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Alcohol use in shiftworkers

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ABSTRACT

It has been suggested that shiftworkers may consume alcohol to help them sleep, resulting in greater consumption. A large study in Australian workers suggested that those on non-standard schedules (outside 8 am–6 pm, Monday–Friday) do not drink more, but are at increased odds of binge drinking (heavy periods of drinking followed by abstinence) than workers on standard schedules. However, differences in types of non-standard schedules were not examined in the study. The current study examined the alcohol intake of Australian shiftworkers on fixed and rotating shifts. Shiftworkers ($n = 118$, age = 43.4 ± 9.9 y, 68% male) on 12 h-rotating ($n = 29$), 8 h-rotating ($n = 29$), morning ($n = 33$) and night ($n = 27$) schedules from printing, postal, nursing and oil industries participated. They completed a Cancer Council Dietary Questionnaire, recording frequency and amount of alcohol consumed on average per day over the preceding year. They also completed a shortened Standard Shiftwork Index, including questions on shift schedule, sleep duration, tiredness, gender and age. Average alcohol consumption was 9.6 ± 13.1 standard drinks/week. One in six reported using alcohol as a sleep aid between shifts at least sometimes and nearly one third reported consuming 12 or more drinks in 24 h. Alcohol consumption was higher for males and decreased with age. Controlling for gender and age, there were no significant differences between shift types in standard drinks/week ($p = 0.50$). However, those on 12-h rotating shifts consumed more drinks per 24 h ($p = 0.04$) and had less sleep ($p < 0.001$). Results support the suggestion that shiftworkers are likely to binge drink, particularly younger, male workers and those on long, rotating shifts. Alcohol use in shiftworkers may put increased pressure on already vulnerable physiological systems.

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1. Introduction

Shiftwork disrupts sleep and circadian rhythms, and can negatively impact on performance, safety, social and family life, and health (Rajaratnam and Arendt, 2001; Åkerstedt, 2003). Shiftwork has been associated with increased risk of cardiovascular and gastrointestinal disturbance, metabolic issues, and certain types of cancer (Åkerstedt and Knutsson, 1997; Davis and Mirick, 2006; Lowden et al., 2010). One arm of research aimed at understanding the mechanisms behind shiftworker health risks focuses on the potential for behavioural strategies to negatively influence health.

Since shiftworkers often attempt to sleep at biologically difficult times, evidence suggests that they may employ sleep aids, particularly when stress at work makes it difficult to relax (Dorrian et al., 2011). Common sleep aids include prescription medication and alcohol (Richardson et al., 1989; Gold et al., 1992; Knauth and Hornberger, 2003; Dorrian et al., 2011).

Alcohol has sedative properties, and reduces the time taken to fall asleep (Roehrs and Roth, 2001). However, alcohol, particularly in larger doses, changes sleep composition, causing disruption later in the sleep period. Where sustained use of alcohol has led to tolerance, alcohol use may even lengthen time to sleep onset (Dorrian et al., 2014). The negative effects of alcohol are well known, and consumption above recommended levels (NHMRC, 2009) has been linked to more than 60 chronic illnesses (Dorrian, 2012). Therefore, while alcohol may be perceived as a strategy for assisting with shiftwork-related sleep difficulties, it may actually exacerbate sleep loss, and potentially further increase health and safety risk for shiftworkers.

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In a recent review of shiftwork, alcohol use and sleep (Dorrian et al., 2014), the following conclusions were drawn from the available literature:

- Shiftworkers report using alcohol as a sleep aid.
- As in the broader population, male shiftworkers are more likely to report higher rates of consumption.
- Average *amounts* of alcohol consumed are not higher in shiftworkers than dayworkers, rather, the *patterns* of alcohol use are different among shiftworkers.
- These patterns of alcohol use may be related to type, length and combination of shifts (and their interaction).

Indeed, findings from a large population-based study of Australian workers ($n=2090$) suggested that, controlling for gender, age, job demands, having a child, and work hour preference, shiftworkers exhibited a different pattern of alcohol consumption than their dayworking counterparts. That is, they had significantly reduced odds of drinking every (or nearly every) day, but increased odds of drinking to risky levels (Dorrian and Skinner, 2012). This is indicative of binge drinking (heavy periods of drinking followed by abstinence). A limitation of the population-based study was the lack of power to examine differences between workers on different types of non-standard schedules. Therefore, the aim of this study was to examine the alcohol intake of Australian shiftworkers on fixed and rotating shifts and to compare the results to the population-based study.

2. Methods

2.1. Participants

Participants ($n=131$) were recruited from six organisations, across four industries: printing, postal, nursing and oil and gas.

2.2. Procedure

Ethics approval was obtained from the University of South Australia Human Research Ethics Committee, and where required, from the ethics committees of the organisations.

Information sessions were held at participating organisations by members of the research team, except where the organisation specified that information be communicated via a representative within the organisation. Potential participants were provided with a study information sheet, questionnaire and reply paid envelope. Questionnaire return was indicative of consent. Overall, the questionnaire took 30–45 mins to complete.

2.3. Standard Shiftwork Index (SSI)

Participants completed a shortened version of the Standard Shiftwork Index, which has been widely used in shiftwork populations globally (Barton et al., 1995), for a review, the reader is directed to Tucker and Knowles (2008). The SSI included questions on age (y), gender (m/f), length of time in shiftwork (y), shift duration (h), total hours worked/week (h) and industry.

The SSI also measured schedule and shift start and finish times. From this information, participants in this study were classified into one of four shift schedules: permanent morning (e.g. 07:00–15:30h), permanent night (e.g. 21:00–07:30h), 8-h rotating (e.g. rotating between morning afternoon and night shift) and 12-h rotating (rotating between morning and night shifts).

Also as part of the SSI, participants recorded sleep duration, frequency of sleeping difficulties (5-point scale from 1 = almost never,

to 5 = almost always), and frequency of alcohol use to help with sleep (5-point scale from 1 = almost never, to 5 = almost always) between shifts of each type and on days off. In the analyses presented in this paper, sleep duration, difficulty sleeping, and alcohol use as a sleep aid, refers to reported averages between shifts (i.e. not including days off).

2.4. Assessment of alcohol intake – Cancer Council Dietary Questionnaire (CQES)

This study was part of a larger investigation of diet in shiftworkers. Alcohol intake was assessed using the Cancer Council Dietary Questionnaire for Epidemiological Studies (CQES) (Giles and Ireland, 1996). The CQES measures typical eating behaviour over a one-year period and is comprised of four sections. The final section asks participants to report on alcohol consumption. These include average glasses of alcohol (in standard drinks equivalent to 10 g alcohol per drink) per day, and maximum number consumed in a single 24-h period. Six types of alcohol are included (beer: low alcohol and full strength; wine: red, wine, fortified; and spirits/liqueurs) with 10 frequency categories to select from ranging from never to daily. Based on their CQES, interested participants requested analysis of their diet, which reported their energy and macronutrient intake relative to recommended levels.

2.5. Statistical analyses

CQES could not be analysed for eight participants, one participant did not work in printing, postal nursing, or oil and gas and four participants worked day shift. Therefore, 118 participants were included in analyses. Of the 11 variables, there were missing data on seven, with a total of 2.3% missing (one value for age, gender and total hours worked/week, three for difficulty sleeping, five for whether alcohol was used as a sleep aid, six for sleep duration and 13 for total hours worked/week). Missing values were not replaced, as reflected in degrees of freedom in the analyses. Univariate Analysis of Variance (ANOVA) was used to examine differences across shift type, and to test for differences between the sample from the current study, and a previously published population-based study of Australian workers (Dorrian and Skinner, 2012), in number of standard drinks consumed/week.

Multiple linear regressions were used to investigate sample-, work- and sleep-related predictors of alcohol consumption. Bivariate correlations were conducted to assess simple relationships between continuous/dichotomous variables and to check for violations of the assumption of multicollinearity. The strongest relationship was found between shiftwork history and age ($r=0.58$) – indicating no violations of this assumption. Regression models specified number of standard drinks/week, maximum drinks in a 24-h period, and alcohol use as a sleep aid, as dependent variables. Given the consistent relationship between gender, age and alcohol consumption in the literature (e.g. Dorrian and Skinner, 2012), gender and age were specified as predictor variables in block 1. Shiftwork history (y), hours of work/week (h), sleep duration (h) and difficulty sleeping (5-point scale), were specified at block 2. Multi-level categorical variables – shift type and industry – were dummy coded and entered as a single block (block 3). Given the strong relationship between these variables, shift type was entered in an initial model, and a second model, which substituted industry for shift type, was run for each dependent variable. For parsimony, final models present significant predictors only.

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