Similarity to prototypical heavy drinkers and non-drinkers predicts AUDIT-C and risky drinking in young adults: prospective study

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ABSTRACT

Objective: The aim of the present study was to explore whether constructs within the Prototype Willingness Model (PWM) predicted risky drinking as measured by AUDIT-C, drinking harms and unplanned drunkenness in a sample of UK young adults. Previous studies exploring the PWM often do not use validated measures of alcohol consumption, and the outcomes of risky drinking are underexplored.

Design: An online prospective study design with four week follow up was employed and 385 young adults completed the study (M age = 21.76, SD = 3.39, 69.6% female; 85.2% students).

Main outcome measures: Intentions to get drunk, AUDIT-C, drinking harms experienced in the last four weeks, and unplanned drunkenness in the last four weeks.

Results: Heavy and non-drinker prototype similarity predicted AUDIT-C, drinking harms and unplanned drunkenness when controlling for past behaviour and reasoned action pathway constructs. Intentions and willingness both mediated the relationship between prototype perceptions and AUDIT-C.

Conclusion: This study supports the use of the PWM in the prediction of AUDIT-C, drinking harms and unplanned drinking in a UK sample. Prototype perceptions influenced behaviour via both reasoned and reactive cognitions. Targeting similarity to heavy and non-drinker prototypes should be the focus of future interventions in this population.

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INTRODUCTION

Alcohol misuse is a serious public health issue impacting on poor health and premature death worldwide (WHO, 2014). Young people bear a considerable proportion of the burden of the detrimental health and social consequences associated with excessive alcohol consumption across the globe (Babor et al., 2010; Rehm, Room, van den Brink, & Jacobi, 2005). In the United Kingdom (UK) national surveys suggest 2.5 million people consume in excess of low risk weekly guidelines (14 units) on their heaviest drinking occasion; the majority of this group are aged 16-24 (Office for National Statistics, 2016). Young people are also more likely to engage in heavy episodic drinking, which is associated with short term harms such as accidents and injuries (WHO, 2014). University students in particular tend to consume alcohol at potentially harmful levels (Kypri, Cronin, & Wright, 2005). According to a systematic review two third of students in the UK and Ireland could be classified as hazardous drinkers (Davoren, Demant, Shiely, & Perry, 2016).

In order to develop effective interventions to reduce risky drinking in young people, it is important to understand the determinants of this behaviour. There has been a focus on the role of drinking intentions, which are strongly correlated with attitudes (personal outcomes and feelings) and social norms (beliefs about what others think) (Cooke, Dahdah, Norman, & French, 2016). French and Cooke (2012) suggest changing beliefs about the ease and acceptability of binge drinking might be an appropriate focus for an intervention aimed at young people. While alcohol consumption is strongly correlated with intentions (Cooke et al., 2016) there is often a discrepancy between what people intend to do and their actual behaviour (Sheeran, 2002; Vlaev & Dolan, 2009). Evidence suggests that this gap between intentions and behaviour is particularly problematic when considering health risk behaviours such as drinking alcohol (Pomery, Gibbons, Reis-Bergan, & Gerrard, 2009). Intentions are weaker predictors of

behaviours that are undertaken in social situations, and for behaviours that are associated with social image and status (Webb & Sheeran, 2006). The social nature of drinking means that even good intentions often fail, as individuals may be influenced by their peers (Jamison & Myers, 2008). Thus, there is an increased focus on understanding the social and automatic nature of some health behaviours, such as risky drinking (Avishai-Yitshak & Sheeran, 2016; Hollands, Marteau, & Fletcher, 2016).

The Prototype Willingness Model (PWM) (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008; Gibbons & Gerrard, 1995) is a modified dual process theory that acknowledges the social nature of health behaviours such as risky drinking. It proposes two paths to behaviour; the reasoned action pathway and the social reaction pathway. The first pathway is a planned route via attitudes, social norms, and intentions, and is characterised by some consideration of behavioural consequences (Gerrard et al., 2008). The second pathway describes how volitional, but unintentional, risk behaviours occur and takes social influences into account (Gerrard et al., 2008). This social reaction pathway to behaviour is via the images or 'prototypes' that young people have about typical people their age that drink or abstain from drinking, which are then influential for an individual's 'willingness' to consume alcohol, by a process of social comparison (Gibbons & Gerrard, 1995).

Meta-analyses have provided broad support for the application of the PWM to understanding risk behaviours (Todd, Kothe, Mullan, & Monds, 2016; van Lettow, de Vries, Burdorf, & van Empelen, 2016). For example, willingness was shown to add to the prediction of behaviour over and above intentions (Todd et al., 2016), and prototypes were found to have a direct relationship to intentions and behaviour (van Lettow et al., 2016), in contrast to the proposition within the social reaction pathway, that they impact behaviour via willingness. Furthermore, the relative importance of both prototype favourability and similarity was highlighted, with similarity having the strongest relationship with willingness and intentions (Todd et al., 2016). However, although both meta analyses conclude that targeting prototype perceptions could

modify willingness and subsequent behaviour, there is less agreement about the optimal way to target these constructs within interventions, with a lack of uniform approach to changing prototypes within the existing literature thus far (Davies, Martin, & Foxcroft, 2016b).

Another consideration is that much of the previous research focusses on the 'actor' verses 'abstainer' prototype distinction, which some researchers argue may particularly oversimplify drinking behaviours in cultures where regular drinking is the norm (Davies, Martin, & Foxcroft, 2015; van Lettow, Vermunt, de Vries, Burdorf, & van Empele, 2013b). A better focus could perhaps be to look at heavy or binge drinkers compared with moderate drinkers. Some research in the Netherlands identified different dimensions of drinker prototypes such as 'tipsy', 'moderate' and 'heavy' drinkers (van Lettow et al., 2013b). In a naturalistic bar lab setting, other researchers have explored the influence of abstainer, social and heavy drinker prototype perceptions on observed alcohol use (Spijkerman, Larsen, Gibbons, & Engels, 2010). More favourable perceptions of the heavy drinker prototype were associated with increased consumption. Similarity was not measured within this study and, as mentioned, in other research this has been found to be more important than favourability (Norman, Armitage, & Quigley, 2007).

Within British culture, drinking during the teenage years appears to be seen as part of growing up (Davies, Martin, & Foxcroft, 2013) and once adolescents reach young adulthood, many engage in heavy drinking (de Visser, Wheeler, Abraham, & Smith, 2013). Other work from the UK has highlighted the importance of tailoring intervention content to the intended population, suggesting a focus on encouraging young people who drink not to get 'too drunk' (de Visser et al., 2015). This work highlights a need to explore more varied types of prototypes with young people in the UK.

In a previous UK study with a prospective design, binge drinker prototypes and binge drinking intentions and behaviour were measured in a sample of 79 students (68 female) (Norman et al., 2007). Adding prototypes to the Theory of Planned Behaviour increased the amount of variance

explained in intentions and behaviour one week later by a small but significant amount, where prototype similarity contributed, but favourability did not add to the model. In this study behaviour was measuring by asking students to report the number of times they had engaged in binge drinking in the previous week, and it is possible that one week is too brief a time period for a prospective study. Furthermore binge drinking is a contested term, and there is variability in how it is understood (Cooke, French, & Sniehotta, 2010).

The Alcohol Use Disorders Identification Test (AUDIT) is used as a screening tool to identify risky drinking (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). A shorter version consisting of three items, the AUDIT-C, has been empirically assessed as the best measure for hazardous drinking in young people (Foxcroft, Smith, Thomas, & Howcutt, 2015) and therefore may be a more appropriate means of testing the predictive nature of theoretical constructs. Not only is the amount of alcohol consumed an important indicator of harm, the consequences of drinking are also important to explore. Young people may not view their drinking as problematic if they have not experienced any negative consequences. Gibbons et al (2000) also argue that individuals who are 'intending' to drink might be more accepting of such consequences (such as a hangover) whereas individuals who are 'willing' to drink will not have considered any adverse outcomes. This lack of forethought means that unplanned behaviour is likely to be more harmful to young people as they do not consider themselves to be personally vulnerable to risks (Gibbons, Gerrard, Ouellette, & Burzette, 1998). Thus, a central assumption of the PWM is that prototypes and willingness should be able to predict unplanned drinking occasions. The current study, therefore, sought to explore whether the PWM could predict drinking harms and unplanned drinking, in addition to hazardous drinking as measured by AUDIT-C, as all three measures capture an aspect of risky drinking behaviour.

In summary, there is need to explore a more diverse range of prototype descriptions within a UK sample over a longer time period and to use validated measures of alcohol consumption and to explore the prediction of drinking harms and unplanned drinking. The exploration of

different prototype descriptions may provide a means of furthering current knowledge about how to target the PWM within interventions. Recent research from Australia suggested that high risk drinkers might inaccurately identify with low risk prototype descriptions (Pettigrew, Jongenelis, Pratt, Slevin, & Chikritzhs, 2017). Interventions could encourage drinkers to perceive their drinking in a more accurate light so that they are aware they are more similar to a high risk drinker.

The PWM also assumes that prototypes influence behaviour via willingness (Gibbons, Gerrard, & Lane, 2003), but they are often found to have a direct correlation with behaviour (van Lettow et al., 2016). Intentions and willingness are also assumed to be independent but are also often highly correlated (Todd et al., 2016). Previous research suggests that, with experience, drinking behaviour becomes less reactive and more planned, and therefore intentions are better able to predict behaviour than willingness (Davies, Paltoglou, & Foxcroft, 2017; Pomery et al., 2009). Thus, it would be informative to test whether prototypes influence behaviour via willingness and/or intention within a young adult sample, where drinking behaviours are normalised.

One further facet within the PWM literature is that not all studies include a measure of past behaviour. In a review of prospective studies on the Theory of Planned Behaviour, past behaviour was only significant variable when added to models for risk behaviours (McEachan, Conner, Taylor, & Lawton, 2011). It has been argued that prospective designs controlling for behaviour are needed (Weinstein, 2007) because of how important this is for determining future behaviour. However, prediction has limited value if we want to try to change behaviours as well as predict them (Sutton, 1998). Thus, it can be argued that controlling for past behaviour is more important than adding it to theories and models (McEachan et al., 2011).

Prior to commending the present study, pilot work with young adults was conducted to explore how drinker prototypes were described. Ten students within a seminar class were asked to discuss how they would describe other people of the same age who either did drink alcohol or did not drink alcohol. This pilot work confirmed that the 'drinker' prototype was not distinct,

and could describe a broad range of behaviours, some considered to be healthy, but some considered risky. Thus, the present research included a heavy drinker and a social drinker prototype to explore their application to the PWM in a British sample.

The current study

In summary, the PWM has been widely applied to understanding young adult drinking worldwide, but there is less evidence applying it to young people in the UK. Few PWM studies also include attitudes and social norms (Todd et al., 2016) and so testing the full PWM is justified in this population. Furthermore, there are many previous studies exploring the prediction of drinking intentions rather than behaviour, and those that do measure behaviour tend not to use validated measures. In addition to using validated measures of consumption, applying the PWM to the prediction of drinking harms and unplanned drinking may provide further information that could be used to inform interventions to target risky drinking consequences. There is also a need to explore a wider range of prototypes than the actor-abstainer, particularly in cultures where alcohol consumption is normative, and to explore both favourability and similarity together. Finally, the mechanism (intentions and/or willingness) through which prototypes impact on behaviour will be explored, given the planned nature of many drinking behaviours for young people.

The aim of the present study was to explore whether the social reaction PWM constructs of prototypes and willingness would predict risky drinking as measured by AUDIT-C, drinking harms and unplanned drinking in a sample of UK young adults using a four week prospective design. It was hypothesised that the social reaction pathway constructs of prototypes and willingness would be able to significantly add to the prediction of behaviours over and above constructs from the reasoned pathway. Further it was expected that willingness and intention would both mediate the relationship between prototype perceptions and behaviour, but that willingness would have a stronger indirect effect than intentions in line with the assumptions of the PWM.

METHODS

Participants and procedure

Drinkers aged 18-30 were invited to sign up to take part in this online study via posters, social media and email. Emails were circulated to students with the permission of their module leaders. Posters were located within a University campus as well as online. Social media posts were used to try to attract non-students. Potential participants were advised that the study was about drinking attitudes and behaviours. Individuals gave their consent online after reading the participant information sheet. At the end of the study they were signposted to sources of support and advice about alcohol. Four weeks after the T1 questionnaire, respondents were sent an email inviting them to take part in T2. If they had not completed T2 within four days they were sent a further reminder email. A further three days after that, the questionnaire was closed. Thus there was a range of completion times at T2, but most of the participants completed within the first four days (approximately 75%). Respondents who completed both parts of the study had the option of entering a prize draw to win shopping vouchers. The study procedures received approval from XXXX University Ethics Committee (reference number 150944).

A total of 385 respondents completed the study measures in full at both time points (78.8% of those eligible for the study who completed time one). The sample consisted of 268 women (69.6%), 112 men (29.1%), and five non-binary respondents (1.3%). The mean age was 21.76 (SD=3.39), 92.2% were white, and 85.2% were students. There were no significant differences on any of the measures between those who completed both time points and those who were lost to follow up.

Design and Measures

An online prospective study design with four week follow up was employed. Participants completed all measures at both time points (hereafter referred to as T1 and T2). Email addresses were used to match the T1 and T2 data, and these were deleted shortly after data collection was completed.

Outcome measures:

Alcohol consumption: AUDIT-C (Babor et al., 2001) was used to measure alcohol consumption. Participants were presented with images depicting drinks containing different UK units. Three items asked; 1)how often do you have a drink containing alcohol? 2) how many standard drinks containing alcohol do you have on a typical day? and 3)how often do you have six or more units (women) or eight or more units (men) on one occasion? AUDIT-C is scored from 0-12, and is appropriate for assessing hazardous drinking in young people (Foxcroft et al., 2015).

Harms: Drinking related harms experienced in the last four weeks were used as a proxy measure for heavy consumption, with a focus on preventable consequences of drinking. The drinking harms scale was adapted for use in a young adult population from a scale used in a previous study (Davies, Martin, & Foxcroft, 2016a) and includes: being sick; embarrassed; missing university or work; trouble with police; injury; being taken to hospital; having a fight; taking an illegal drug or 'legal high'; losing a personal item such as a phone; unprotected sex; regretted sex; not knowing where you are when you woke up; having an embarrassing photo posted on social media. Participants indicate yes/no as to whether the harms had occurred in the last four weeks.

Unplanned drinking: One of the assumptions of the PWM is that prototype evaluation occurs spontaneously and that many young people do not intend to get drunk, but may well do if the social context is conducive. Thus, unplanned drinking was assessed by a single item; over the

course of the last month, did you get drunk when you had not planned to beforehand (yes/no /don't know).

Theory based measures:

Social reaction pathway:

Prototypes: Direct measures of favourability and similarity have been deemed better than indirect measures (van Lettow et al., 2016). Thus, participants were presented with a description of three prototypes, the non-drinker, the social drinker and the heavy drinker and asked how favourable (1 =extremely negative; 7 = extremely positive) and how similar they were to this person (1= not at all; 7 very). *Willingness* to drink was also measured in the same way as in previous research (Ouellette, Gerrard, Gibbons, & Reis-Bergan, 1999) using a hypothetical scenario about being at a party, already having consumed a lot of alcohol and being offered another drink by a friend. Participants indicated how willing they were to a) have another drink, and b) refuse another drink from 1 (not at all willing) to 7 (highly willing). In order to calculate a total willingness to drink score the responses to item b were reverse scored and the two were items summed to create the willingness variable (2 items; α=.829).

Reasoned action pathway:

Intentions: Participants were asked to what extent they intended to get drunk/ get drunk more than once in the next four weeks. Response options were from 1(definitely do not intend to) to 7 (definitely intend to). The two items were averaged to form an intentions measure (2 items, T1 α=.909; T2 α=.925). *Social norms* were measured using four items about the behaviours, expectations and approval of one's circle of friends about consuming alcohol and getting drunk in the next four weeks (from 1 = strongly disagree; 7 = strongly agree; 4 items; α=.843). *Attitudes* were assessed using four semantic differential pairs about getting drunk in the next four weeks on a seven point scale (harmful/ beneficial; good/bad; pleasant/unpleasant; worthless/ useful; 4 items; α=.781).

Analysis

Data were analysed using descriptive statistics and correlations were used to check that assumptions for regression were met. Hierarchical linear regression was used to test the prediction of AUDIT-C. A binary categorical variable was created to group participants into those who reported one or more harms at T2, or those who reported none, and a further binary categorical variable was used to group participants who had got drunk when they did not plan to in the last four weeks and those that had not. Hierarchical logistic regression was used to test the prediction of harms and unplanned drunkenness. In all models, past behaviour was entered first, reasoned action variables second, and social reaction variables third. Missing data was dealt with using pairwise deletion.

The mediation models were tested using the PROCESS macro in SPSS (Hayes, 2012). PROCESS is an add-on tool for SPSS, which uses the bootstrapping method to test estimated indirect effects. Mediation model four was used to test six separate models as Hayes (2018) advises that highly correlated predictors may confound effects. Therefore each prototype perception measure at T1 (favourability and similarity for heavy, social and non-drinkers) was entered into separate models as predictors, T1 intentions and willingness were entered as parallel mediators in order to compare the indirect effects and T2 AUDIT-C was entered as the outcome variable. The confidence intervals for the indirect effects were bias corrected and accelerated (BCa) based on 10000 samples.

Results

Means, standard deviations and Pearson correlations are shown in Table 1. Prototype perceptions (favourability and similarity) were positively correlated with willingness, and willingness was also positively correlated with AUDIT-C at both time points. Variables from the planned pathway were correlated as anticipated, with intentions strongly positively correlated with AUDIT-C at both time points. Multicollinearity was not an issue with the independent variables, and other assumptions for regression analysis were also met. There were no

significant differences between men and women on any of the study measures, other than AUDIT-C, with men scoring significantly higher (T1 M= 7.11, SD = 2.62; T2 M = 6.35, SD= 2.47) than women (T1 M= 6.22, SD = 2.40; T2 M = 5.75, SD= 2.35) at both time points (T1 t(378)=3.20, p=.002; T2 t(378)=2.24, p=.026. However when taking into account multiple comparisons, the difference at T2 was rendered non-significant (12 comparisons, adjusted alpha level = .004).

[Insert Table 1]

Predicting AUDIT-C

T1 AUDIT-C predicted 68.4% of the variance in T2 AUDIT-C (see Table 2). Adding reasoned action measures at step two, made a small but significant change to the amount of variance explained by the model increasing it to 70.9%. Social norms and intentions were significant additional predictors of AUDIT-C in the model, but attitudes did not significantly contribute to the model. As shown in Table 2, adding prototype perceptions and willingness in step three also increased the variance explained by the model by a small but significant amount to 72.3%. T1 AUDIT-C and intentions remained significant predictors. Heavy drinker prototype favourability and similarity, non-drinker prototype similarity and willingness also contributed significantly to the model.

[Insert Table 2]

Predicting drinking harms

The first block of the model was statistically significant showing that T1 harms explained 17.4% of the variance in T2 harms and correctly classified 64.7% of cases. At step two the model was statistically significant and explained 36.0% of the variance in T2 harms and correctly classified 74% of cases. T1 harms, social norms and intentions were significant predictors in the model. At step three the model was also statistically significant and explained 40.7% of the variance in T2 harms and correctly classified 73.5% of cases. T1 harms, social norms, intentions, heavy

drinker prototype similarity and non-drinker prototype similarity were significant predictors in this model (Table 3).

[Insert Table 3]

Predicting unplanned drinking

The first block of the model was statistically significant showing that T1 unplanned drinking explained 32.4% of the variance in T2 unplanned drinking and correctly classified 75.2% of cases. At step two the model was statistically significant and explained 39.9% of the variance in T2 unplanned drinking, correctly classifying 75.2% of cases. T1 unplanned drinking, social norms and intentions were significant predictors in the model. As shown in Table 4, at step three the model was also statistically significant and explained 44.1% of the variance in T2 unplanned drinking and correctly classified 77.1% of cases. T1 unplanned drinking, intentions, heavy drinker prototype similarity and non-drinker prototype similarity were significant predictors in this model.

[Insert Table 4]

Mediation analyses

Intentions and willingness were both significant mediators of the relationships between all six prototype perception measures (favourability and similarity of heavy, social and non-drinker) and AUDIT-C at T2 (Table 5). However, as indicated by pairwise comparisons, the indirect effect of intentions was stronger than the indirect effect of willingness for social drinker favourability, social drinker similarity and non-drinker similarity.

[Insert Table 5]

DISCUSSION

The aim of the present study was to explore whether prototypes and willingness would predict risky drinking as measured by AUDIT-C, drinking harms and unplanned drinking in a sample of UK young adults using a four week prospective design.

Intentions were the strongest predictor of AUDIT-C when controlling for past behaviour, but willingness, and heavy drinker favourability and similarity, and non-drinker similarity were also still significant. The finding for willingness is in line with Todd et al's (2016) findings that willingness did not add more than intentions to prediction of actual alcohol use.

In predicting whether or not drinking harms were reported at T2, heavy and non-drinker similarity remained significant when all other variables were controlled for. Social norms and intentions were stronger predictors of drinking harms than the prototype measures. Unplanned drunkenness was also predicted by heavy and non-drinker similarity, and intentions remained significant from the reasoned action pathway when all other variables were controlled for. Given that the social reaction pathway proposes to predict spontaneous behaviours, it would be expected that willingness, rather than intention, would predict unplanned drinking, alongside other drinker prototypes. However, the finding that heavy drinker prototypes predict this behaviour provides some support for the PWM in its ability to account for unplanned behaviours.

Interestingly, willingness was less important as a predictor of risky drinking compared to prototype perceptions. The finding of a direct relationship between prototypes and behaviour supports meta-analytic findings (Todd et al., 2016) and is in contrast with the original assumptions of the PWM. Mediation analyses found that prototypes impacted on AUDIT-C via both intentions and willingness. For social drinker favourability and similarity, and non-drinker similarity the indirect effect of intentions was significantly stronger than willingness. This is in contrast to the assumptions of the PWM that willingness should mediate this relationship. This finding might relate to the predominantly student sample, who having prior experience with

drinking behaviours, are likely to be planning and intending to drink, rather than only open to engaging in drinking if the right set of circumstances prevailed (Davies et al., 2017; Pomery et al., 2009). These results show that prototype perceptions may continue to influence behaviours even once they become less spontaneous and more planned and intentional. Similarity to prototypes, in particular, may continue to drive risk behaviours into young adulthood. Further work to explore this effect in an older and non-student sample would be informative.

Taken together, the study findings implicate an important role for heavy and non-drinker prototype similarity, which were able to predict risky drinking behaviours even when accounting for past behaviour. These findings add to the body of literature that supports the application of the PWM to understanding risky drinking in young people (Norman et al., 2007; Spijkerman et al., 2010; van Lettow, de Vries, Burdorf, Norman, & van Empelen, 2013a; Zimmermann & Sieverding, 2010). A strength of this study was that it incorporated the use of AUDIT-C as a validated measure of behaviour, and it explored whether the PWM could predict drinking harms and unplanned drinking as well as alcohol consumption. This can be seen as a novel contribution of the current study, alongside its prospective design, and exploration of the PWM and alcohol use within a UK sample.

Favourability of, and similarity to, the social drinker prototype were positively correlated with AUDIT-C and intentions, but failed to add anything to the regression models. It is possible that the social drinker prototype is not as distinct as the heavy or non-drinker image (Ouellette, Hessling, Gibbons, Reis-Bergan, & Gerrard, 2005; van Lettow, de Vries, Burdorf, Conner, & van Empelen, 2015b), given the likely frequency of drinking in the sample. Furthermore the less distinct prototypes were not predictive of drinking in other studies (van Lettow et al., 2015b).

In line with other previous findings, this study suggests a more important role for prototype similarity over favourability in the prediction of risky drinking (Norman et al., 2007; van Lettow et al., 2015b). As other researchers have suggested, this may be because young people who

drink are motivated to behave in a way that is consistent with their self-image (Aloise-Young & Hennigan, 1996).

One way in which prototypes are thought to be important is that they are related to social norms. Previous studies have found that they are correlated (Gibbons, Gerrard, Blanton, & Russell, 1998; Rivis & Sheeran, 2003) and that they interact when predicting willingness to engage in drinking (Teunissen et al., 2012). A further recent study has found that prototype perceptions mediate the relationship between prior drinking behaviour and future drinking intentions (Rhodes, Loiewski, Potocki, & Ralston, 2017). In the present study, social norms were correlated with prototype perceptions, and had a stronger relationship with social drinker favourability and similarity. Social norms were a stronger predictor of harms than prototype perceptions, but were rendered non-significant when prototypes and willingness were added to the models predicting AUDIT-C and unplanned drinking. Future research could explore the relationship between social norms and drinking harms in more detail.

Attitudes were not significant predictors within these models. This is surprising as previous research suggests that attitudes are more important than social norms (Armitage & Conner, 2001). Cooke et al (2016) called for clear definitions of alcohol consumption in theory based items. It is possible that attitudes towards 'getting drunk' were not the most appropriate way to measure this, or that attitudes do not directly affect behaviour, they only do this via intentions, while social norms do have a direct effect (Johnston & White, 2003).

Limitations

It is important to consider the limitations of the current study alongside these findings. The sample was predominantly students and there were more women than men. There were too few non-students in comparison to students to allow robust comparison to be made, but this should be a focus for future work because non-students remain less well represented in this type of research.

Although the use of a four week follow up builds on previous studies that have used one week follow up (Norman et al., 2007), it is possible that this time frame is still too short, and there may be little change in behaviour. A 12 month longitudinal study design such as that conducted by Litt and Lewis (2016) might allow more inferences to be made regarding the relationship between the theoretical constructs and behaviour. While a prospective design is better than a cross sectional design for the prediction of behaviour, further experimental research is research needed to fully understand the mechanisms by which theoretical constructs influence behaviour (Weinstein, 2007).

Finally, it is important to acknowledge that the study measures relied upon self-report, and thus could be influenced by social desirability, memory, or situational factors. Although the study information assured confidentiality of the data, some research suggests that young people may under-report their alcohol consumption, even when anonymity is assured (Davis, Thake, & Vilhena, 2010). Furthermore, the use of a single item measure for unplanned drunkenness may be criticised. Further work could consider a more reliable means of capturing this behaviour.

Implications

Importantly, this study has demonstrated that prototype perceptions, specifically similarity to the heavy and the non-drinker, can add to the prediction of risky drinking when controlling for past behaviour and reasoned action pathway constructs. This study is novel in the inclusion of a validated measure of drinking behaviour, the AUDIT-C, and PWM constructs, and the inclusion of past behaviours in a prospective exploration of this theory.

These findings have important theoretical and practical implications. They support the application of the PWM to the prediction of AUDIT-C, drinking harms and unplanned drunkenness within a prospective design. They also show that social reaction pathway constructs predict additional variance to planned pathway constructs, supporting a move towards the exploration of non-deliberative factors in the prediction of risky drinking in young adults.

From a practical perspective, these findings suggest that similarity to heavy and non-drinker prototypes could be the most important constructs to target in order to change behaviours, via a direct and an indirect route. It is possible that non-drinker similarity could be enhanced by engagement in social activities that do not involve alcohol. However, interviews with young people in this age group suggest a lack of credible alternatives, particularly on university campuses (Davies, Law, & Hennelly, 2018). Some existing interventions have already attempted to apply the PWM to reduce alcohol consumption, but there have been mixed results. For example, altering prototype perceptions has been effective in delaying adolescent drinking (Gerrard et al., 2006), but was not effective in reducing binge drinking in female university students (Todd & Mullan, 2011). A digital intervention using prototype alteration as an additional strategy was found to reduce alcohol consumption in an adult sample, but not over and above the effects found when the intervention was delivered without this feature (van Lettow, de Vries, Burdorf, Boon, & van Empelen, 2015a). There is, at present, still a lack of agreement in the literature about changing prototypes and further work is needed to determine the optimal way of achieving this within interventions (Davies et al., 2016b).

Conclusion

These findings provide further evidence to support the use of the PWM in the prediction of risky drinking in a UK sample. When controlling for past behaviour, similarity to the heavy and non-drinker prototype were able to directly predict risky drinking as measured by intentions to get drunk, AUDIT-C, harms and unplanned drunkenness. This study shows that the PWM can predict the harmful consequences of drinking as well as alcohol consumption using a validated measure. Targeting similarity to heavy drinker and non-drinker prototypes should be the focus of future interventions. Identification with a non-drinker prototype could be enhanced by further engagement in social activities related to non-drinking.

Declaration of interests: The author declares no conflicts of interest.

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TABLES & FIGURES

Table1. *Means, standard deviations and Pearson correlations between PWM measures and AUDIT-C*

	ATT	SN	**I**	HF	HS	SF	SS	NF	NS	W	AC1	AC2
Mean	4.11	5.15	**3.97**	2.87	2.28	5.24	5.08	4.93	3.04	4.06	6.48	5.93
(SD)	(0.94)	(1.56)	**(2.11)**	(1.40)	(1.51)	(1.45)	(1.52)	(1.44)	(1.62)	(1.64)	(2.49)	(2.40)
Attitudes (ATT)	-											
Social norms (SN)	.389**											
Intentions (I)	.571**	.528**										
Heavy drinker favourability (HF)	.161**	.248**	**.192****									
Heavy drinker similarity (HS)	.112*	.224**	**.225****	.437**								
Social drinker favourability (SF)	.285**	.316**	**.302****	.240**	.110*							
Social drinker similarity (SS)	.303**	.324**	**.331****	.081	.104*	.527**						
Non-drinker favourability (NF)	-.223**	-.137*	**-.170****	-.092	-.132*	.061	.030					
Non-drinker similarity (NS)	-.333**	-.252**	**-.323****	-.058	-.096	-.190**	-.199**	.351**				
Willingness (W)	.276**	.401**	**.347****	.199**	.238**	.283**	.173**	-.206**	-.272**			
AUDIT C Time 1 (AC1)	.390**	.578**	**.587****	.273**	.336**	.292**	.347**	-.203**	-.387**	.417**		
AUDIT C Time 2 (AC2)	.430**	.570**	**.599****	.323**	.368**	.305**	.329**	-.191**	-.391**	.450**	.827**	

Note ** $p<.001$ *$p<.05$

Table 2: *Standardised betas, t and p values within hierarchical multiple regression model testing whether social reaction pathway variables predict T2 AUDIT-C over and above planned pathway variables and T1 AUDIT-C*

	R^2	β	t	p
Step 1	.684			
Constant				p<.001
T1 AUDIT-C		.827	28.82	p<.001
Step 2	.709			
Constant				p=.516
T1 AUDIT-C		.684	18.51	p<.001
Attitudes		.063	1.86	p=.064
Social norms		.090	2.53	p=.012
Intentions		.115	2.93	p=.004
Step 3	.723			
Constant				p=.483
T1 AUDIT-C		.619	15.93	p<.001
Attitudes		.049	1.45	p=.149
Social norms		.061	1.72	p=.085
Intentions		.103	2.69	p=.008
Heavy drinker favourability		.065	2.10	p=.036
Heavy drinker similarity		.066	2.13	p=.034
Social drinker favourability		-.002	-0.05	p=.961
Social drinker similarity		.007	0.22	p=.825
Non-drinker favourability		.024	0.80	p=.425
Non-drinker similarity		-.062	-1.99	p=.048
Willingness		.076	2.42	p=.016

Step 1 F (1, 383) = 830.66, p<.001).
Step 2 2 ΔR^2 =.028 (F change =12.31, p<.001; F (4, 380) = 235.29, p<.001).
Step 3 ΔR^2 =.019 (F change =3.77, p=.001; F (11, 373) = 92.33, p<.001)

Table 3: *Beta, Wald, p values, odds ratios and 95% confidence intervals for of hierarchical logistic regression model testing whether social reaction pathway variables predict T2 Harms over and above planned pathway variables and T1 Harms*

	B	Wald(df =1)	p	95% CI for Odds Ratio Lower	Odds Ratio	Upper
Step One						
Constant	-2.043	25.866	.000		.130	
T1 Harms	2.456	34.623	.000	5.145	11.661	26.428
Step Two						
Constant	-4.575	33.820	.000		.010	
T1 Harms	1.740	15.129	.000	2.370	5.695	13.685
Attitudes	.034	.041	.839	.746	1.034	1.435
Social norms	.355	15.311	.000	1.194	1.427	1.705
Intentions	.299	15.553	.000	1.162	1.348	1.563
Step Three						
Constant	-4.918	18.096	.000		.007	
T1 Harms	1.598	11.632	.001	1.973	4.942	12.377
Attitudes	-.023	.016	.899	.688	.977	1.389
Social norms	.288	8.760	.003	1.102	1.334	1.615
Intentions	.254	10.315	.001	1.104	1.289	1.505
Heavy drinker favourability	-.085	.652	.420	.748	.919	1.128
Heavy drinker similarity	.235	5.537	.019	1.040	1.265	1.539
Social drinker favourability	.216	2.461	.117	.948	1.240	1.624
Social drinker similarity	-.045	.190	.663	.780	.956	1.172
Non-drinker favourability	.032	.103	.749	.849	1.032	1.255
Non-drinker similarity	-.201	4.874	.027	.685	.818	.978
Willingness	.119	1.774	.183	.945	1.126	1.342

Model 1: Nagelkerke R^2 = 17.4, χ^2 (1) = 53.69, p<.001; Model 2 Nagelkerke R^2 = 36.0, χ2 (4) = 122.10, p <.001; Model 3; Nagelkerke R^2 = 41.1, χ2 (11) = 141.71 , p <.001.

Table 4: *Beta, Wald, p values, odds ratios and 95% confidence intervals for of hierarchical logistic regression model testing whether social reaction pathway variables predict T2 unplanned drunkenness over and above planned pathway variables and T1 unplanned drunkenness*

	B	Wald(df =1)	p	95% CI for Odds Ratio Lower	Odds Ratio	Upper
Step One						
Constant	-1.860	77.823	.000		.156	
T1 Unplanned	2.364	80.431	.000	6.345	10.638	17.835
Step Two						
Constant	3.585	21.080	.000		.028	
T1 Unplanned	2.135	60.195	.000	4.931	8.455	14.498
Attitudes	-.083	.210	.647	.646	.921	1.312
Social norms	.212	4.060	.044	1.006	1.236	1.518
Intentions	.255	9.514	.002	1.098	1.291	1.518
Step Three						
Constant	-4.026	11.328	.001		.018	
T1 Unplanned	2.111	.287	.000	4.704	8.260	14.504
Attitudes	-.090	.194	.641	.625	.914	1.336
Social norms	.175	.110	.110	.961	1.191	1.477
Intentions	.196	.086	.022	1.028	1.217	1.441
Heavy drinker favourability	-.140	.112	.211	.699	.870	1.082
Heavy drinker similarity	.280	.102	.006	1.084	1.324	1.616
Social drinker favourability	.113	.150	.454	.834	1.119	1.502
Social drinker similarity	-.062	.117	.599	.747	.940	1.184
Non-drinker favourability	.117	.106	.271	.913	1.124	1.383
Non-drinker similarity	-.221	.103	.032	.655	.802	.982
Willingness	.113	.096	.236	.929	1.120	1.350

Model 1: Nagelkerke R^2 = 17.4, χ^2 (1) = 53.69, p<.001; Model 2 Nagelkerke R^2 = 36.0, χ2 (4) = 122.10, p <.001; Model 3; Nagelkerke R^2 = 41.1, χ2 (11) = 141.71 , p <.001.

Table 5. *Bootstrapped indirect effects for parallel mediator models of intentions and willingness as mediators of relationship between prototype perceptions and T2AUDIT-C*

Prototype perception	Intentions	95% CI [a]	Willingness	95% CI [a]	Pairwise comparison	95% CI [a]
Heavy drinker favourability	.1570	[.0709, .2535]	.0840	[.0339, .1411]	.0731	[-.0267, .1797]
Heavy drinker similarity	.1685	[.0895, .2558]	.0897	[.0401, .1525]	.0788	[-.0161, .1749]
Social drinker favourability	.3051	[.1986, .4246]	.1517	[.0811, .2357]	.1534	[.0152, .3008]*
Social drinker similarity	.2419	[.1606, .3336]	.0723	[.0253, .1252]	.1695	[.0717, .2738]*
Non-drinker favourability	-.1409	[-.2354, -.0525]	-.0914	[-.1498, -.0406]	-.0495	[-.1514, .0477]
Non-drinker similarity	-.2207	[-.2941, -.1508]	-.0978	[-.1552, -.0506]	-.1230	[-.2157, -.0295]*

[a] = Bias-corrected and accelerated bootstrapping confidence intervals based on 10,000 samples * = pairwise comparison indicates significant difference between mediation effects of intentions and willingness on AUDIT-C