

Pre-Drinking and Alcohol-Related Harm in Undergraduates: The Influence of Explicit
Motives and Implicit Alcohol Identity

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Abstract

The present study investigated how pre-drinking could be explained using a model based on dual-systems theory, incorporating measures of explicit and implicit constructs.

Undergraduate students ($N = 144$; 44 male; 100 female; $M_{\text{age}} = 20.1$ years), completed an online survey comprising measures of pre-drinking motives, a measure of pre-drinking cost motives, and an alcohol identity implicit association test. Variance-based structural equation modelling revealed that the predictors explained 34.8% of the variance in typical pre-drinking alcohol consumption and 25% of the variance in alcohol-related harm. Cost, interpersonal enhancement, and barriers to consumption motives predicted higher typical pre-drinking alcohol consumption and greater alcohol-related harm. Higher situational control scores predicted lower typical pre-drinking alcohol consumption, and lower alcohol-related harm. Positive implicit alcohol identity predicted alcohol-related harm, but not typical alcohol consumption. Results indicate that a dual-systems approach to pre-drinking has utility in predicting alcohol-related harm and may inform interventions to reduce excessive alcohol consumption and associated harm.

Keywords: alcohol, pre-drinking, pre-loading, dual-systems theory, alcohol-related harm

Introduction

Excessive alcohol consumption is particularly prominent in university student populations; students tend to outdrink their non-student peers on drinking occasions (Slutske et al., 2004). A recent web-based study demonstrated that the vast majority of university students drink alcohol, and of those who do drink, a third are doing so at hazardous levels Hallett et al. (2012). *Pre-drinking* (also known as *pre-partying*) refers to the consumption of alcohol at home or a private residence, prior to going to a subsequent event for the evening (such as a party, bar, or night club) where drinking often continues (Pedersen & LaBrie, 2007). Miller (2013) conducted a large-scale, multi-site, random sample of Australians on nights out in popular drinking locations on Friday and Saturday nights, to gather information on their drinking behaviors. Of the national sample (N = 6,762), 65% of interviewees reported pre-drinking during their current night out, with 85% of these doing so in private homes. Although large-scale prevalence data is informative, to date, few studies have investigated the relationship between the psychological factors influencing pre-drinking, and how they may relate to alcohol consumption in pre-drinking sessions, and alcohol-related harm. Research that identifies these factors can lead to a more comprehensive understanding of excessive alcohol consumption during pre-drinking sessions that may be informative for health behavioral interventions.

Pre-drinking can lead to excessive alcohol consumption and has been linked to alcohol-related harm in a number of studies. LaBrie et al. (2011) showed that a quarter of American college students reported drinking to unconsciousness within the past month with much of the alcohol consumed during pre-drinking sessions. Research by Hughes et al. (2008) showed that pre-drinkers in the United Kingdom were more than four times more likely to consume as much as five times the recommended safe drinking limit over an evening, and more than twice as likely to have been involved in a confrontation in the *night-*

time environment (popular bar or night club areas). Miller's (2013) multi-site study sampling drinkers in Australian night-time environments found that pre-drinkers were more likely to report engaging in aggressive behavior, experiencing alcohol-related accidents, and driving under the influence of alcohol, than non-pre-drinkers. These results have been corroborated in university populations, where students were shown to be more likely to consume more alcohol during pre-drinking occasions, and more likely to experience alcohol-related harm than those who did not pre-drink on these occasions (Hummer, Napper, Ehret, & LaBrie, 2013; Labhart, Graham, Wells, & Kuntsche, 2013; Pedersen & LaBrie, 2007).

Pre-drinking motives

LaBrie, Hummer, Pedersen, Lac, and Chithambo (2012) developed and validated the *prepartying motives inventory*, a measure of pre-drinking-specific motives that comprises four motive dimensions. *Interpersonal enhancement* consists of motives regarding the social elements of pre-drinking, including meeting and talking to new people, and enjoying the pre-drinking environment. *Intimate pursuit* reflects pre-drinking for the purpose of seeking a romantic or sexual partner during pre-drinking or at the subsequent event. *Situational control* refers to being able to exert some control over alcohol consumption that is perhaps not possible in other drinking contexts, such as the type or alcoholic beverage consumed, avoiding drink tampering, and not having to drink at the subsequent event following pre-drinking. *Barriers to consumption* reflect pre-drinking motives related to having access to or being in possession of alcohol in contexts where doing so is risky (e.g., alcohol-free or policed events). LaBrie et al. (2012) demonstrated the validity of the inventory in their scale-development study, however there may be other factors that influence pre-drinking not fully accounted for by the measure.

Cost of alcohol appears an important motive for pre-drinking reported by student pre-drinkers, who largely consider pre-drinking as an inexpensive way of becoming intoxicated prior to attending a subsequent event (e.g., Pedersen, LaBrie, & Kilmer, 2009; Read, Merrill, & Bytschkow, 2010). Price has been raised as the most important factor influencing pre-drinking, reported by 61% of pre-drinkers on nights out, followed by social motives such as fun and socialisation, reported by 22.4% of pre-drinkers (Miller, 2013). Miller and Droste (2013) provide further evidence in investigating the effect of increasing the cost of alcohol on university students' hypothetical drinking behavior. They found that at a price between \$1 and \$3 per standard drink, their entire sample reported willingness to consume four or more drinks; as price increased to \$10 per drink, less than a quarter of the sample were still willing to do so. Although pre-drinking was not a focus of Miller and Droste's (2013) study, evidence indicates expensive drinks in licensed premises may favour the consumption of cheap alcohol prior to attending these premises (e.g., Miller, 2013), making pre-drinking an appealing option for alcohol consumption. An item reflecting cost was included during development of LaBrie and colleagues' (2012) prepartying motive inventory; however, the authors indicated it was not sufficiently contained within the factor structure of the inventory and was therefore omitted from the final version. This appears to be an important omission, as financial motives clearly represent an important motive for pre-drinking and may present an avenue for individual-level or policy-based interventions to reduce excessive pre-drinking. For example, frugality has been identified as negatively predicting alcohol expenditure, as well as typical and peak session alcohol consumption in college students (Rose, Smith, & Segrist, 2010). Although pre-drinkers motivated by cost may be considered frugal, findings from Barton and Husk (2012) show that pre-drinkers in fact spend *more* money in total on nights involving pre-drinking than those who did not pre-drink, a fact which may be communicated in health behavior-change interventions. From a policy perspective, pre-

drinkers motivated by cost may be responsive to minimum or ‘floor’ pricing policies that may remove or reduce the financial incentive in pre-purchasing alcohol at cheaper retail prices (Lonsdale, Hardcastle, & Hagger, 2012; MacLean & Callinan, 2013).

Impulsive processes and alcohol consumption

Recently, research has looked at the influence of impulsive processes on alcohol consumption behaviors (e.g., Houben & Wiers, 2006, 2009; Lindgren et al., 2012). Much of this research takes a dual-systems approach to explaining behavior (e.g., Strack & Deutsch, 2004), which posits that behavior is influenced by reflective and impulsive systems operating in parallel and interacting with each other. The reflective system incorporates deliberations or conscious processes that influence behavior (e.g., planning, intention); whereas the impulsive system incorporates automated, associative processes that influence behavior. The impulsive system is thought to constitute an associative store of episodic and semantic links between perceptual input, and behavioral schemata (Strack & Deutsch, 2004). This associative store may include positive affective reactions, or typical approach-avoidance behavioral tendencies, following presentation of certain perceptual stimuli (Hofmann, Friese, & Wiers, 2008). These associations are thought to be quickly reactivated in future presentation of such stimuli, which may override processes in the reflective systems, such as intention, restraint, or self-control (Hofmann et al., 2008). With respect to alcohol consumption, excessive past experience with alcohol consumption may lead to the formation of strong associative clusters in the impulsive system that may supersede more deliberative, reflective processes, and contribute to problematic patterns of alcohol consumption (see Wiers et al., 2007).

Numerous authors have advocated a dual-systems approach to improve the prediction of health behavior by including measures of impulsive processes (e.g., Hagger, 2013a, 2013b; Hagger & Chatzisarantis, 2014; Hofmann, Friese, & Strack, 2009; Sheeran,

Gollwitzer, & Bargh, 2013) such as the implicit association test (IAT; Greenwald, McGhee, & Schwartz, 1998). Such an approach may be particularly important to predict risky health behaviors such as excessive alcohol consumption, where predictive models based on exclusively explicit theories of behavior perform less well than for behaviors requiring planning or intending to act. For example, dieting or physical activity behaviors appear to be better predicted by models based on the *theory of planned behavior* than risk or abstinence-based behaviors, such as engaging in alcohol consumption, or reducing alcohol use (see McEachan, Conner, Taylor, & Lawton, 2011). Keatley, Clarke, and Hagger (2012, 2013) showed that a range of spontaneous behaviors, that ostensibly required less planning, were better predicted by implicit measures of motivation than explicit measures. Similarly, Churchill et al. (2008) found that incorporating implicit measures to a theory of planned behavior model significantly improved prediction of impulsive snacking behavior. Research into the prediction of alcohol consumption behaviors by measures of implicit processes may also have marked importance in the applied sense. For example, Houben et al. (2010; 2012) demonstrated that participants presented with alcohol cues that were consistently paired with negative responses (a type of *evaluative conditioning*) exhibited stronger negative implicit attitudes toward alcohol and a subsequent reduction in alcohol consumption over the following week relative to controls (Houben, Havermans, Nederkoorn, & Jansen, 2012; Houben, Havermans, & Wiers, 2010). Studies such as these show the importance of considering influences on behavior from both reflective and impulsive systems in order to identify the predictors of behavior.

The present study

The aim of the present study was to investigate how pre-drinking alcohol consumption and alcohol-related harm could be explained using a predictive model based on dual-systems theory, incorporating measures of both reflective and impulsive systems.

Although the prepartying motives inventory has demonstrated criterion validity in predicting pre-drinking alcohol consumption, we expect that self-reported cost motive, a factor excluded from that inventory, may be an important determinant of pre-drinking, especially in an Australian sample (Miller, 2013; Miller & Droste, 2013). A further focus of the study was to investigate the relationship between pre-drinking motives and perceived alcohol-related harm, which, as yet, appears unexplored. In addition, evidence for the role of implicit processes in alcohol consumption warrants consideration how implicit measures may predict alcohol consumption behaviors such as pre-drinking, and alcohol-related harm. Therefore, we adopted a dual-systems perspective to investigate the predictive validity of both the prepartying motives inventory and self-reported cost motive as explicit measures, and the alcohol identity implicit association test as an implicit measure, in their prediction of typical pre-drinking alcohol consumption, and alcohol-related harm. We hypothesised that four pre-drinking motives from the prepartying motives inventory, *intimate pursuit* (H₁), *interpersonal enhancement* (H₂), *barriers to consumption* (H₃), and *situational control* (H₄), would significantly and positively predict students' self-reported typical pre-drinking alcohol consumption. We also hypothesised that *self-reported cost* motive would have positively predict pre-drinking alcohol consumption, independent of the effects of other dimensions from the pre-partying motives inventory (H₅), given evidence from previous research indicating that cost is a primary reason for pre-drinking. We also hypothesised that greater implicit alcohol identity would positively predict typical pre-drinking alcohol consumption (H₆), and that these effects would be independent of the explicit motive dimensions captured in the prepartying motives inventory.

In addition, we hypothesised that the four pre-drinking motives, *intimate pursuit* (H₇), *interpersonal enhancement* (H₈), *barriers to consumption* (H₉), and *situational control* (H₁₀), would significantly predict alcohol-related harm in students. We also predicted that self-

reported cost motive would have a pervasive effect on alcohol-related harm (H_{11}) given the association between cost and pre-drinking, and that pre-drinkers encounter more alcohol-related harm on drinking occasions (e.g., Barry, Stollefson, Piazza-Gardner, Chaney, & Dodd, 2013; Labhart et al., 2013). Finally, we hypothesised that implicit alcohol identity would predict alcohol-related harm (H_{12}), and that these effects would be independent of the explicit motive dimensions captured in the prepartying motives inventory.

Method

Participants

One hundred and forty-four undergraduate psychology students (44 male, 100 female, $M_{\text{age}} = 20.1$ years, $SD = 1.58$ years) participated in the study for course credit. Criteria for inclusion in the study were: (1) current university student status; (2) over legal drinking age (18 years); and (3) had engaged in at least one pre-drinking occasion in the previous month. The majority of participants (82%) identified as being of Caucasian Australian ethnicity, and 76.4% of the sample reported drinking alcohol approximately once a month. Participants reported first drinking alcohol at a mean age of 15.9 years ($SD = 1.53$), and first becoming intoxicated at 16.3 years ($SD = 1.57$). The study was approved by the [University omitted for peer review] University Health Research Ethics committee in advance of data collection.

Materials

Pre-drinking motives. The pre-partying motives inventory (PMI; LaBrie et al., 2012) is a 16-item measure comprising common reasons or motives relating to student pre-drinking behavior. Students are asked to rate how often each statement reflects their reasons for pre-drinking in the last 12 months, on a five-point Likert-type scale ranging from 1 (*almost never/never*) to 5 (*almost always/always*). The PMI has four motive dimension subscales.

Interpersonal enhancement (6 items) relates to pre-drinking to enhance sociability and interaction prior to the event (e.g., "...to meet new friends once I go out"). *Intimate pursuit* (three items) relates to pre-drinking to increase the likelihood of meeting potential romantic or sexual partners (e.g., "...to increase the likelihood of hooking up."). *Situational control* (four items) relates to pre-drinking to control the type or quantity of alcohol consumed during a session (e.g., "...to enjoy my favourite drink in case the place I'm going does not serve that drink"). *Barriers to consumption* (two items) reflects pre-drinking to mitigate the lack of alcohol at the later function or to avoid negative repercussions related to taking alcohol to a function (e.g., "...to avoid getting caught with alcohol on the way to, or at, the final destination"). We included an item reflecting self-reported cost motive that was omitted from the scale following its validation ("*I pre-drink because it is cheaper than purchasing drinks at the destination*") as cost has been implicated as an important reason for pre-drinking (MacLean & Callinan, 2013; Miller, 2013; Read et al., 2010). We expected this measure to have a significant independent effect on pre-drinking behavior irrespective of whether or not it was associated with the other items on the inventory or did not load neatly on any one factor from the inventory.

Implicit alcohol identity. We used the alcohol identity implicit association test (AI-IAT; Gray, LaPlante, Bannon, Ambady, & Shaffer, 2011) to measure students' implicit alcohol identity. The AI-IAT has been found to significantly predict unique variance in alcohol consumption, craving, and related problems, after controlling for explicit predictors (Lindgren et al., 2012). The AI-IAT is a computer-administered categorisation task comprising two target (*me* and *not me*) and two attribute (*drinker* and *non-drinker*) categories and a list of words related to each (i.e., *me, mine, me, self, they, them theirs, other, drinker, partier, drunk, drink, non-drinker, abstainer, sober, abstain*). Participants are required to categorise words into their respective target or attribute category as they are presented in

trials, by pressing designated keys on their computer keyboard. We created a five-step online version of the AI-IAT. Participants could correct erroneous responses by pressing the correct key before advancing to the next trial. The IAT was scored according to the improved D-score algorithm suggested by Greenwald et al. (2003). Positive D-scores were indicative of strong implicit alcohol identity.

Alcohol consumption. Participants estimated how much alcohol they would consume during a typical pre-drinking session, in Australian standard drink equivalents, with the aid of a pictorial guide adapted from National Health and Medical Research Council (NHMRC; 2009) guidelines. In order to illustrate the pre-purchased element in pre-drinking sessions, larger containers of alcohol (e.g., 700mL bottles, 24-can cartons) were included in the guide as well as measures used on licensed premises (e.g., a 335ml beer bottle). We also measured participant alcohol consumption frequency using an item from the AUDIT-C (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998).

Alcohol-related harm. The Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ) was used as a measure of alcohol-related harm. The B-YAACQ consists of 24 statements regarding negative experiences related to alcohol consumption in the previous three months (e.g., passing out from drinking, having a hangover) with respondents prompted to provide a 'yes' or 'no' response to each. We scored *no* responses as 0, and *yes* responses as 1, and summed responses to form an index of alcohol-related harm for each participant ranging from 1 to 24, with higher scores indicating higher alcohol-related harm.

Procedure

Participants were provided with information on the study and were invited to access an online questionnaire. Participants consented to participate by clicking 'Agree' to a series of statements regarding their informed consent. Participants completed demographic

questions as well as measures of alcohol consumption, the PMI, and the AI-IAT. The measures were presented in a random order to each participant, and items within measures were displayed in a random order, to avoid potential presentation-order effects.

Results

Preliminary analyses

In terms of alcohol consumption frequency, 98 (76.4%) participants indicated they drank alcohol at least once a month. On average, participants reporting drinking 6.6 standard drinks during a typical pre-drinking session ($SD = 4.0$, median = 6). Table 2 includes descriptive statistics of the study variables.

Variance-Based Structural Equation Model

Correlations between study measures are included in Table 2. Controlling for alcohol consumption frequency, we used variance-based structural equation modelling to test the relationships between the explicit PMI motive dimensions and cost motive, and the AI-IAT in how they predicted typical alcohol consumption during pre-drinking sessions, and experience of negative alcohol-related consequences on the B-YAACQ in the previous month. Latent variables were generated for each PMI motive dimension from their respective indicators. The AI-IAT and B-YAACQ scores were modelled as single-indicator latent variables, the former from participant D-scores, and the latter from the summed alcohol-related harm index. We sought to establish whether the self-reported cost motive item would load on the barriers to consumption subscale, as anticipated by LaBrie et al (2012). However, consistent with LaBrie et al., cost failed to load significantly on any PMI subscale. Given previous research on the importance of cost in driving alcohol consumption decisions in students and young

adult Australians (Miller, 2013; Miller & Droste, 2013), we retained the self-reported cost motive as a single-indicator latent variable in our analyses.

Evaluation of the model was made at the measurement and structural levels according to published criteria for VB-SEM models (Vinzi, Chin, Henseler, & Wang, 2010). In summary, the model was considered suitable if the following latent variable criteria were met: (1) composite reliability (ρ) and internal consistency (α) exceeded .70; (2) the average variance extracted (AVE) exceeded .50, and; (3) the square root of the AVE exceeded the value of the correlation between that variable and all others in the model (Vinzi et al., 2010). For the PMI, item loadings should exceed .50 ($p < .05$) on their respective motive dimensions (Hair, Black, Babin, & Anderson, 2009). Full-colinearity variance-inflation factor (FCVIF) values lower than 3.30 indicate no issues with multicollinearity (Kock, 2012). Overall model fit was evaluated by the Q^2 coefficient exceeding zero for endogenous variables (Hair, Sarstedt, Ringle, & Mena, 2012), significant average R^2 (ARS) and average path coefficient (APC) values (Kock, 2012), and the goodness-of-fit (GoF) statistic (.100, .250, and .360 correspond to small, medium, and large effect sizes; Tenenhaus, Amato, & Vinzi, 2004).

Reliability coefficients and average variance extracted (AVE) values for the PMI are provided in Table 2. Overall, the model fit was adequate (APC = .160, ARS = .299, Adj. ARS = .263, Tenenhaus GoF = .516). The PMI motive dimensions, self-reported cost motive, and AI-IAT predicted 25% (Adj. $R^2 = .211$, $Q^2 = .255$) of the variance in B-YAACQ scores, and 34.8% (Adj. $R^2 = .315$, $Q^2 = .353$) of the variance in typical pre-drinking alcohol consumption. Model path coefficients between the PMI motive dimensions and self-reported cost motive, AI-IAT, and both typical pre-drinking alcohol consumption and B-YAACQ scores are included in Figure 1.

Results indicated that the *intimate pursuit* motive dimension from the PMI did not significantly predict typical pre-drinking alcohol consumption, leading us to reject H₁. The *interpersonal enhancement*, *barriers to consumption*, and *situational control* motive dimensions from the PMI significantly predicted typical pre-drinking alcohol consumption, supporting H₂ through H₄. The self-reported cost motive item also significantly predicted typical pre-drinking alcohol consumption, supporting H₅. The AI-IAT did not significantly predict typical pre-drinking alcohol consumption, leading to rejection of H₆.

With regards to the hypotheses underlying alcohol-related harm, *intimate pursuit* did not significantly predict scores on the B-YAACQ, leading to the rejection of H₇. However, the *interpersonal enhancement*, *barriers to consumption* and *situational control* motive dimensions significantly predicted B-YAACQ scores, supporting H₈₋₁₀. Self-reported cost motive positively predicted B-YAACQ scores, supporting H₁₁. The AI-IAT significantly predicted scores on the B-YAACQ, supporting H₁₂.

Discussion

The aim of the present study was to examine the effects of explicit pre-drinking motives and implicit alcohol identity on typical pre-drinking alcohol consumption and alcohol-related harm. We adopted a dual-systems approach to propose hypothesised effects of explicitly-measured self-reported motives from the pre-drinking motives inventory and an implicit association test of alcohol identity on typical pre-drinking alcohol consumption and alcohol-related harm outcomes. We also included the self-reported cost motive as a single-indicator latent variable as an additional predictor of outcomes our analyses, in response to research that has identified cost as a key reason for pre-drinking and its lack of inclusion in the pre-drinking inventory. We anticipated that the explicit and implicit measures would predict these outcome variables in a pattern consistent with dual-systems models (e.g.,

Perugini, 2005; Strack & Deutsch, 2004). To our knowledge, this is the first study to adopt a dual-systems approach in predicting a specific alcohol consumption behaviour (i.e., pre-drinking) and its consequences.

Explicit motives. Focusing on the effects of motives from the pre-partying inventory that were proposed to reflect more explicit factors influencing typical pre-drinking alcohol consumption, we found that self-reported pre-drinking alcohol consumption was statistically significantly and positively predicted by *interpersonal enhancement* and *barriers to consumption*, and negatively predicted by *situational control*. Pre-drinking alcohol consumption was not, however, significantly predicted by *intimate pursuit*.

As *interpersonal enhancement* motives relate to socialising with friends and making for an interesting drinking occasion, these results are consistent with the body of research highlighting the influence of social dynamics that underpin individuals' pre-drinking behavior (e.g., Pedersen & LaBrie, 2007; Pedersen et al., 2009). That *situational control* negatively predicted typical pre-drinking alcohol consumption contrasts with the results of LaBrie et al (2012), who found a positive relationship between these variables. It is possible that individuals who pre-drink for reasons associated with situational control may do so to enjoy specific drinks, or types of drinks, in the pre-drinking context. In doing so, they may consume less alcohol when pre-drinking as they are focused on enjoying the beverage itself rather than more hedonistic motives such as interpersonal enhancement or intimate pursuit. Individuals who score lower on situational control may therefore consume more alcohol during pre-drinking sessions. This has potential implications for interventions that promote the enjoyment of types of alcoholic beverages in moderation, rather than excessive, uninhibited alcohol consumption. The *barriers to consumption* motive reflects being motivated to pre-drink based on the availability or ability to consume alcohol at the subsequent destination. LaBrie et al. (2012) speculated that individuals who endorse this

motive likely attain peak BAC during pre-drinking sessions, to optimise the intoxication “buzz” that carries them through the evening. Our results appear consistent with this premise indicating that restricted access to alcohol at the destination (e.g., queuing, drink limits) motivates individuals to consume more alcohol during pre-drinking sessions (e.g., Wells et al., 2009). In addition, the significant effect of self-reported cost motive on typical pre-drinking alcohol consumption is consistent with findings throughout the literature that individuals appear motivated to pre-drink because it is a cost-effective way of becoming intoxicated for the subsequent event relative to purchasing alcohol when at the subsequent event (Miller, 2013). These findings suggest that pre-drinking may potentially be effectively controlled by the introduction of ‘floor’ pricing schemes, or introducing a volumetric taxation system, that reduces the motive to pre-drink for cost reasons (Byrnes, Cobiac, Doran, Vos, & Shakeshaft, 2010; Lonsdale et al., 2012).

For the second set of hypotheses, relating to the effects of motives on perceived alcohol harm, *interpersonal enhancement*, *barriers to consumption* and *situational control* significantly predicted alcohol-related harm. *Intimate pursuit* did not significantly predict scores on our measure of alcohol-related harm, suggesting that this motive is not consistent with excessive drinking leading to alcohol-related harm. The finding that *interpersonal enhancement* significantly predicted alcohol-related harm suggests that individuals who pre-drink to socialise while consuming alcohol may encounter higher instances of alcohol-related harm. A potential focus for future research may be upon ‘drinking games’ (Hummer et al., 2013), which allow individuals to socialise while consuming large quantities of alcohol at pre-drinking sessions, potentially contributing to the experience of alcohol-related harm. That higher scores on the *barriers to consumption* dimension significantly predicted alcohol-related harm is consistent with the relationship between this dimension and pre-drinking alcohol consumption. The finding indicates that individuals endorsing this motive may also

be likely to encounter alcohol-related harm as a result of excessive pre-drinking for reasons related to access to alcohol (e.g., LaBrie et al., 2012). *Situational control* scores negatively predicted alcohol-related harm, indicating that pre-drinkers who value exerting control over their alcohol consumption during pre-drinking sessions potentially report lower alcohol-related harm, perhaps due to drinking less during pre-drinking sessions.

Self-reported cost motive significantly predicted alcohol-related harm, which highlights the risk associated with being motivated to pre-drink because cheap alcohol can be consumed prior to going out, and alcohol-related harm. This finding presents a dilemma for initiatives aimed at reducing excessive drinking by increasing the cost of alcohol for consumers. For example, Anderson, Chisholm, and Fuhr (2009) reported that policy-based increases in alcohol prices indeed led to both reduced alcohol consumption and alcohol-related harm in many countries. However, trends show that some consumers tended to seek out cheaper alternatives in response. For instance, the *alcopops tax* introduced in Australia to reduce excessive consumption of ready-to-drink alcoholic beverages appeared to do so, however evidence suggests some consumers instead opted for cheaper, higher alcoholic content beverages such as spirits and cask wine (Doran & Digiusto, 2011; Skov et al., 2011). Legislative interventions based on increasing the cost of alcohol may do well to target cheaper alcoholic beverages specifically, such as ‘floor’ pricing schemes (e.g., Lonsdale et al., 2012), to reduce the financial incentive influencing pre-drinking (MacLean & Callinan, 2013) and contributing to alcohol-related harm.

Implicit Alcohol Identity. Given recent findings in the area of dual-systems research (REF), we hypothesised that pre-drinkers who exhibited stronger positive implicit alcohol identities would likely report consuming more alcohol during pre-drinking sessions. This was not supported by our results ($p = .07$; $f^2 = .03$). This suggests that pre-drinking alcohol consumption may be more influenced by the reflective system than the impulsive system,

with stronger effects for the explicit pre-drinking motives. This finding is supported by Hofmann et al. (2008) who remark that in the research on health behaviours, such as alcohol consumption and snacking, strong reflective influences often mean that the behavioural impact of impulsive influences is likely to be negligible. Considering the significant zero-order correlations between the implicit alcohol identity ~~AI-IAT~~ and pre-drinking alcohol consumption, and between implicit alcohol identity and both interpersonal enhancement and cost motive, we conducted a post-hoc analysis to test for mediation of these explicit motives on the relationship between implicit alcohol identity and typical pre-drinking alcohol consumption. However, we found no support for mediation.

It is possible that the generality of the measures might be a factor determining the strength of the effects. As our measure of implicit alcohol identity, the AI-IAT, is a general measure of implicit alcohol identity, it may be that it is not as effective in predicting typical pre-drinking alcohol consumption as the PMI motives, which refer specifically to pre-drinking. The development of implicit measures with a high-level of contextual specificity is a current challenge for dual-systems research (e.g., Keatley et al., 2012). For example, it would be difficult to develop an implicit measure of pre-drinking identity using the IAT methodology as it would be a challenge to identify stimulus words that were exclusive to pre-drinking and not also relevant to general alcohol identity.

Supporting our hypothesis, implicit alcohol identity significantly and positively predicted alcohol related harm, consistent with research by Lindgren et al. (2012). Results indicate that implicit alcohol identity may predict problems related to alcohol consumption in pre-drinkers better than it predicts alcohol consumption during pre-drinking sessions. This may be in part due to the nature of the behaviors included in the B-YAACQ – that is, spontaneous, unplanned consequences to consuming alcohol (e.g., “*When drinking, I have done impulsive things I regretted later*”) which are often better predicted by implicit

measures (Keatley et al., 2013). This finding supports the premise for *evaluative conditioning* interventions in pre-drinkers that are seeing increasing support in the alcohol literature (Hofmann et al., 2008; Houben et al., 2010). It may be important to incorporate such components as part of a broader dual-systems framework that targets influential routes to specific alcohol consumption behaviours and their consequences (Hofmann et al., 2008).

Strengths, limitations, and future research directions

The present study has several strengths. To our knowledge, this is the first study applying a dual-systems theoretical approach to investigate explicit motives and implicit alcohol identity on pre-drinking behavior, an alcohol consumption behavior with demonstrable risks (e.g., Barry et al., 2013; Labhart et al., 2013). The present findings are especially important given the increasing evidence suggesting that explicit models of behavior appear less effective in predicting a range of harmful behaviors (e.g., excessive alcohol consumption) than pro-health behaviors (McEachan et al., 2011), and that the incorporation of both explicit and implicit factors in predictive models leads to more effective prediction in these models (Churchill et al., 2008). Recent evaluative conditioning studies also highlight potential intervention strategies that target impulsive systemic influences on behavior (e.g., Houben et al., 2012). These may be particularly influential in reducing excessive alcohol consumption in populations where interventions based on more explicit methods of behavior change (e.g., intention, planning) or the efficacy of which is dependent on implicit influences (see Ostafin & Palfai, 2012). To our knowledge, this is the first study to examine the effects of implicit alcohol identity in the context of pre-drinking, and advances knowledge by indicating the relative contribution of implicit and explicit motives on pre-drinking behaviour. Results indicate implicit measures may be used to evaluate the contribution of the relative contribution of the impulsive system for different patterns of alcohol consumption.

The present study also used a recently-validated measure of motives specifically related to pre-drinking, showing the relative influence of endorsing certain motives on alcohol consumption during pre-drinking sessions and alcohol-related harm, supporting the ecological validity of the prepartying motives measure. Future research into pre-drinking should include the prepartying motives inventory as it highlights potential avenues for intervention. For instance, the present results suggest the promotion of situational control-related motives in pre-drinking situations may lead to reductions in alcohol consumption and alcohol-related harm in pre-drinkers. Similarly, considering barriers to curb or reduce consumption in intervention efforts, primarily regarding drinking at the subsequent destination (e.g., bar, night club), would be a worthwhile endeavour. Although we did not observe our cost motive significantly loading on a pre-partying motives inventory dimension, we included it in our analyses and found it was a strong predictor of both typical pre-drinking alcohol consumption and alcohol-related harm in pre-drinkers. The relationship between being motivated to pre-drink due to the cheaper cost of doing so has important implications for alcohol policy and cost-based methods to reduce excessive alcohol consumption. Future research should continue to investigate the relationship between alcohol cost and modes of consumption in pre-drinking, and in other alcohol consumption research settings.

The AI-IAT significantly predicted scores on the B-YAACQ, indicating that positive implicit alcohol identities are linked to alcohol-related harm. This is consistent with previous research and provides further support for interventions that target implicit influences on behavior (Houben, Havermans, Nederkorn, & Jansen, 2012; Houben, Nederkorn, Wiers, & Jansen, 2011; Houben, Havermans, Remco, & Weirs, 2010). This provides a unique contribution to an important line of research in alcohol consumption interventions, given the challenge of maintaining reductions in excessive drinking in the longer-term (Carey, Scott-Sheldon, Carey, & DeMartini, 2007) and interventions taking a more explicit approach

appear to show inconsistent or no effects on behavior (e.g., normative feedback interventions; see Moreira, Oskrochi, & Foxcroft, 2012). An important caveat of these findings is that the B-YAACQ is a generalised measure of alcohol-related harm that may not reflect consequences of pre-drinking specifically. This may have contributed to some attenuation in the prediction of harm using pre-drinking-specific measures. Although the established links between pre-drinking and increase alcohol-related harm have been noted in recent studies (Hummer, Napper, Ehert, & LaBrie, 2013), we suggest future research is needed to investigate the more proximal consequences of pre-drinking, specifically, to derive a measure of pre-drinking alcohol-related harm.

The correlational design of our study precludes the identification of definitive causal relationships between motive dimensions and the implicit alcohol identity, and our outcome measures. Future research may endeavour to use prospective designs to follow pre-drinkers over longer periods of time to uncover detailed relationships between pre-drinking motives and alcohol-related behaviors. Recruiting our sample from a participant pool in a single university in Australia raises concerns about the generalizability of our findings to the broader pre-drinking student population. Further, that we did not measure the prevalence or frequency with which participants engaged in pre-drinking may be noted as a limitation and important area for future research. However, undergraduate students were the focal population of our study, and our results are somewhat consistent with the themes and trends identified in large-scale Australian research highlighting the importance of social dynamics and cost influencing pre-drinking in Australians in the night-time environment (Miller, 2013). Given that we modelled cost motive as a single-indicator latent variable, the predictive relationships between this and our outcome variables may have been affected. We therefore suggest future research incorporates a more comprehensive measure of cost motive, or that

the prepartying motives inventory is perhaps revised to acknowledge the importance of cost in driving pre-drinking decisions in students.

Conclusions

Specific pre-drinking motive dimensions and self-reported cost motive appear to be related to typical pre-drinking alcohol consumption and alcohol-related harm. In addition, alcohol-related harm was predicted by motive dimensions, cost, and implicit alcohol identity, consistent with an additive pattern from dual systems theory (Perugini, 2005). Specifically, we found that being motivated to pre-drink because of interpersonal enhancement and barriers to consumption at the subsequent event significantly predicted higher typical pre-drinking alcohol consumption and that situational control motives significantly predicted lower typical pre-drinking alcohol consumption. Alcohol-related harm was significantly predicted by barriers to consumption and situational control, as well as positive implicit alcohol identity. Being motivated by cost was a significant predictor of both typical alcohol consumption and alcohol-related harm. Given our preliminary evidence for the important role that cost plays in motivating pre-drinking in the present study, the importance of financial considerations as a driver of pre-drinking requires further investigation. To our knowledge, this is the first study to investigate the role of implicit processes in pre-drinking as a specific pattern of alcohol consumption. Future research should endeavour to adopt a dual-systems approach to examining pre-drinking and its associated consequences, to inform interventions that reduce excessive alcohol consumption.

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all

patients for being included in the study. The authors declare that they have no conflict of interest.

References

- Anderson, Peter, Chisholm, Dan, & Fuhr, Daniela C. (2009). Effectiveness and cost-effectiveness of policies and programmes to reduce the harm caused by alcohol. *The Lancet*, 373(9682), 2234-2246. doi: 10.1016/s0140-6736(09)60744-3
- Barry, Adam E., Stellefson, Michael L., Piazza-Gardner, Anna K., Chaney, Beth H., & Dodd, Virginia. (2013). The impact of pre-gaming on subsequent blood alcohol concentrations: An event-level analysis. *Addictive Behaviors*, 38(8), 2374-2377. doi: 10.1016/j.addbeh.2013.03.014
- Barton, Adrian, & Husk, Kerryn. (2012). Controlling pre-loaders: alcohol related violence in an English night time economy. *Drugs and Alcohol Today*, 12(2), 89-97. doi: 10.1108/17459261211235119
- Bush, Kristen, Kivlahan, Daniel R, McDonell, Mary B, Fihn, Stephan D, & Bradley, Katharine A. (1998). The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. *Archives of internal medicine*, 158(16), 1789. doi: 10.1001/archinte.158.16.1789
- Byrnes, Joshua M, Cobiac, Linda J, Doran, Christopher M, Vos, Theo, & Shakeshaft, Anthony P. (2010). Cost-effectiveness of volumetric alcohol taxation in Australia. *Med J Aust*, 192(8), 439-443. doi: 10.1111/j.1465-3362.2011.00309.x
- Carey, Kate B., Scott-Sheldon, Lori A. J., Carey, Michael P., & DeMartini, Kelly S. (2007). Individual-level interventions to reduce college student drinking: A meta-analytic review. *Addictive Behaviors*, 32(11), 2469-2494. doi: 10.1016/j.addbeh.2007.05.004
- Churchill, Sue, Jessop, Donna, & Sparks, Paul. (2008). Impulsive and/or planned behaviour: Can impulsivity contribute to the predictive utility of the theory of planned behaviour? *British Journal of Social Psychology*, 47(4), 631-646. doi: 10.1348/014466608X284434
- Doran, Christopher M, & Digiusto, Erol. (2011). Using taxes to curb drinking: A report card on the Australian government's alcopops tax. *Drug and Alcohol Review*, 30(6), 677-680. doi: 10.1111/j.1465-3362.2011.00309.x
- Gray, Heather M, LaPlante, Debi A, Bannon, Brittany L, Ambady, Nalini, & Shaffer, Howard J. (2011). Development and validation of the Alcohol Identity Implicit Associations Test (AI-IAT). *Addictive behaviors*, 36(9), 919-926. doi: 10.1016/j.addbeh.2011.05.003
- Greenwald, Anthony G, McGhee, Debbie E, & Schwartz, Jordan LK. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology*, 74, 1464-1480.
- Hagger, Martin S. (2013a). The multiple pathways by which self-control predicts behavior. *Frontiers in psychology*, 4.
- Hagger, Martin S. (2013b). The opportunity cost model: Automaticity, individual differences, and self-control resources. *Behavioral and Brain Sciences*, 36(06), 687-688.
- Hagger, Martin S, & Chatzisarantis, Nikos LD. (2014). An integrated behavior change model for physical activity. *Exercise and Sport Sciences Reviews*, 42(2), 62-69.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R.E. (2009). *Multivariate data analysis*. Upper Saddle River, NJ: Prentice Hall.
- Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science*, 40(3), 414-433. doi: 10.1007/s11747-011-0261-6
- Hallett, J., Howat, P., Maycock, B., McManus, A., Kypri, Kypros, & Dhaliwal, S. (2012). Undergraduate student drinking and related harms at an Australian university: web-

- based survey of a large random sample. *BMC Public Health*, 12(1), 37. doi: 10.1186/1471-2458-12-37
- Hofmann, Wilhelm, Friese, Malte, & Strack, Fritz. (2009). Impulse and self-control from a dual-systems perspective. *Perspectives on Psychological Science*, 4(2), 162-176. doi: 10.1111/j.1745-6924.2009.01116.x
- Hofmann, Wilhelm, Friese, Malte, & Wiers, Reinout W. (2008). Impulsive versus reflective influences on health behavior: a theoretical framework and empirical review. *Health Psychology Review*, 2(2), 111-137. doi: 10.1080/17437190802617668
- Houben, K., Havermans, R. C., Nederkoorn, C., & Jansen, A. (2012). Beer à no-go: learning to stop responding to alcohol cues reduces alcohol intake via reduced affective associations rather than increased response inhibition. *Addiction*, 107(7), 1280-1287. doi: 10.1111/j.1360-0443.2012.03827.x
- Houben, K., Havermans, R. C., & Wiers, R. W. (2010). Learning to dislike alcohol: conditioning negative implicit attitudes toward alcohol and its effect on drinking behavior. *Psychopharmacology*, 211(1), 79-86. doi: 10.1007/s00213-010-1872-1
- Houben, Katrijn, & Wiers, Reinout W. (2006). Assessing implicit alcohol associations with the Implicit Association Test: Fact or artifact? *Addictive behaviors*, 31(8), 1346-1362. doi: 10.1016/j.addbeh.2005.10.009
- Houben, Katrijn, & Wiers, Reinout W. (2009). Response inhibition moderates the relationship between implicit associations and drinking behavior. *Alcoholism: Clinical and Experimental Research*, 33(4), 626-633. doi: 10.1111/j.1530-0277.2008.00877.x
- Hummer, J. F., Napper, L. E., Ehret, P. E., & LaBrie, J. W. (2013). Event-specific risk and ecological factors associated with prepartying among heavier drinking college students. *Addictive Behaviors*, 38(3), 1620-1628. doi: 10.1016/j.addbeh.2012.09.014
- Keatley, D., Clarke, D. D., & Hagger, M. S. (2012). Investigating the predictive validity of implicit and explicit measures of motivation in problem-solving behavioural tasks. *British Journal of Social Psychology*, 52(5), 510-524. doi: 10.1111/j.2044-8309.2012.02107.x
- Keatley, D., Clarke, D. D., & Hagger, M. S. (2013). The predictive validity of implicit measures of self-determined motivation across health-related behaviours. *British Journal of Health Psychology*, 18(1), 2-17. doi: 10.1111/j.2044-8287.2011.02063.x
- Kock, N. (2012). *WarpPLS 3.0 User Manual* (pp. 55). Retrieved from http://www.scriptwarp.com/warppls/UserManual_WarpPLS_V3.pdf
- Labhart, F., Graham, K., Wells, S., & Kuntsche, E. (2013). Drinking before going to licensed premises: An event-level analysis of predrinking, alcohol consumption, and adverse outcomes. *Alcoholism: Clinical and Experimental Research*, 37(2), 284-291. doi: 10.1111/j.1530-0277.2012.01872.x
- LaBrie, J. W., Hummer, J. F., Pedersen, E. R., Lac, A., & Chithambo, T. (2012). Measuring college students' motives behind prepartying drinking: Development and validation of the prepartying motivations inventory. *Addictive Behaviors*, 37(8), 962-969. doi: 10.1016/j.addbeh.2012.04.003
- Lindgren, K. P., Neighbors, C., Teachman, B. A., Wiers, R. W., Westgate, E., & Greenwald, A. G. (2012). I drink therefore I am: Validating alcohol-related implicit association tests. doi: 10.1016/j.addbeh.2013.01.026
- Lonsdale, Adam J, Hardcastle, Sarah J, & Hagger, Martin S. (2012). A minimum price per unit of alcohol: A focus group study to investigate public opinion concerning UK government proposals to introduce new price controls to curb alcohol consumption. *BMC public health*, 12(1), 1-16.

- MacLean, Sarah, & Callinan, Sarah. (2013). "Fourteen Dollars for One Beer!" Pre-drinking is associated with high-risk drinking among Victorian young adults. *Australian and New Zealand Journal of Public Health*, 37(6), 579-585. doi: 10.1111/1753-6405.12138
- McEachan, R. R. C., Conner, M., Taylor, N. J., & Lawton, R. J. (2011). Prospective prediction of health-related behaviours with the Theory of Planned Behaviour: a meta-analysis. *Health Psychology Review*, 5(2), 97-144. doi: 10.1080/17437199.2010.521684
- Miller, P. G. (2013). Patron Offending and Intoxication in Night-Time Entertainment Districts (POINTED) *Monograph Series 46*. Canberra: National Drug Law Enforcement Research Fund.
- Miller, P. G., & Droste, N. (2013). Alcohol price considerations on alcohol and illicit drug use in university students. *Journal of Alcoholism and Drug Dependence*, 1(109), 2. doi: 10.4172/jaldd.1000109
- Moreira, M. T., Oskrochi, R., & Foxcroft, D. R. (2012). Personalised normative feedback for preventing alcohol misuse in university students: Solomon three-group randomised controlled trial. *PloS one*, 7(9), e44120. doi: 10.1371/journal.pone.0044120
- National Health and Medical Research Council. (2009). *Australian guidelines to reduce risks from drinking alcohol*. Canberra, ACT: Commonwealth of Australia Retrieved from <http://www.nhmrc.gov.au/files/nhmrc/publications/attachments/ds10-alcohol.pdf>.
- Ostafin, Brian D, & Palfai, Tibor P. (2012). When wanting to change is not enough: automatic appetitive processes moderate the effects of a brief alcohol intervention in hazardous-drinking college students. *Addiction Science & Clinical Practice*, 7(1), 1-9. doi: 10.1186/1940-0640-7-25
- Pedersen, E. R., & LaBrie, J. (2007). Partying before the party: Examining prepartying behavior among college students. *Journal of American College Health*, 56(3), 237-245. doi: 10.3200/JACH.56.3.237-246
- Pedersen, E. R., LaBrie, J. W., & Kilmer, J. R. (2009). Before you slip into the night, you'll want something to drink: exploring the reasons for prepartying behavior among college student drinkers. *Issues in Mental Health Nursing*, 30(6), 354-363. doi: 10.1080/01612840802422623
- Perugini, Marco. (2005). Predictive models of implicit and explicit attitudes. *The British Journal of Social Psychology*, 44(1), 29-45. doi: 10.1348/014466604X23491
- Read, J. P., Merrill, J. E., & Bytschkow, K. (2010). Before the party starts: risk factors and reasons for "pregaming" in college students. *Journal of American College Health*, 58(5), 461-472. doi: 10.1080/07448480903540523
- Rose, Paul, Smith, Shannon Toney, & Segrist, Daniel J. (2010). Too cheap to chug: frugality as a buffer against college-student drinking. *Journal of Consumer Behaviour*, 9(3), 228-238. doi: 10.1002/cb.314
- Sheeran, Paschal, Gollwitzer, Peter M, & Bargh, John A. (2013). Nonconscious processes and health. *Health Psychology*, 32(5), 460.
- Skov, Steven J, Chikritzhs, Tanya N, Kypri, Kypros, Miller, Peter G, Hall, Wayne D, Daube, Michael M, & Moodie, A Rob. (2011). Is the "alcopops" tax working? Probably yes but there is a bigger picture. *Medical journal of Australia*, 195(2), 84-86.
- Slutske, Wendy S., Hunt-Carter, Erin E., Nabors-Oberg, Rachel E., Sher, Kenneth J., Bucholz, Kathleen K., Madden, Pamela A. F., . . . Heath, Andrew C. (2004). Do college students drink more than their non-college-attending peers? Evidence from a population-based longitudinal female twin study. *Journal of Abnormal Psychology*, 113(4), 530-540.

- Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review*, 8(3), 220-247. doi: 10.1207/s15327957pspr0803_1
- Tenenhaus, M., Amato, S., & Vinzi, V. E. (2004). *A global goodness-of-fit index for PLS structural equation modelling*. Paper presented at the XLII SIS Scientific Meeting, 2004, Padova, Italy. .
- Vinzi, V. E., Chin, W. W., Henseler, J., & Wang, H. (2010). *Handbook of Partial Least Squares : Concepts, Methods and Applications*. New York, USA: Springer.
- Wiers, R. W., Bartholow, B. D., van den Wildenberg, E., Thush, C., Engels, R. C. M. E., Sher, K. J., . . . Stacy, A. W. (2007). Automatic and controlled processes and the development of addictive behaviors in adolescents: a review and a model. *Pharmacology Biochemistry and Behavior*, 86(2), 263-283. doi: 10.1016/j.pbb.2006.09.021

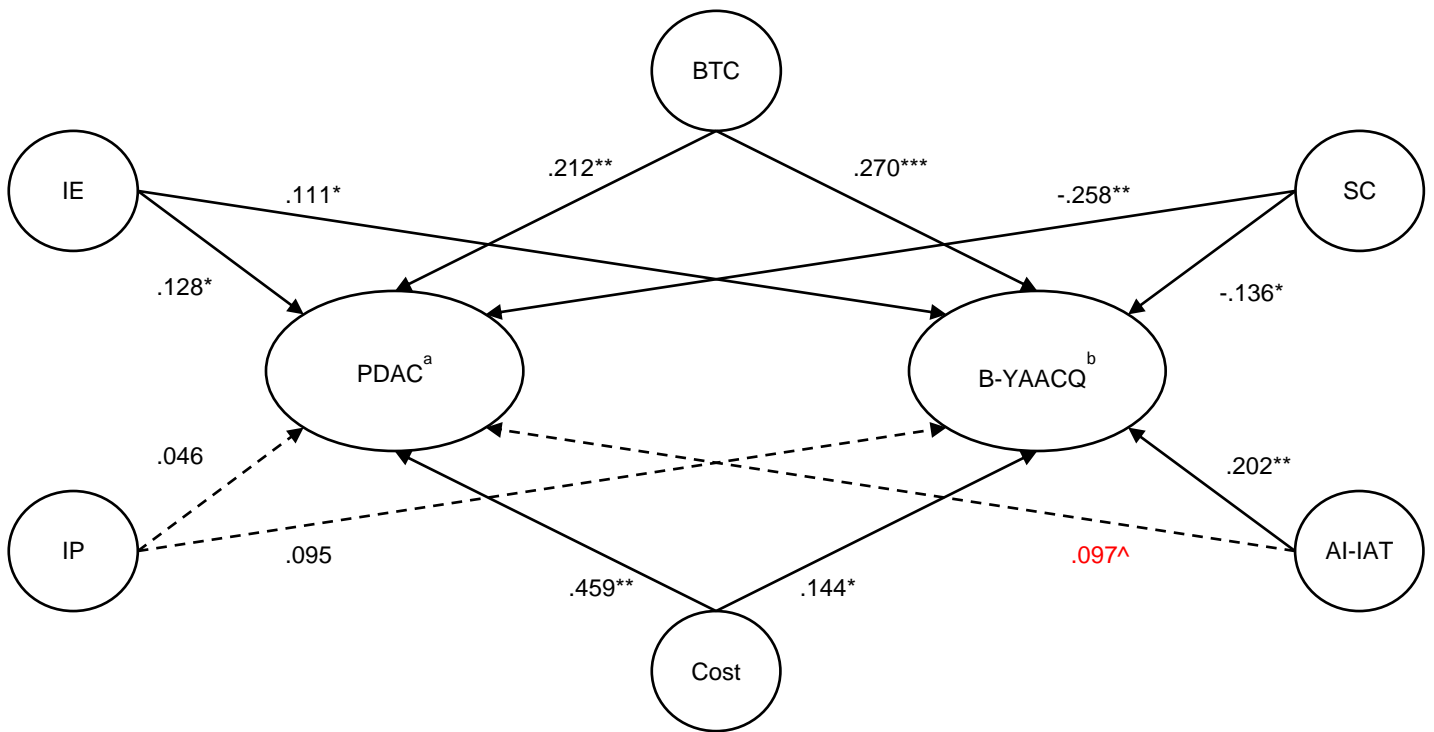


Figure 1. Path model showing the standardised regression coefficients between motive dimensions from the PMI, cost, and the AI-IAT.

Note. * $p < .05$ ** $p < .01$. ^a $R^2 = .258$; ^b $R^2 = .307$. IP = intimate pursuit; IE = interpersonal enhancement; SC = situational control; BTC = barriers to consumption; AI-IAT = alcohol identity implicit association test; PDAC = typical pre-drinking alcohol consumption; B-YAACQ = brief young adult alcohol consequences scale. ^aAlthough the path from AI-IAT to B-YAACQ was not statistically significant ($p = .07$), the effect size ($f^2 = .03$) suggests a significant, albeit small, effect was present with insufficient statistical power to confirm it.

Table 1

Correlations between study variables.

	1	2	3	4	5	6	7	8	9
1. IP	(.873)								
2. IE	.394**	(.788)							
3. BTC	.391**	.514**	(.881)						
4. SC	.262**	.418**	.611**	(.794)					
5. AI-IAT	.076	.239*	.095	-.082	-				
6. PDAC	.207*	.429**	.296**	.137	.272**	-			
7. Cost	.188*	.592**	.338**	.427**	.264**	.519**	-		
8. B-YAACQ	.251**	.366**	.349**	.143	.314**	.315**	.316**	-	
9. AC Freq	-.028	.175*	.080	-.177	.306**	.121	.166*	.159	-

Note. Latent variable λ AVE (average variance extracted) are presented on the principal diagonal. AI-IAT = alcohol identity implicit association test; IP = intimate pursuit; IE = interpersonal enhancement; BTC = barriers to consumption; SC = situational control; B-YAACQ = total scores on brief young adult alcohol consequences scale; PDAC = typical pre-drinking alcohol consumption; AC Freq = alcohol consumption frequency. * $p < .05$
** $p < .01$