PREDICTING BINGE-DRINKING BEHAVIOUR USING AN EXTENDED TPB: EXAMINING THE IMPACT OF ANTICIPATED REGRET AND DESCRIPTIVE NORMS

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Abstract — Aims: To investigate the utility of an extended Theory of Planned Behaviour (TPB), including descriptive norms and anticipated regret, in predicting binge-drinking intentions and behaviour. Methods: A total of 178 undergraduates completed a questionnaire containing measures of TPB variables, descriptive norms, anticipated regret, and previous binge-drinking behaviour. One week later, 104 students completed a measure of binge-drinking behaviour. Results: Hierarchical regression demonstrated that attitudes (beta = 0.30, P < 0.001) and anticipated regret (beta = 0.47, P < 0.001) were significant predictors of intentions, with the final equation accounting for 58% of the variance. Hierarchical regression found that intentions (beta = –0.21, P < 0.05) and previous binge-drinking behaviour (beta = 0.36, P < 0.01) predicted current drinking behaviour, accounting for 33% of the variance. Conclusions: The study suggests that modifying attitudes and inducing regret may be effective strategies for reducing binge-drinking intentions among undergraduates, which should reduce subsequent binge-drinking behaviour.

INTRODUCTION

Reducing binge-drinking is part of the government’s health promotion strategies in Scotland (Scottish Executive, 2002) and England and Wales (The Strategy Office, 2004). Binge-drinking is associated with a range of health-related problems including violence (Swahn et al., 2004), drink driving (Windle, 2003), accidental falls (Savola et al., 2005), and unsafe sex (Corbin and Fromme, 2002), and there is also the possibility of developing long-term health problems associated with alcohol consumption such as liver cirrhosis (Pincock, 2003), hypertension (Xin et al., 2001), and coronary heart disease (Marmot, 2001).

Several definitions of binge-drinking exist. The UK government defines binge-drinking as drinking 8 units in a single session for men or 6 units in a single session for women (Health Education Authority, 1996). Another definition is based on recommendations that men should drink no more than 21 alcoholic units in a week, with women recommended to drink no more than 14 units. Following these guidelines, binge-drinking is classified as consuming at least half of the weekly recommended units in a single session (e.g. 7 units for women and 10 units for men). Murgraff et al. (1999) discuss several limitations with these definitions, such as a lack of consideration of body mass, and concludes that there is considerable variation in definitions used in research. The present study defines binge-drinking as consuming 10 units in a single session for men, or 7 units in a single session for women. This definition is consistent with previous research (Norman et al., 1998; Webb et al., 1996; Norman and Conner, 2006) and is more commonly used than the 6/8 unit definition favoured by the UK government.

A recent paper by Miller et al. (2005) examined the problems associated with individuals who engaged in binge-drinking compared to individuals who drank the same amount, but spread the consumption over more sessions (termed ‘spreaders’). Miller et al. (2005) found that there was little difference between the two groups when alcohol consumption was ≤15 units per week, but above this level binge-drinkers showed more instances of public disorder, crime, accidents and injuries than spreaders. Thus, there seems to be something particularly dangerous about binge-drinking. Undergraduates are known to be at increased risk of binge-drinking (Webb et al., 1996; Norman et al., 1998). Recently, Norman and Conner (2006) found that 67% of British undergraduate participants had engaged in at least one binge-drinking session during their study.

Theory of planned behaviour and binge drinking

This study uses the Theory of Planned Behaviour (TPB, Ajzen, 1991) to explain the motivational determinants of behaviour. According to this model, the primary determinants of future behaviour are one’s intention to perform the behaviour (e.g. ‘I intend to engage in a binge-drinking session in the next week’) and the subjective perception of having control over behaviour (perceived behavioural control). In turn, intentions are predicted by three variables. Attitudes are a person’s positive or negative evaluation of performing the focal behaviour (e.g. ‘For me to engage in a binge-drinking session in the next week’). PBC can be viewed as a combination of both self-efficacy (Bandura, 1977) and locus of control (Rotter, 1966) as it is meant to capture perceptions of both internal control and an appreciation of external barriers to performance (Ajzen, 2002a). When PBC is a reflection of actual control over behavioural performance, it is expected that it will predict behaviour directly. According to the TPB, the influences of other internal (e.g. personality traits) and external (e.g. availability) variables are hypothesized to be mediated by the variables in the model.
The TPB has been applied to the prediction of binge-drinking behaviour and binge-drinking intentions with some success. Johnston and White (2003) found that the TPB explained 69% of the variance in intentions, with attitude, subjective norm, and self-efficacy all being significant predictor variables. Similarly, Norman and Conner (2006) reported that TPB variables accounted for 66% of the variance in intentions with attitude, self-efficacy, and perceived control over all significant predictor variables.

The TPB has also been shown to predict binge-drinking behaviour. Norman and Conner (2006) found that intention and self-efficacy were significant predictors of a dichotomous measure of binge-drinking behaviour (Nagelkerke $R^2 = 0.31$, Paul Norman, personal communication). Johnston and White (2003) found that intention explained 51% of the variance in binge-drinking behaviour. Despite the success of previous TPB research, there is scope for improving prediction of both intentions and behaviour. One approach is to examine the impact of additional variables, which may account for variance left unexplained by the TPB. In this study, we tested the impact of descriptive norms, anticipated regret, and past behaviour as predictors of binge-drinking intentions and behaviour.

**Descriptive norms**

Deutsch and Gerrard (1955) distinguished between injunctive, ought, norms, and descriptive norms, by claiming that individuals considered both what they perceived significant others thought they ought to do (subjective norm) as well as what they observed significant others actually did (descriptive norm). Thus, although significant others may not want you to engage in a binge-drinking session, they may binge-drink themselves and this may be a more salient determinant of behaviour (i.e. if they are binge-drinking then it is ok for me to do so also). Rivis and Sheeran (2003) reviewed the existing literature and found descriptive norms were distinct from subjective norms and that after controlling for TPB variables, descriptive norms significantly added to the variance explained in intentions, across a range of behaviours. For example, Sheeran and Orbell (1999) found that descriptive norms predicted intentions to play the national lottery over and above TPB variables. With regard to alcohol consumption, Campo et al. (2003) reported that students, who perceived that their male friend’s were binge-drinkers, were more likely to binge-drink themselves. Thus, perceptions of others’ drinking behaviour appear to be an important determinant of individuals’ drinking behaviour (Kuntsche et al., 2004). This study is the first to incorporate descriptive norms into the TPB to predict binge-drinking intentions and behaviour.

**Anticipated regret**

Anticipated regret, perceiving that one will feel regret at not performing a behaviour, has emerged as a significant predictor of intentions. In a series of studies, Richard and colleagues (e.g. Richard et al., 1995; van der Pligt et al., 1998) demonstrated that anticipating regret at not using a condom was a significant predictor of condom use intentions. Anticipated regret has also been shown to predict intentions regarding driving violations (Parker et al., 1995) playing the national lottery (Sheeran and Orbell, 1999), and exercise (Abraham and Sheeran, 2004), over and above the prediction afforded by TPB variables. Although anticipated regret has never been applied to binge-drinking behaviour, there are reasons to believe that regret may predict binge-drinking intentions and behaviour. Binge-drinking sessions often lead to negative short term health consequences (e.g. being hung over the next day, feeling nauseous) and experience of these consequences may prompt regret in individuals. *

**Past behaviour**

Extensive research has demonstrated that past behaviour is a consistently strong predictor of future behaviour (e.g. Ouellette and Wood, 1998). Past behaviour has been shown to be a particularly effective predictor of behaviours which are performed frequently; Ouellette and Wood found that the correlation between past behaviour and future behaviour was $r = 0.59$ for frequently performed behaviours. Because binge-drinking is a behaviour that can be performed repeatedly, past binge-drinking behaviour frequency may be a good predictor of future binge-drinking behaviour. Evidence for this assumption comes from Norman and Conner (2006) who reported that the introduction of previous binge-drinking behaviour into the regression equation improved prediction of future behaviour. This is the only paper that has tested this assumption, in addition to measuring TPB variables, and Norman and Conner used a dichotomous measure of binge-drinking behaviour. This paper differs in that we use a continuous measure of binge-drinking behaviour. A continuous measure of past binge-drinking behaviour should improve prediction of intentions and behaviour because it allows for differentiation between individuals who binge-drink infrequently (once a week) from those who binge-drink frequently (four or five times a week). Moreover, the inclusion of past behaviour allows us to test whether TPB cognitions predict behaviour change.

**Intentions to avoid binge-drinking**

The present paper also differs from previous research in that we asked participants their intentions to limit their drinking and avoid binge-drinking as opposed to their binge-drink intentions. This reflects a health-focused approach coined for a sample with very high binge drinking prevalence. Norman and Conner’s (2006) figures as well as pilot studies in Scotland indicated very high frequency of binge drinking amongst UK undergraduates. In addition, it is worth understanding undergraduates’ plans to drink within the binge-drinking limits. This information can be used to help inform health promotion campaigns by identifying psychological factors which differentiate between individuals who plan to binge-drink and those who do not.

The aim of this study is to test the TPB augmented by measures of descriptive norms, anticipated regret, and past behaviour in the prediction of binge-drinking behaviour and intentions to limit binge-drinking.

**METHOD**

**Participants and design**
One hundred and seventy-eight (103 female, 75 male, 17–53 years, M = 20.28, SD = 4.70) undergraduates completed
measures at Time 1. One week later (Time 2) 108 (65 female, 43 male) participants completed a second set of measures, which was internet-based.

In order to reduce ambiguity about the meaning of ‘binge-drinking’ a definition of binge-drinking was printed on the front page of all the questionnaires (‘Binge drinking’ is defined as drinking at least half of the recommended weekly alcoholic units in a single session, which entails 7 units for women and 10 units for men). Participants were also informed about the number of units in different alcoholic drinks: A pint of ordinary strength lager (Carling Black Label, Fosters) = 2 units, A pint of strong lager (Stella Artois, Kronenburg 1664) = 3 units, A pint of bitter (John Smith’s, Boddingtons) = 2 units, A pint of ordinary strength cider (Dry Blackthorn, Strongbow) = 2 units, A 175ml glass of red or white wine = ~2 units, A shot, which is a pub measure of spirits, (includes mixed drinks, e.g. whisky cola) = 1 unit, An alcopop (e.g. Smirnoff Ice, Bacardi Breezer, WKD, Reef) = ~1.5 units. These definitions were also included as a footnote on each page of the questionnaire.

Measures

All TPB variables were assessed on 7-point scales using items adapted from Cooke and Sheeran (2004) and Norman and Conner (2006). Attitudes were measured by responses to the stem ‘For me to drink less than 7(females)/10(males) units in a single session in the next week would be...’ on five bipolar scales (harmful-beneficial, unpleasant-pleasant, bad-good, worthless-valuable, unenjoyable-enjoyable (alpha = 0.72). Subjective norms were measured using four items, ‘Most people who are important to me think I should—should not drink less than 7(females)/10(males) units in a single session in the next week.’, ‘The people in my life whose opinion I value would approve-disapprove of me drinking less than 7(females)/10(males) units in a single session in the next week.’, ‘The people in my life whose opinion I value do not drink 7(females)/10(males) units in a single session’, and ‘Most people who are important to me think I drink less than 7(females)/10(males) units in a single session in the next week (completely true-completely false).’ Reliability for this scale was a little low (alpha = 0.56) so items were kept separate in analyses. PBC was measured using three items ‘For me to drink less than 7(females)/10(males) units in a single session in the next week would be (very difficult-very easy)’, ‘If I wanted to I could drink less than 7(females)/10(males) units in a single session in the next week (definitely false-definitely true)’, and ‘How much control do you believe you have over drinking less than 7(females)/10(males) units in a single session in the next week? (no control-complete control)’ (alpha = 0.66). Intention was measured using four items ‘I intend to drink less than 7(females)/10(males) units in a single session in the next week (strongly disagree-strongly agree)’, ‘I plan to drink less than 7(females)/10(males) units in a single session in the next week (strongly disagree-strongly agree)’, ‘I will try to drink less than 7(females)/10(males) units in a single session in the next week (definitely false-definitely true)’, and ‘In the next week, I intend to stop drinking before I am drunk (strongly disagree-strongly agree)’ (alpha = 0.87). Descriptive norms were measured using two questions from Campo et al. (2003) ‘How many women do you know who drink more than 7 units in a single session?’ and ‘How many men do you know who drink more than 10 units in a single session?’ (alpha = 0.89).** Anticipated regret was measured using two items from Abraham and Sheeran (2004) ‘In the next week, I would feel regret if I drank more than 7(females)/10 (males) units in a single session (definitely no-definitely yes)’ and ‘In the next week, I would feel upset if I drank more than 7(females)/10 (males) units in a single session (definitely no-definitely yes)’ (alpha = 0.84). Past behaviour was measured by responses to the question ‘How many days in the previous week did you drink 7(females)/10(males) or more units?’

At Time 2, participants completed the following measure of their drinking behaviour: ‘How many days in the previous week did you drink 7(females)/10(males) or more units?’ Because some constructs (descriptive norms and past behaviour) were not measured on seven-point scales all items were standardized. This was done prior to conducting analyses.

Procedure

The study received ethical approval from the University of Aberdeen. All participants gave informed consent prior to taking part in the study. Participants completed the first questionnaire in a laboratory class setting. Prior to Time 2, participants were sent an email with instructions to complete the measure of behaviour and a web link to follow to fill in the information. After completing the Time 2 measure, participants were emailed a debrief sheet which explained the purpose of the study.

RESULTS

Data analysis proceeded in two stages. First, variables from the TPB, descriptive norms, anticipated regret and past behaviour were used to predict intentions. Second, binge-drinking behaviour at Time 2 was predicted using variables measured at Time 1.

Descriptive analyses

At Time 1, 114 participants (64%) had engaged in at least one binge-drinking session in the previous week. At Time 2, 63 participants (59%) reported engaging in at least one binge-drinking session. Table 1 presents the means, standard deviations and correlations between the TPB variables, descriptive norms, anticipated regret, past behaviour, and Time 2 behaviour. These data show that participants did not possess strong intentions to limit their alcohol consumption, although they had positive attitudes, positive subjective norms, and high PBC with regard to limiting alcohol consumption, suggesting that this behaviour is valued and perceived as under control. The descriptive norm measures show that participants reported knowing an average of 14 people who binge-drink. Participants anticipated little regret if they failed to meet their target of drinking within the limits.

Intention had significant correlations with all variables. There were positive correlations between intention and attitude, subjective norms, PBC, and anticipated regret. So, positive intentions to limit alcohol consumption were associated with positive attitudes to drinking within limits, perceived
approval for drinking within the limits, perceived control over drinking within limits, and more anticipated regret at not drinking within limits. Intention had significant negative correlations with descriptive norms and past behaviour. Therefore, knowing more people who binge drink, and engaging in more binge-drinking sessions in the past, were all associated with less intention to drink within the limits.

Predicting intention

A three-step hierarchical regression was conducted to test the impact of variables on the prediction of intention. On the first step TPB variables were entered. On the second step, past behaviour was entered into the Equation. On the final step, descriptive norm and anticipated regret were entered.

Table 2 provides the results of the analysis. TPB variables explained 37% of the variance in intentions to limit alcohol consumption with significant beta weights for attitudes and PBC. Entry of past behaviour significantly increased the variance accounted for (\(\Delta R^2 = 0.06, P < 0.001\)), with the model accounting for 43% of the variance in intentions. There were significant beta values for past behaviour (beta = -0.27, \(P < 0.001\)) and past behaviour (beta = -0.27, \(P < 0.001\)). On the final step, the additional variables significantly improved prediction of intentions (\(\Delta R^2 = 0.15, P < 0.001\)). The final model accounted for 58% of the variance in intentions. In this equation, anticipated regret (beta = 0.47, \(P < 0.001\)) and attitude (beta = 0.30, \(P < 0.001\)) were the only significant predictor variables. So, positive intentions to drink within the binge-drinking limits were predicted by feelings of regret if not staying within these limits, and positive attitudes about the benefits of drinking within these limits.

Given that entry of anticipated regret into the regression equation coincided with past behaviour becoming a non-significant predictor of intentions, we decided to test the possibility that anticipated regret mediated the relationship between past behaviour and intentions. We have no a priori reason to expect that anticipated regret would mediate the relationship between past behaviour and intention; however, a mediation analysis allows us to examine the possibility that anticipated regret mediates the relationship between past behaviour and intention. A Sobel test indicated that anticipated regret significantly mediates the effect of past behaviour (Z_{Sobel} = 3.05, \(P = 0.002\)). When past behaviour is entered as a predictor of intentions on its own there is stronger relationship (beta = -0.43, \(P < 0.001\)), than when past behaviour and anticipated regret are entered at the same time (beta = -0.22, \(P < 0.001\)) (Table 3).

Dropdown analyses

Independent t-tests were used to test for differences in the variables used to predict binge-drinking behaviour between participants who completed the Time 2 measure of behaviour (\(N = 105\)) and participants who did not (\(N = 73\)). The only significant difference was found for anticipated regret, with individuals who completed both measures having higher anticipated regret (M = 3.48, SD = 1.92) compared to individuals who did not complete T2 measures (M = 2.89, SD = 1.76), \(t(1, 176) = 2.05, P < 0.05\).

Predicting behaviour

A four-step hierarchical regression was conducted to test the impact of the variables on the prediction of behaviour. On the first step, intention and PBC were entered. On the second step, past behaviour was entered into the Equation. Attitudes and subjective norms were entered on the third step while descriptive norms and anticipated regret were entered on the final step. Intention and PBC accounted for 25% of the variance in future behaviour with significant beta weights for both variables. The inclusion of past behaviour significantly increased the variance accounted for in future behaviour (\(\Delta R^2 = 0.07, P < 0.01\)); the model explained 32% of the variance in behaviour. There were significant beta values for past...
behave (beta = 0.35, P < 0.01) and intention (beta = −0.20, P < 0.05). Entry of additional variables did not improve prediction of binge-drinking behaviour. So, binge-drinking behaviour was predicted by past binge-drinking behaviour and intentions to drink within the binge-drinking limits. The significant beta weight for intentions in the final model also indicates that intentions were predictive of behavioural change.

We performed an additional analysis to assess the importance of anticipated regret on binge-drinking behaviour (we thank an anonymous reviewer for this suggestion). Although anticipated regret did not predict behaviour in the regression reported, this is probably because past behaviour is such a strong predictor of future behaviour. We were interested to test the possibility that (i) anticipated regret predicts binge-drinking behaviour, and (ii) intention mediates the relationship between anticipated regret and behaviour. Anticipated regret, when entered alone, was a significant predictor of binge-drinking behaviour (beta = −0.30, P < 0.01) and accounted for 9% of the variance in behaviour. When intention was entered at the same time, anticipated regret was reduced to non-significance (beta = −0.03) while intention was a significant predictor (beta = −0.42, P < 0.01) suggesting that the impact of anticipated regret on behaviour is completely mediated by intention. A Sobel test confirmed that intention fully mediates the impact of that anticipated regret on behaviour (ZSobel = −3.46, P = 0.0005).

DISCUSSION

In summary, the present study found the following. Positive intentions to limit alcohol consumption were associated with positive attitudes to limit alcohol consumption and more anticipated regret if not sticking to limits. Future binge-drinking behaviour was best predicted by past binge-drinking behaviour, although intentions also predicted binge-drinking behaviour. This study adds to the literature examining the motivational determinants of binge-drinking behaviour (Norman et al., 1998; Murgraff et al., 2001; Johnston and White, 2003; Norman and Conner, 2006). This study provides the first test of anticipated regret and descriptive norms as predictors of binge-drinking intentions and behaviour and the second test of past behaviour as a predictor of binge-drinking intentions.

Anticipated regret was the strongest predictor of intentions, and this finding is consistent with McNally and Palfai (2001), who found that negative emotional expectancies predicted willingness to reduce alcohol consumption. Regret may become associated with binge-drinking behaviour and, as a result, become salient when contemplating future alcohol consumption. Thus individuals who perceive greatest regret may wish to limit their alcohol consumption. It may be possible to reduce binge-drinking by inducing regret among participants. To date, there have been few studies which tried to manipulate regret in participants: Abraham and Sheeran (2004) found that placing anticipated regret items before intention items in a questionnaire produced higher intention scores compared to a condition where participants completed anticipated regret items after intention items. However, Abraham and Sheeran did not follow up their participants to see if these stronger intentions produced increased exercise behaviour. Further research is required to see if regret can be manipulated, and if it can be, to see if this has a sustainable effect on subsequent intentions and behaviour. It may be wise to emphasize regret in health promotion leaflets aimed at reducing alcohol consumption.

The fact that anticipated regret mediated the relationship between past binge-drinking behaviour and intentions is an interesting finding, and suggests that although past behaviour can predict intentions, regret is a more important variable for binge-drinking intentions. It might also point to the conclusion that anticipated regret reflects past behaviour to some degree—if individuals have had unpleasant experiences with drinking large quantities of alcohol, these experiences are very likely to be included in their feelings of anticipated regret. Thus, anticipated regret appears to be a more proximal predictor of intentions than past binge-drinking behaviour and helps discriminate between individuals who plan to continue binge-drinking and those who have decided not to binge-drink. The finding that intention mediates the effect of anticipated regret on behaviour suggests that anticipated regret is a variable important for intention formation could be incorporated into the TPB as an additional predictor of intentions.

Previous studies (Murgraff et al., 2001; Johnston and White, 2003; Norman and Conner, 2006) have shown attitudes to be a consistent predictor of intentions to binge-drink; the present paper shows that attitudes to limit drinking are significantly linked to intentions to limit drinking. However, most research that is aimed at reducing binge-drinking behaviour focuses on reducing perceptions that heavy alcohol consumption is the norm (Campo et al., 2003), rather than focus on changing attitudes. The results from this study support a move towards focusing on attitude change as a way to reduce binge-drinking intentions. Considerable research (e.g. Dijkstra et al., 2001) has demonstrated that students perceive many positive consequences of heavy alcohol consumption (e.g. reduced stress, greater sociability), with less consideration of the negative consequences of heavy alcohol consumption (e.g. feeling unwell, greater risk of violence). Therefore, health promotion may be aimed at encouraging an appreciation of the positive consequences of light and controlled consumption, to encourage students to enjoy themselves without binge-drinking.

Table 3. Prediction of behaviour using TPB variables and past behaviour

<table>
<thead>
<tr>
<th>Step</th>
<th>Variable entered</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Intention</td>
<td>−0.27*</td>
<td>−0.20*</td>
<td>−0.16</td>
<td>−0.17</td>
</tr>
<tr>
<td></td>
<td>PBC</td>
<td>−0.32**</td>
<td>−0.14</td>
<td>−0.11</td>
<td>−0.12</td>
</tr>
<tr>
<td>2</td>
<td>Past behaviour</td>
<td>0.35**</td>
<td>0.36**</td>
<td>0.38**</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Attitude</td>
<td>−0.06</td>
<td>−0.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subjective norm 1</td>
<td>0.14</td>
<td>0.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subjective norm 2</td>
<td>−0.06</td>
<td>−0.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subjective norm 3</td>
<td>−0.08</td>
<td>−0.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subjective norm 4</td>
<td>−0.04</td>
<td>−0.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Descriptive norm</td>
<td></td>
<td></td>
<td>−0.05</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>Anticipated regret</td>
<td></td>
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</tr>
</tbody>
</table>

| R²   | 0.25             | 0.32   | 0.35   | 0.35   |
| ΔR² | 0.25***          | 0.07** | 0.03   | 0.00   |
| ΔF  | 16.44***         | 15.59***| 6.24***| 4.92***|

Note: *P < 0.05; **P < 0.01; ***P < 0.001.
Existing research emphasizes the importance of normative variables in predicting binge-drinking behaviour and intentions (Campo et al., 2003; Johnston and White, 2003), however we found no evidence for norms as predictors of intentions. The finding that subjective norms did not predict intentions after controlling for other variables is worth considering. Ajzen (1991) has stated that attitudes, subjective norms and PBC vary in their importance depending on the behaviour, so it is possible that subjective norms are not important predictors of binge-drinking, though this seems unlikely because binge-drinking is often a social behaviour. It may be that subjective norms were not measured well in the present study, although the measures were similar to those used in other research (see Norman and Conner, 2006). It may also be possible that participants were confused about whose approval they were being asked about; work by French et al. (in press) has shown that participants sometimes struggle to answer items which use the phrase ‘most people who are important to me’ partly because there could be a disagreement between important people (e.g. friends want you to drink, parents would not). One suggestion to improve measurement could be to ask participants to list their important referents and then answer questions based on these referents. Steadman et al. (2002) has shown that subjective norm measures can directly predict behaviour, when it is made clear whose opinion is being sought.

Previous research has demonstrated that perceived behavioural control is an important predictor of binge-drinking intentions and behaviour (Norman et al., 1998; Johnston and White, 2003; Norman and Conner, 2006); however, there were no unique effects of PBC on either intentions or behaviour in this study. The most likely explanation for these findings were the high levels of PBC reported by participants, the mean value was 6.20 on a 7-point scale, thus there was a lack of variation in responses which probably undermined the impact of PBC in analyses. PBC may be rated as high in a laboratory setting, where there is no alcohol and no pressure to drink, as opposed to ratings of PBC in a drinking context, where PBC may be rated as lower because alcohol consumption may not be completely under your control, for example you may find it difficult to refuse when a friend buys you another drink. Including phase-specific control expectations such as maintenance or recovery self-efficacy (Scholz et al., 2005) including barriers more proximal to behaviour might improve this relation.

The finding that previous binge-drinking behaviour was the strongest predictor of current binge-drinking behaviour might be due to the fact that binge-drinking is a behaviour performed repeatedly under stable conditions, thus creating automatic behavioural routines that need no conscious control or intent (Verplanken et al., 1997; Ouellette and Wood, 1998). In addition, measures of behaviour at both points of measurement share method variance—both previous behaviour and current behaviour were measured numerically whereas other variables were measured on scales. Research by Courneya and McAuley (1994) supports the idea that shared method variance partly explains the stronger relationship between past behaviour and future behaviour compared to the relationship between intention and future behaviour.

Ajzen (2002b) argues that previous behaviour as a predictor of behaviour merely indicates that behavioural performance is stable, and tells us little about why a person performs behaviour. It is important to try and understand which factors underpin the link between previous drinking and current drinking; is it the behaviour itself? Or does binge-drinking only take place on a Wednesday night in the Student Union during term time? At present too little is known about the relative importance of contextual factors in applied settings (such as student nights, happy hours, sports group social events, etc.) that facilitate heavy drinking. More research is required to find out which of these factors are important, and how they interact to produce binge-drinking behaviour in UK undergraduates.

Intentions were also a significant predictor of binge-drinking behaviour over and above past behaviour. This is encouraging because it suggests that behaviour may be modified if intentions are changed. Despite the importance of the link between intentions and behaviour, there have been few intervention studies which have attempted to change intentions and then investigate the impact on subsequent behaviour. Hardeman et al. (2002) found only 12 studies that used the TPB to design an intervention, and there appeared to be great variation in how the TPB is used, with methods ranging from persuasion, information leaflets, goal setting, and skills training. In addition, not all studies found that the variables suggested by the TPB produced behaviour change. Webb and Sheeran (2006) conducted a meta-analysis of 40 intervention-studies that successfully changed intentions (with an average effect size of \( d = 0.48 \)) and followed up a measure of goal attainment. They showed that these intervention indeed engendered a significant difference in goal achievement but with a small average effect size of \( d = 0.26 \) (Webb and Sheeran, 2006). More experimental research is required to check the usefulness of the TPB to inform behavioural change interventions (cf. Weinstein, in press).

Implications and future directions

Research is needed to examine ways to reduce the prevalence of binge-drinking behaviour. One way to instigate behavioural change is to use self-regulatory strategies. Implementation intentions (Gollwitzer, 1999), which are intentions specifying the environmental cues associated with behavioural performance (‘I intend to go to the gym next Monday at 5 pm’) have been shown to increase intention-behaviour consistency and increase behavioural performance (Orbell et al., 1997; Sheeran and Orbell, 2000; Milne et al., 2002). Murgraff et al. (1996) tested the effectiveness of implementation intentions on reducing binge-drinking among UK undergraduates. They found that participants who planned how, when and where to refuse a drink reported fewer instances of binge-drinking at follow-up and greater reduction in binge-drinking frequency relative to baseline levels compared to participants who did not. Further research is needed to replicate these findings as the majority of Murgraff et al.’s sample was female.

There are a number of limitations with the present study. First, self-report measures of binge-drinking behaviour were used. Undergraduates may under or overestimate how much alcohol they have consumed when completing the questionnaires. However, by asking students to report how many occasions they drank more than 7/10 units (and in the
previous week) we hope that this measure yielded more accurate responses because participants are asked about heavy drinking sessions over a recent time period, which would be easier to recall. Nonetheless, future research should seek more objective measures of alcohol consumption. Second, the response rate at Time 2 (61%) may be considered low and it may be that there are differences between participants who took part at both timepoints and those who only completed Time 1 measures. However, analyses showed the only difference was in anticipated regret scores, suggesting that the samples were not too dissimilar. It is possible that participants low in anticipated regret did not feel that they were at the risk of being a binge-drinker and subsequently decided not to participate at Time 2. As a result it is possible that prediction of behaviour at Time 2 was affected because we had more participants who reported regret at binge-drinking. Finally, binge-drinking behaviour was considered over a short period of time, so future research needs to track binge-drinking behaviour over longer periods of time.

In conclusion, the present study shows that deliberative variables are important determinants of intention and behaviour. Interventions which focus on promoting attitudes to drinking within the binge-drinking limits and/or increasing anticipated regret at drinking more than these limits should be designed and implemented as ways to promote intentions to reduce binge-drinking behaviour. In turn, stronger intentions to limit drinking should lead to less binge-drinking behaviour. Given the prevalence of binge-drinking among undergraduates, and the importance attached to reducing binge-drinking by the UK government, such interventions appear timely and are required to deal with this important health issue.

*There is some conceptual overlap between the concepts of anticipated regret and negative outcome expectancies (Leigh and Stacy, 1993), in particular the emotion subscale of the Alcohol Outcome Expectancies Scale. Despite this overlap, these constructs are distinct in that measures of negative outcome expectancies refer to perceptions about performing behaviour, whereas anticipated regret focuses on perceptions at not performing behaviour.

**These items are how descriptive norms were measured, consistent with previous studies. However, we acknowledge that it may have improved prediction of intentions and behaviour had we asked participants how many men and women they knew who drank less than the binge-drinking limits. We thank an anonymous reviewer for making this suggestion.

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