the addition of past behaviour would increase the amounts of variance explained in binge drinking intentions and behaviour. In line with Triandis (1977), it was further predicted that the frequency of past binge drinking would moderate TPB-intention and intention-behaviour relations. The strength of these relationships was expected to weaken with increasing levels of past behaviour.

Method
Respondents and procedure
Participants were 398 undergraduate psychology students who completed TPB questionnaires in relation to binge drinking (mean age = 20.26, SD = 4.37; 92 male, 305 female, 1 missing). The respondents completed a second questionnaire on their binge drinking behaviour over the previous week 1 week later. Completed questionnaires were obtained for 273 respondents who had previously completed the Time 1 questionnaire (68.6% response rate). In order to assess any attrition biases, the Time 1 questionnaire responses of those respondents who completed both questionnaires were compared with those respondents who had only completed the Time 1 questionnaire. No significant differences were found between the two groups on any of the TPB or binge drinking measures, although females were more likely to complete the Time 2 questionnaire than males (71.1% vs. 59.8%; $\chi^2 = 4.23, df = 1, p < .05$).

Measures
The Time 1 questionnaire included direct measures of the main constructs of the TPB constructed in line with recommendations (Ajzen & Fishbein, 1980; Conner & Sparks, 1996). All items were measured on 7-point response scales and coded so that high values indicated high levels on the variable of interest. Frequency of binge drinking was also assessed in the Time 1 questionnaire, and binge drinking in the previous week was assessed at 1-week follow-up. Binge drinking was defined in both questionnaires as consuming at least five pints of beer (or 10 shorts/glasses of wine) in a single session for men, or consuming at least three and a half pints of beer (or seven shorts/glasses of wine) in a single session for women (see Bennett, Smith, & Nugent, 1990).

Attitude towards engaging in a binge drinking session during the next week was measured using five semantic differential scales (i.e. engaging in a binge drinking session over the next week would be bad/good, foolish/wise, harmful/beneficial, pleasant/unpleasant, enjoyable/unenjoyable; $\alpha = .90$).

Subjective norm was measured using two items (i.e. People who are important to me would approve/disapprove of me engaging in a binge drinking session over the next week, People who are important to me think I should/should not engage in a binge drinking session over the next week; $\alpha = .85$).

To assess self-efficacy, four items were used (i.e. For me, engaging in a binge drinking session over the next week would be easy/difficult, How certain are you that you could engage in a binge drinking session over the next week?, How confident are you that you could engage in a binge drinking session over the next week? If I wanted to, I could easily engage in a binge drinking session over the next week; $\alpha = .87$).
Perceived control was measured using four items (i.e. How much control do you have over whether or not you engage in a binge drinking session over the next week? I feel in complete control over whether or not I engage in a binge drinking session over the next week, How much do you feel that whether or not you engage in a binge drinking session over the next week is beyond your control?, How much will factors outside your control influence whether or not you engage in a binge drinking session over the next week?; α = .75).

Behavioural intention was assessed using four items (i.e. Do you intend to engage in a binge drinking session over the next week?, I will engage in a binge drinking session over the next week, How likely is it that you will engage in a binge drinking session over the next week?, I intend to engage in a binge drinking session over the next week; α = .97).

Past binge drinking at Time 1 was assessed by asking respondents to indicate, on average, how often they engaged in a binge drinking session. For data analysis, responses were computed into frequency of binge drinking sessions per week.

Time 2 binge drinking was assessed by asking respondents to indicate whether or not they had engaged in a binge drinking session over the previous week.

Results

Descriptive findings

The means, standard deviations, and intercorrelations between the variables under consideration are presented in Table 1. Respondents reported engaging in binge drinking an average of 1.51 times per week and 66.7% engaged in a binge drinking session during the 1-week follow-up period. As shown in Table 1, intentions to engage in binge drinking were correlated with each of the TPB constructs, such that strong intentions were associated with positive attitudes, strong perceptions of social pressure, strong feelings of self-efficacy, and weak perceptions of control. Intention was also positively correlated with past binge drinking and negatively correlated with age. Binge drinking at Time 2 was correlated with all the TPB constructs, with the exception of perceived control. Thus, binge drinking at Time 2 was associated with positive attitudes, strong perceptions of social pressure, strong feelings of self-efficacy, and strong intentions. Binge drinking at Time 2 was also positively correlated with past binge drinking and negatively correlated with age.

Predicting binge drinking intentions

A hierarchical linear regression analysis was used to predict intention to engage in a binge drinking session over the next week (see Table 2). The independent variables were entered in three blocks: (i) age and gender, (ii) attitude, subjective norm, self-efficacy, and perceived control, and (iii) past binge drinking. In this way, it was possible to examine the predictive utility of the TPB variables, controlling for the effects of age and gender, as well as the additional predictive utility of past behaviour. Age and gender were able to explain 8% of the variance in binge drinking intentions ($R^2 = .08$, adj.$R^2 = .07$, $F = 16.63$, $df = 2, 386$, $p < .001$), with both variables emerging as significant independent predictors. The addition of the TPB variables led to a substantial increase in the amount of variance explained in binge drinking intentions ($\Delta R^2 = .66$, $\Delta F = 246.74$, $p < .001$). The addition of the TPB variables resulted in the beta weights for age and gender becoming non-significant, indicating that their effects on intention were fully mediated by the TPB variables (Baron & Kenny, 1986). The variables in the regression equation
Table 1. Descriptive statistics and intercorrelations between the measures

<table>
<thead>
<tr>
<th></th>
<th>Gender</th>
<th>ATT</th>
<th>SN</th>
<th>SE</th>
<th>PC</th>
<th>T1B</th>
<th>INT</th>
<th>T2B&lt;sup&gt;ab&lt;/sup&gt;</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.13*</td>
<td>-0.24***</td>
<td>-0.15**</td>
<td>-0.11*</td>
<td>.11*</td>
<td>-.17***</td>
<td>-.25***</td>
<td>-.20***</td>
<td>20.26</td>
<td>4.37</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.10*</td>
<td>-0.01</td>
<td></td>
<td>-0.14**</td>
<td>.02</td>
<td>-.09</td>
<td>-.08</td>
<td>-.08</td>
<td>92 m</td>
<td>305 f</td>
</tr>
<tr>
<td>Attitude (ATT)</td>
<td></td>
<td></td>
<td>0.53***</td>
<td></td>
<td>0.65***</td>
<td>-.11*</td>
<td>0.53***</td>
<td>0.83***</td>
<td>4.34</td>
<td>1.25</td>
</tr>
<tr>
<td>Subjective norm (SN)</td>
<td></td>
<td></td>
<td></td>
<td>0.39***</td>
<td>0.00</td>
<td>0.26***</td>
<td>0.43***</td>
<td>0.17**</td>
<td>3.91</td>
<td>1.28</td>
</tr>
<tr>
<td>Self-efficacy (SE)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.11*</td>
<td>0.46***</td>
<td>0.70***</td>
<td>0.42***</td>
<td>5.88</td>
<td>1.29</td>
</tr>
<tr>
<td>Perceived control (PC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.27***</td>
<td></td>
<td>-0.22***</td>
<td>5.80</td>
<td>1.09</td>
</tr>
<tr>
<td>Past binge drinking (T1B)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.63***</td>
<td>0.42***</td>
<td>1.51</td>
<td>1.35</td>
</tr>
<tr>
<td>Behavioural intention (INT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.48***</td>
<td>4.86</td>
<td>1.92</td>
</tr>
<tr>
<td>T2 binge drinking (T2B) &lt;sup&gt;ac&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>182</td>
<td>66.7</td>
</tr>
</tbody>
</table>

Note. *p < .05, **p < .01, ***p < .001.

N = 398.
*N = 273.
<sup>b</sup> Point biserial correlations.
<sup>c</sup> N %. 

T2B and binge drinking
<table>
<thead>
<tr>
<th>Step/Predictor</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td>-0.27***</td>
<td>-0.04</td>
<td>-0.04</td>
<td>-0.04</td>
</tr>
<tr>
<td>Gender</td>
<td>0.02</td>
<td>0.03</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>2. Attitude</td>
<td>-0.10*</td>
<td>0.63***</td>
<td>0.55***</td>
<td>0.50***</td>
</tr>
<tr>
<td>Subjective norm</td>
<td>0.03</td>
<td></td>
<td>-0.02</td>
<td>-0.01</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>0.29***</td>
<td>0.25***</td>
<td>0.21***</td>
<td></td>
</tr>
<tr>
<td>Perceived control</td>
<td>-0.11***</td>
<td>-0.07**</td>
<td>-0.05*</td>
<td></td>
</tr>
<tr>
<td>3. Past binge drinking</td>
<td></td>
<td>0.20***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Attitude × past binge drinking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>.08***</td>
<td>.74***</td>
<td>.77***</td>
<td>.78***</td>
</tr>
<tr>
<td>$\Delta R^2$</td>
<td>-</td>
<td>.66***</td>
<td>.03***</td>
<td>.01***</td>
</tr>
</tbody>
</table>

Note. $N = 389$, *p < .05, **p < .01, ***p < .001.

at Step 2 explained 74% of the variance in binge drinking intentions ($R^2 = .74$, adj.$R^2 = .74$, $F = 184.16$, $df = 6, 382$, $p < .001$), with attitude, self-efficacy, and perceived control (negative relationship) having significant beta weights. The addition of past binge drinking produced a further small increase in the amount of variance explained in binge drinking intentions ($\Delta R^2 = .03$, $\Delta F = 42.92$, $p < .001$). Attitude, self-efficacy, and perceived control, along with past binge drinking, all made significant contributions to the regression equation at Step 3. Together the variables under consideration were able to explain 77% of the variance in binge drinking intentions ($R^2 = .77$, adj.$R^2 = .77$, $F = 182.41$, $df = 7, 381$, $p < .001$).

In order to assess the moderating role of past behaviour on TPB-intention relations, interaction terms were constructed between each of the TPB constructs and past behaviour and entered into the regression analysis in order to predict binge drinking intentions (Baron & Kenny, 1986). The variables were mean centred prior to the construction of the interaction terms in order to minimize any problems of multicollinearity and to aid the interpretation of the results (Aiken & West, 1991). A number of researchers have commented on the low power of moderated regression analyses to detect moderation effects, which may stem from a range of factors such as sample size, intercorrelations between the predictors, and measurement error (see Anguinis & Stone-Romero, 1997). As a result, the interaction terms were entered using a stepwise procedure at a fourth step in the regression analysis reported above. A significant increment in the amount of variance explained in binge drinking intentions would indicate that past behaviour moderates the impact of the TPB variable on intention. Only the attitude × past behaviour interaction term produced a significant increment in the amount of variance explained in intention scores ($\Delta R^2 = .01$, $\Delta F = 173.43$, $p < .001$). The direction of the beta weight ($B = -0.14, p < .001$) indicates that the attitude-intention relationship became weaker as the frequency of past behaviour increased. The nature of the interaction between attitude and past behaviour was explored in greater detail using simple slopes analysis (Aiken & West, 1991). Regression lines were examined at three levels of the hypothesized moderator (i.e. the mean level and one standard deviation above and below the mean). Attitude was found to be a stronger predictor of intention under low ($B = 1.13$, $p < .001$) than under moderate ($B = .88$, $p < .001$) or high ($B = .63$, $p < .001$) levels of past behaviour. Nevertheless, it should be noted that attitude was a significant predictor of intention at all three levels of past behaviour.
Predicting binge drinking at Time 2

Given that binge drinking was a dichotomous variable, a hierarchical logistic regression analysis was performed to predict binge drinking at Time 2 (see Table 3). The independent variables were entered in four blocks: (i) age and gender, (ii) intention, self-efficacy, and perceived control, (iii) attitude and subjective norm, and (iv) frequency of binge drinking at Time 1. In this way, it was possible to examine the predictive utility of the TPB variables, controlling for the effects of age and gender, as well as the sufficiency of the TPB. The addition of age and gender produced a significant improvement on the constant-only model ($\chi^2 = 11.36, p < .01$), although only age emerged as a significant independent predictor. The addition of intention, self-efficacy, and perceived control at Step 2 produced a further significant improvement in the model ($\chi^2 = 57.78, p < .001$), with intention and self-efficacy emerging as significant independent predictors. The impact of age became non-significant at this step, indicating that its effect on behaviour was fully mediated by the TPB. The addition of attitude and subjective norm at Step 3 failed to improve the model ($\chi^2 = 2.32, ns$). The addition of past binge drinking at Step 4 produced a further small, but significant, improvement in the model ($\chi^2 = 11.36, p < .01$). Intention, self-efficacy, and past binge drinking emerged as significant independent predictors in the final model.

Table 3. Predicting binge drinking at Time 2: Hierarchical logistic regression analysis (unstandardized regression coefficients)

<table>
<thead>
<tr>
<th>Step/Predictor</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
<th>Step 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td>-0.09**</td>
<td>-0.03</td>
<td>-0.03</td>
<td>-0.04</td>
<td>-0.03</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.06</td>
<td>-0.10</td>
<td>-0.17</td>
<td>-0.26</td>
<td>-0.22</td>
</tr>
<tr>
<td>2. Intention</td>
<td>0.40**</td>
<td>0.58***</td>
<td>0.44**</td>
<td>0.31</td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>0.44**</td>
<td>0.46**</td>
<td>0.47**</td>
<td>0.52**</td>
<td></td>
</tr>
<tr>
<td>Perceived control</td>
<td>0.07</td>
<td>0.09</td>
<td>0.11</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>3. Attitude</td>
<td>-0.34</td>
<td>-0.46</td>
<td>-0.53*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjective norm</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Past binge drinking</td>
<td></td>
<td></td>
<td></td>
<td>0.63**</td>
<td>0.78***</td>
</tr>
<tr>
<td>5. Intention × past binge drinking</td>
<td></td>
<td></td>
<td></td>
<td>-0.20*</td>
<td></td>
</tr>
</tbody>
</table>

Note. $N = 262, \ast p < .05, \ast\ast p < .01, \ast\ast\ast p < .001$.

The moderating role of past behaviour on the intention–behaviour relationship was assessed by constructing an interaction term between intention and past behaviour and entering it into the regression analysis at a fifth step.\(^1\) A significant improvement in the model would indicate that past behaviour moderates the impact of intention on behaviour. In line with expectations, the addition of the intention × past behaviour interaction term produced a significant improvement in the model ($\chi^2 = 3.93, p < .05$). The direction of the regression coefficient ($B = -.20, p < .05$) indicates that the intention–behaviour relationship became weaker as the frequency of past behaviour increased. Simple slopes analysis revealed that intention was a significant predictor of binge drinking behaviour under low ($B = .10, p < .001$), and moderate ($B = .06, p < .01$) levels of past behaviour. However, as the frequency of past behaviour increased,

\(^1\)Interaction terms with past behaviour were also constructed for the other TPB constructs. However, none of these were significant when entered into the regression analysis at a fifth step.
the predictive power of intention decreased and became non-significant under high levels of past behaviour \( B = .003, ns \).

**Discussion**

The present study sought to apply an expanded version of the TPB containing separate measures of self-efficacy and perceived control to the prediction of binge drinking intentions and behaviour among a sample of undergraduate students over a 1-week period. The TPB was found to be highly predictive of intentions to engage in a binge drinking session over the next week, explaining an additional 66% of the variance in intention scores after controlling for the effects of age and gender, with attitude, self-efficacy, and perceived control emerging as significant predictors. The present results are broadly in line with previous applications of the TPB in relation to alcohol consumption, which have found the TPB to be able to predict between 17% and 69% of the variance in alcohol use-related intentions (Armitage et al., 1999; Conner et al., 1999; Johnston & White, 2003; McMillan & Conner, 2003a; Schlegel et al., 1992). In previous studies, attitude, subjective norm, and perceived behavioural control have been found to be predictive of alcohol use intentions (Conner et al., 1999; McMillan & Conner, 2003a) and intentions to get drunk among non-problem drinkers (Schlegel et al., 1992). In an application of an extended version of the TPB, Armitage et al. (1999) found that subjective norm, self-efficacy, and perceived control were predictive of alcohol use intentions.

It is noteworthy that in most applications of the TPB to alcohol-related intentions, including the present study, a negative relationship has been found between perceptions of control and intention. Thus, low perceptions of control are associated with strong alcohol-use intentions. Moreover, this effect is present in both correlation and regression analyses, suggesting that it is not merely a statistical artefact (i.e. suppressor effect; Tabachnick & Fidell, 1996). Though opposite in direction to that predicted by the TPB and found in many other applications (Armitage & Conner, 2001), the negative relationship between perceptions of control and intention is in line with other work which has suggested that problem drinkers may have a more external locus of control than non-problem drinkers (Donovan & O'Leary, 1978; Huckstadt, 1987; Schlegel et al., 1987). In the present context, it is possible to speculate that intentions to engage in binge drinking may, in part, be the result of external pressures to drink over which the individual has little control (e.g. friend's birthday). In support of such a view, Norman et al. (1998) reported that binge drinkers were more likely to cite a range of facilitating factors, such as celebrating an event and being at a party, as important influences on their behaviour. Similarly, McMillan and Conner (2003a) found that the perception of many facilitating factors and few inhibiting factors was related to stronger intentions to drink alcohol over the next 6 months.

Taken together, these findings suggest that people recognize the link between external pressures (i.e. facilitating factors) and the increased likelihood of engaging in a binge drinking session. However, the existence of such pressures may also reduce people's perceptions of control over performing (or not) the behaviour which may, in part, explain the negative correlations that are typically reported between perceived behavioural control and alcohol use intentions. Further, in relation to substance use more generally, a number of researchers have suggested that a distinction can be made between perceptions of control over taking a substance versus perceptions of control over obtaining a substance (Kok, DeVries, Muddle, & Strecher, 1991; Orbell, Blair, Sherlock, & Conner, 2001; Petraitis et al., 1995). Interestingly, Orbell et al., found that
a measure of perceived behavioural control towards obtaining ecstasy had a positive relationship with ecstasy use intentions, as predicted by the TPB. In contrast, a measure of perceived behavioural control towards taking ecstasy had a negative relationship with ecstasy use intentions, thus confirming the link between substance use intentions and reduced perceptions of control that has been found in relation to many substance use behaviours (e.g. Armitage et al., 1999; Conner & McMillan, 1999; Conner, Sherlock, & Orbell, 1998, Study 1).

An alternative explanation for the negative perceived control-intention relationship has been put forward by Eagly and Chaiken (1993) who suggest that a positive relationship between perceived behavioural control and intention may only be expected for positively evaluated behaviours. For negatively evaluated behaviours, such as binge drinking, greater perceptions of control may be expected to lead to lower intentions. However, contrary to this position, binge drinking was evaluated as a slightly positive behaviour in the present study as evidenced by the mean attitude score. Eagly and Chaiken's position also suggests that attitude towards the behaviour should moderate the perceived behavioural control-intention relationship. However, further analysis of the present data revealed that the interaction term between perceived control and attitude was non-significant in a moderated regression analysis ($\beta = 0.04$, ns). Conner et al. (1999) also found no evidence for such a moderation effect in relation to alcohol use intentions, although McMillan and Conner (2003b) reported a number of significant attitude $\times$ perceived behavioural control interactions in relation to drug use intentions.

The TPB was also found to be predictive of binge drinking behaviour at 1-week follow-up, after controlling for the effects of age and gender, with intention and self-efficacy emerging as significant independent predictors. Similar findings have been reported in previous applications of the TPB to alcohol use in which the TPB has been found to explain between 17% and 51% of the variance in alcohol-related behaviour (Armitage et al., 1999; Conner et al., 1999; Johnston & White, 2003; Schlegel et al., 1992). In previous studies, intention has emerged as the sole predictor of alcohol use (Armitage et al., 1999) and the frequency of getting drunk among non-problem drinkers (Schlegel et al., 1992), whereas other studies have found both intention and perceived behavioural control to be predictive of alcohol-related behaviour (Conner et al., 1999; McMillan & Conner, 2003a; Schlegel et al., 1992) for problem drinkers.

The influence of past behaviour within the TPB was also assessed in the present study. Past behaviour was found to explain additional variance in binge drinking intentions and behaviour at 1-week follow-up. Although small, these increments were significant and in line with previous studies (see Conner & Armitage, 1998). As Ajzen (2002) argues, this may be taken as evidence that the TPB is not sufficient and that it would benefit from the inclusion of further social cognitive variables. A number of such variables including descriptive norms, moral norms, self-identity, and anticipated affect have been considered in the literature (see Ajzen, 1991; Conner & Armitage, 1998). Nevertheless, when the amount of additional variance explained by past behaviour is small, as in the present study, the advantages of including additional variables in the TPB, in terms of variance explained, has to be weighed against the loss of parsimony of the model. Moreover, it is likely that part of the additional variance explained by past behaviour is due to common method variance between measures of past and future behaviour (Ajzen, 2002).

As well as considering the additional predictive utility of past behaviour, the present study also considered the moderating role of past behaviour within the TPB. Past behaviour was found to moderate the attitude-intention relationship, such that as
the frequency of past behaviour increased the strength of the attitude–intention relationship decreased. This is consistent with the idea that repeatedly performing a behaviour leads to a reduction in the amount of deliberative processing (Verplanken et al., 1997). As a consequence, there is a reduction in the importance of attitudes in determining intentions as the frequency of past behaviour increases. Similar findings have been reported by Trafimow (2000) who found that habit moderated the correlations between attitude and subjective norm and condom use intentions. Past binge drinking was also found to moderate the intention–behaviour relationship in line with predictions. Thus, the strength of the intention–behaviour relationship was found to become weaker as the frequency of past behaviour increased. Similar results have been found by Verplanken et al. (1998) in relation to travel mode choice, although Norman et al. (2000) failed to find a moderating effect for past behaviour on the intention–behaviour relationship in relation to exercise behaviour. It is clear that further tests of the moderation hypothesis are required to determine the extent of the moderating effect of past behaviour on both TPB-intention and intention–behaviour relations.

When past behaviour is found to have a direct influence on future behaviour, this is usually taken to reflect the involvement of habitual processes that serve to weaken the impact of intentions on behaviour (e.g. Ouellette & Wood, 1998; Triandis, 1977). However, as Ajzen (2002) argues, inferring the existence of a habit from a strong past behaviour-future behaviour correlation, and then using the concept to explain the existence of the strong correlation, involves a circular argument. Instead, an independent measure of habit is required in order to be able to use habit as an explanation for the impact of past behaviour on future behaviour. Using frequency of past behaviour as a measure of habit strength, as suggested by Triandis, fails to capture all of the defining features of a habitual response. Habitual behaviours are performed frequently, but they are also performed automatically, efficiently, and with little effort or conscious awareness (Verplanken & Orbell, 2003). Hence, a number of alternative self-report measures of habit have been reported in the literature, which focus on the extent to which a behaviour is performed without awareness or by force of habit. These measures have been found to be predictive of intentions and behaviour (Conner & McMillan, 1999; Kahle & Beatty, 1987; Mittal, 1988; Towler & Shepherd, 1991; Trafimow, 2000; Wittenbraker, Gibbs, & Kahle, 1983). In addition, Trafimow (2000) reported that such a measure of habit moderated attitude-intention and subjective norm-intention relations for condom use, although Conner and McMillan (1999) failed to find a moderation effect on the intention–behaviour relationship for cannabis use. Clearly, further work is required to develop and compare alternative measures of habit in order to assess the direct effect of habitual processes on intentions and behaviour as well as the moderating role of habit in relation to the TPB.

The present study has a number of limitations that should be noted. First, the response rate to the follow-up questionnaire was relatively low (68.8%). As a result, the sample may have been more biased towards those with favourable attitudes towards binge drinking. However, no significant differences were found between the Time 1 questionnaire responses of those who did and did not complete the follow-up questionnaire. Second, binge drinking behaviour was measured using self-report measures, which may have inflated the size of the correlations with the TPB measures. In their meta-analysis, Armitage and Conner (2001) found that while the TPB was predictive of both self-report and observed behaviours, it was more predictive of self-report behaviours (multiple Rs = .55 vs. .44). Future studies may seek to use more reliable measures of binge drinking behaviour, for example from a nominated peer or
through the use of diaries. Third, the present study considered binge drinking over a relatively short time period, although other studies have found the TPB to be predictive of alcohol use over periods up to 6 months (McMillan & Conner, 2003a). Fourth, the present study was conducted on undergraduate students, which may limit the generalizability of the findings. However, as found in the present study, previous research has reported high levels of binge drinking among students (Gill, 2002; Moore et al., 1994; Norman et al., 1998) thus indicating that they may be considered an ‘at risk’ group for many of the short-term harmful effects of excessive alcohol use.

Despite the above limitations, the present findings have a number of important implications for theory-based interventions to promote more appropriate drinking behaviour (Hardeman et al., 2002; Michie & Abraham, 2004). Attitude was the strongest predictor of binge drinking intentions, which were, in turn, predictive of binge drinking behaviour. Interventions may therefore target attitudes towards binge drinking by focusing on the negative consequences of binge drinking and by challenging the positive consequences associated with binge drinking. Given that the attitude-intention and intention-behaviour relationships were weaker under high levels of past behaviour, it may be important to inculcate such beliefs before drinking patterns become well established. Interestingly, perceived control was negatively associated with binge drinking intentions, suggesting that intentions to engage in binge drinking may, in part, be the result of external pressures to drink over which the individual has little control. Therefore, interventions should attempt to alter the social environment in order reduce the influence of such external pressures to engage in binge drinking (Toomey & Wagenaar, 2002). This may achieved directly by changing drinking environments (e.g. pubs) to encourage activities other than the simple consumption of alcohol (e.g. eating) or by reducing the promotion of cheap drinks (e.g. ‘happy hours’; Yates & Hebblethwaite, 1983). Alternatively, wider social attitudes towards binge drinking could be changed through the promotion of appropriate models of alcohol consumption in the media (DeFoe & Breed, 1988/1989). Health promotion efforts such as these are required if the incidence of binge drinking among young people and the problems associated with such patterns of alcohol use are to be reduced.

References


Gill, J. S. (2002). Reported levels of alcohol consumption and binge drinking within the UK undergraduate student population over the last 25 years. *Alcohol and Alcoholism, 37*, 109–120.


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