



Predicting heavy episodic drinking using an extended temporal self-regulation theory



Nicola Black^{a,*}, Barbara Mullan^b, Louise Sharpe^c

^a Health Psychology Group, Institute of Applied Health Sciences, School of Medicine, Medical Sciences and Nutrition, 2nd Floor, Health Sciences Building Foresterhill, The University of Aberdeen, Aberdeen AB25 2ZD, United Kingdom

^b School of Psychology and Speech Pathology, Curtin University, GPO Box U1987, Perth, Western Australia 6845, Australia

^c School of Psychology, University of Sydney, Brennan MacCallum Building (A18), Sydney, NSW 2006, Australia

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ABSTRACT

Introduction: Alcohol consumption contributes significantly to the global burden from disease and injury, and specific patterns of heavy episodic drinking contribute uniquely to this burden. Temporal self-regulation theory and the dual-process model describe similar theoretical constructs that might predict heavy episodic drinking. The aims of this study were to test the utility of temporal self-regulation theory in predicting heavy episodic drinking, and examine whether the theoretical relationships suggested by the dual-process model significantly extend temporal self-regulation theory. **Methods:** This was a predictive study with 149 Australian adults. Measures were questionnaires (self-report habit index, cues to action scale, purpose-made intention questionnaire, timeline follow-back questionnaire) and executive function tasks (Stroop, Tower of London, operation span). Participants completed measures of theoretical constructs at baseline and reported their alcohol consumption two weeks later. Data were analysed using hierarchical multiple linear regression. **Results:** Temporal self-regulation theory significantly predicted heavy episodic drinking ($R^2 = 48.0\text{--}54.8\%$, $p < 0.001$) and the hypothesised extension significantly improved the prediction of heavy episodic drinking frequency ($\Delta R^2 = 4.5\%$, $p = 0.001$) but not peak consumption ($\Delta R^2 = 1.4\%$, $p = 0.181$). Intention and behavioural prepotency directly predicted heavy episodic drinking ($p < 0.01$). Planning ability moderated the intention-behaviour relationship and inhibitory control moderated the behavioural prepotency-behaviour relationship ($p < 0.05$). **Conclusions:** Both temporal self-regulation theory and the extended temporal self-regulation theory provide good prediction of heavy episodic drinking. Intention, behavioural prepotency, planning ability and inhibitory control may be good targets for interventions designed to decrease heavy episodic drinking.

1. Introduction

1.1. Heavy episodic drinking

Alcohol consumption is responsible for 4.6% of the global burden of disease and injury (Rehm et al., 2009). Further, patterns of heavy episodic drinking contribute uniquely to this burden by increasing the risk of such health problems as ischaemic heart disease (Roerecke & Rehm, 2010) and ischaemic stroke (Sundell, Salomaa, Vartiainen, Poikolainen, & Laatikainen, 2008). Despite this, each year 39% of Australian adults exceed recommended limits for single-occasion consumption (i.e., engage in *heavy episodic drinking*; Australian Institute of Health and Welfare, 2014). Given the prevalence and consequences of heavy episodic drinking, it is important to understand

the determinants of this behaviour.

1.2. Theoretical approaches

1.2.1. Traditional approaches

One theoretical approach that has been extensively applied to the prediction of alcohol consumption broadly, and heavy episodic drinking specifically, is the theory of planned behaviour (TPB; Cooke, Dahdah, Norman, & French, 2014). The TPB proposes that attitudes, subjective norms and perceived behavioural control influence intention to engage in a behaviour (Ajzen, 1991). In turn, intention and perceived behavioural control influence actual engagement in the behaviour. The TPB accounts for a moderate amount of variance (40%) in intention to engage in health risk behaviours such as heavy episodic drinking, and a

Abbreviations: DPM, The dual-process model; TST, Temporal self-regulation theory

* Corresponding author.

E-mail addresses: nicola.black@abdn.ac.uk (N. Black), barbara.mullan@curtin.edu.au (B. Mullan), louise.sharpe@sydney.edu.au (L. Sharpe).

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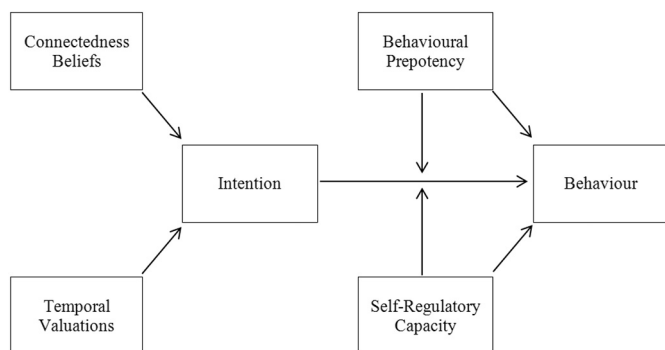


Fig. 1. Temporal self-regulation theory.

small amount of variance (15%) in actual engagement in health risk behaviours (McEachan, Conner, Taylor, & Lawton, 2011). The limited prediction of behaviour from intention has been referred to as the *intention-behaviour gap* (Sheeran, 2002) and it has been suggested that motivation-based models such as the TPB do not sufficiently address post-intentional, or volitional, factors that influence a person's ability to execute their intentions (Caudwell, Mullan, & Hagger, 2016; Schwarzer, 2014).

1.2.2. Temporal self-regulation theory

One theory with the potential to address the intention-behaviour gap is temporal self-regulation theory (TST; see Fig. 1; Hall & Fong, 2007). TST proposes that beliefs about the outcomes of a behaviour (*connectedness beliefs*) and the temporally weighted perceived value of these outcomes (*temporal valuations*) predict intention to engage in the behaviour. Immediate benefits and consequences of behaviour affect intention more strongly than do distal benefits and consequences. In turn, actual engagement in the behaviour is predicted by intention, the degree of automaticity of the behaviour (*behavioural prepotency*) and the capacity to regulate behaviour (*self-regulatory capacity*). Further, behavioural prepotency and self-regulatory capacity are each suggested to moderate the translation of intention into behaviour. In this way, TST provides a possible explanation for the intention-behaviour gap.

TST is yet to be applied in full to the prediction of heavy episodic drinking; however, studies conducted primarily with adolescents and young adults provide evidence regarding individual links. There is consistent evidence that heavy episodic drinking is directly determined to some degree by both intention (Cooke et al., 2014) and aspects of behavioural prepotency (specifically, habit and past behaviour; Collins & Carey, 2007; Gardner, de Bruijn, & Lally, 2012; Norman, 2011; Norman & Conner, 2006; Norman, Conner, & Stride, 2012). In contrast, it is not clear that self-regulatory capacity directly predicts heavy episodic drinking, with previous research finding no direct link between the neuropsychological basis of self-regulatory capacity, *executive function*, and heavy episodic drinking (Mullan, Wong, Allom, & Pack, 2011). Regarding the moderation of the intention-behaviour relationship, there is mixed evidence for both behavioural prepotency and self-regulatory capacity. Some studies suggest that aspects of behavioural prepotency moderate the translation of intention into behaviour (Gardner et al., 2012; Norman & Conner, 2006), while others find no such link (Norman, 2011; Woolfson & Maguire, 2010). Further, where significant moderation effects have been found, the nature of the moderation appears inconsistent. For example, under stronger behavioural prepotency, Gardner et al. (2012) report stronger intention-behaviour relationships, whereas Norman and Conner (2006) report weaker (and non-significant) intention-behaviour relationships. Similarly, higher executive function has been associated with both stronger (Thush et al., 2008)¹ and weaker (Mullan et al., 2011)

intention-behaviour relationships. Overall, there is clear evidence for some of the relationships proposed by TST, but inconsistent evidence for other links. Conducting a complete examination of the prediction of heavy episodic drinking offered by TST is an important step in extending and clarifying the current literature.

1.2.3. The dual-process model

Hofmann, Friese, and Wiers' (2008) integrated, dual-process model (DPM) suggests that health behaviours are determined by both reflective and impulsive factors, and their degree of influence on behaviour is moderated by various boundary conditions. As acknowledged by the authors of DPM (Friese, Hofmann, & Wiers, 2011), there is considerable similarity between the constructs proposed by TST and DPM; reflective and impulsive factors map to intention and behavioural prepotency, respectively. Further, one of the identified boundary conditions, executive function, maps to self-regulatory capacity. One key difference between TST and DPM lies in the relationship between self-regulatory capacity and behavioural prepotency. DPM suggests that executive function moderates the translation of impulsive factors into behaviour, such that people are more likely to enact their impulses when their executive function is weak. This suggestion is empirically supported (Grenard et al., 2008; Houben & Wiers, 2009; Peeters et al., 2012, 2013) and is in line with the broader conceptualisation of the role of self-regulatory capacity: to monitor and alter behaviour in a goal-directed manner, a process that involves both inhibition of goal-incongruent responses and enactment of goal-congruent responses (Baumeister, 2002). Integrating this suggestion into TST, it is likely that self-regulatory capacity moderates the translation of behavioural prepotency into behaviour. If so, this would increase the explanatory power of TST and improve the identification of behaviour-change targets across contexts.

1.3. The current study

The aims of the current study were (1) to examine the utility of TST in predicting heavy episodic drinking and (2) to determine whether the additional relationship suggested by DPM increases this utility. Given the above empirical evidence, it was predicted that TST would offer significant prediction of heavy episodic drinking and this prediction would be extended when integrating DPM constructs. It was hypothesised that intention and behavioural prepotency would directly predict heavy episodic drinking behaviour and that stronger self-regulatory capacity would be associated with weaker behavioural prepotency-behaviour relationships. Given the relatively weaker evidence for the other theoretical relationships, no specific hypotheses were made.

2. Method

2.1. Measures

2.1.1. Baseline measures: temporal self-regulation theory

Connectedness beliefs and *temporal valuations* were assessed using the comprehensive effects of alcohol questionnaire (Fromme, Stroot, & Kaplan, 1993). This validated and reliable measure of alcohol expectancies was used as alcohol expectancies are described as synonymous with connectedness beliefs within the TST. Positive and negative outcomes were averaged separately. For connectedness beliefs, higher scores (range: 1–4) indicate greater perceived likelihood of the outcome occurring (Cronbach's $\alpha = 0.920$ and 0.903 for positive and negative outcomes, respectively). For temporal valuations, higher scores (range: 1–5) indicate more-positive perceptions of the outcomes and the midpoint indicates neutral perceptions (Cronbach's $\alpha = 0.929$ and

(footnote continued)
outcome expectancies, rather than intention itself

¹ Thush et al. (2008) examined the predictor of intention, positive alcohol-related

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