



## A longitudinal examination of protective behavioral strategies and alcohol consumption among adult drinkers

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### HIGHLIGHTS

- Protective behaviour strategies (PBSs) can reduce alcohol intake.
- Three tested PBSs were associated with lower alcohol consumption over time.
- These PBSs were equally effective among different population segments.
- Three PBSs were associated with heavier alcohol consumption over time.
- Enactment of PBSs was greater in females and older drinkers.

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### ABSTRACT

Previous studies suggest that employing specific behavioral strategies when drinking can prevent excessive alcohol consumption and related harms. However, these studies have typically examined these 'protective behavioral strategies' (PBSs) in combination, limiting understanding of whether individual strategies differ in their effectiveness. Further, most existing research is cross-sectional in design, precluding the determination of causal relationships between PBS use and alcohol consumption. To address these research gaps, the present study sought to longitudinally (i) identify which individual PBSs are significantly related to reduced alcohol consumption over time and (ii) explore the effectiveness of individual PBSs among specific population groups. The sample comprised 1328 Australian adult drinkers (47% male) who completed an online survey assessing engagement in PBSs and alcohol consumption at two time points approximately four weeks apart. Reported enactment of the PBS 'Count your drinks' was associated with a significant reduction in alcohol consumption between T1 and T2. In contrast, enactment of the PBSs 'Ask a friend to let you know when you have had enough to drink', 'Put extra ice in your drink', 'Use a designated driver', and 'Leave drinking venues at a pre-determined time' was associated with an increase in alcohol consumption. The results thus suggest that many PBSs may not be effective in reducing alcohol consumption and that some may be associated with higher levels of intake. The results have implications for the development of harm-minimization campaigns designed to encourage drinkers to reduce their alcohol consumption.

### 1. Introduction

Excessive alcohol use is a major public health concern, contributing to a wide range of diseases that reduce quality of life and increase mortality (World Health Organization, 2014). It is estimated that 5.9% of all deaths globally are attributable to alcohol (WHO, 2014). In Australia, alcohol use is the third leading contributor to the burden of

disease behind tobacco use and being overweight (Australian Institute of Health and Welfare, 2016).

Despite substantial evidence of the harmful effects of alcohol, per capita consumption is increasing globally (WHO, 2014). Identifying and implementing effective policies and practices is critical to reducing alcohol intake and related harms. One potential approach receiving increasing attention is the promotion of protective behavioral strategies

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(PBSs) (e.g., Arterberry, Smith, Martens, Cadigan, & Murphy, 2014; Braitman, Henson, & Carey, 2015). PBSs are cognitive-behavioral strategies aimed at helping drinkers control their alcohol intake and/or reduce their risk of alcohol-related harm (Martens et al., 2005). Three categories of PBSs have been identified: stopping or limiting drinking (e.g., Stopping drinking at a predetermined time, Determining not to exceed a set number of drinks), modifying the manner of drinking (e.g., Avoiding drinking games, Avoiding mixing different types of alcohol), and serious harm reduction (e.g., Using a designated driver, Knowing where your drink has been at all times) (Martens et al., 2005; Martens, Ferrier, & Cimini, 2007; Treloar, Martens, & McCarthy, 2015).

A substantial body of cross-sectional evidence, mostly conducted with US college students and young adults, suggests that PBS use is associated with lower alcohol consumption and fewer negative alcohol-related consequences (Arterberry et al., 2014; Braitman et al., 2015; DeMartini et al., 2013; Ehret, Ghaidarov, & LaBrie, 2013; Jongenelis et al., 2016; Kenney & LaBrie, 2013; Linden-Carmichael, Lau-Barraco, & Milletich, 2014; Martens et al., 2005; Patrick, Lee, & Larimer, 2011; Pearson, D'Lima, & Kelley, 2013; Ray, Turrissi, Abar, & Peters, 2009). Consequences have been typically measured with a variation of the Rutgers Alcohol Problem Index (RAPI: White and Labouvie, 1989) that includes items relating to problems such as being unable to do homework or study for a test, getting into fights with others, and being unable to stop drinking. In the few longitudinal studies, PBS use at the aggregate level has been found to predict lower levels of alcohol-related consequences (Grazioli et al., 2015; Martens, Martin, Littlefield, Murphy, & Cimini, 2011; Napper, Kenney, Lac, Lewis, & Labrie, 2014), but mixed results have been observed for consumption. Some studies have found PBS use to be associated with lower alcohol consumption (Martens et al., 2011; Napper et al., 2014), while others have not (Grazioli et al., 2015; Martens et al., 2007).

These mixed findings may be due to a number of factors. First, in accordance with the structure of the Protective Behavioral Strategies Scale (Martens, Pederson, Labrie, Ferrier, & Cimini, 2007), there has been a tendency in previous research to aggregate individual PBSs into categories prior to conducting analyses, and different results have been obtained depending on which categories of PBSs are under investigation. For example, manner of drinking strategies have been found to be more strongly associated with lower alcohol use than strategies focusing on stopping/limiting drinking or serious harm reduction (Martens, Pederson, et al., 2007; Napper et al., 2014). Analyzing individual PBSs separately has the potential to overcome issues relating to strategy aggregation by identifying specific strategies that are effective. To this end, one of the few studies examining individual PBS use found that while most of the PBSs in the manner of drinking category were associated with lower alcohol intake, this was only the case for some strategies in the stopping/limiting drinking or reducing harm categories (Frank, Thake, & Davis, 2012). It has been suggested that this may be because strategies that involve limiting drinking are more challenging to implement than those that relate to manner of drinking (Napper et al., 2014).

Second, it is likely that not all PBSs are equally effective, and previous research suggests that some may actually be associated with higher levels of alcohol consumption. For example, a cross-sectional study investigating the use of individual strategies found that quenching thirst with a non-alcohol beverage before consuming alcohol was associated with greater alcohol consumption (Jongenelis et al., 2016). This outcome highlights the importance of investigating individual PBSs rather than aggregated categories of PBSs to ensure that the effects of particular strategies are not masked.

A further issue is whether different PBSs exhibit varying levels of effectiveness among specific population groups. The focus of previous research on younger drinkers has precluded investigation of PBS effectiveness by age. This is an important variable to consider given recent data from Australia and the US showing a decline over time in drinking among teenagers and young adults but increasing rates of

drinking among older adults (Breslow, Castle, Chen, & Graubard, 2017; Lipari, Van Horn, Hughes, & Williams, 2017). The few studies exploring gender differences have produced mixed results. Benton et al. (2004) found that while both male and female drinkers were less likely to experience alcohol-related consequences when they engaged in PBSs, the protective effect of PBS use was stronger in males. In contrast, other studies have found the protective effect of PBSs to be stronger in females (Clarke et al., 2016) or only present in females and not males (Delva et al., 2004; Sutfin et al., 2009). Once again, these mixed findings could be explained by differences in the types of PBSs assessed between studies.

Ensuring PBSs are effective at reducing alcohol consumption among individuals from all socioeconomic status (SES) backgrounds is also important, particularly in light of evidence showing that higher SES drinkers engage in more frequent and heavier drinking, but lower SES drinkers experience more negative alcohol-related consequences (Australian Institute of Health and Welfare, 2017a, 2017b; Collins, 2016). Finally, it is critical to understand whether PBSs are effective among different categories of drinkers, and especially heavier drinkers who are most in need of effective harm-minimization strategies. This is reflected in previous PBS research focusing specifically on heavy-drinking college populations (Martens et al., 2011; Napper et al., 2014).

### 1.1. Present study

This study assessed the relationship between PBS use and alcohol consumption over time in an Australian sample of adult drinkers. Specific aims were to (i) identify which PBSs are most strongly related to reduced alcohol consumption over time and (ii) investigate whether demographic factors (gender, age, and SES) and drinking status (low risk vs high risk) moderate the relationship between PBS use and alcohol consumption.

## 2. Method

### 2.1. Sample

The sample comprised drinkers aged 18 (the minimum purchase age in Australia) to 70 years recruited via a large online panel provider (PureProfile). The panel has over 350,000 Australian members who are sourced via internal referral programs and advertising on social media and radio. Panel members can participate in surveys by either using a link received via email or accessing surveys online. Small incentives are offered for survey completion.

To be eligible to participate in the present study, respondents had to report consuming alcohol at least twice per month. Quotas were used to achieve an even gender split and to divide the sample evenly between three age groups: 18–30 years, 31–50 years, and 51–70 years. Respondents were surveyed at two time points approximately four weeks apart. In total, 2003 individuals responded to the initial invitation, of whom 1404 (70%) completed both the baseline (T1) and follow-up (T2) surveys.

### 2.2. Measures and procedure

The study was approved by the Curtin University Human Research Ethics Committee and respondents completed an informed consent procedure. Both the T1 and T2 surveys included questions on drinking behavior and frequency of use of PBSs. Respondents' demographic characteristics (e.g., gender, age, and SES) were only assessed at T1. Low (quintiles 1 and 2), mid (quintiles 3 and 4), and high (quintile 5) SES scores were calculated based on the Australian Bureau of Statistics' (2011) index of socio-economic disadvantage.

Respondents' alcohol intake was measured at T1 using the following items from national alcohol intake surveys (Australian Institute of Health and Welfare, 2011, 2014, 2016, 2017a, 2017b): *In the last*

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