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Associations between alcohol outlet densities and adolescent alcohol consumption: A study in Australian students

B. Rowland [a,*], J.W. Toumbourou [a], L. Satyen [a], G. Tooley [a], J. Hall [a], M. Livingston [b,c], J. Williams [a,d,e]

[a] Department of Prevention Sciences, Centre for Mental Health and Wellbeing Research and School of Psychology, Deakin University, Victoria, Australia
[b] Drug Policy Modelling Program, National Drug and Alcohol Research Centre, University of New South Wales, Sydney, NSW 2052, Australia
[c] Centre for Alcohol Policy Research, Turning Point Alcohol and Drug Centre, 54-62 Gertrude Street, Fitzroy, VIC 3065, Australia
[d] Murdoch Children's Research Institute, The Royal Children's Hospital, Melbourne, Victoria, Australia
[e] Department of Paediatrics, The University of Melbourne, Parkville, Australia

HIGHLIGHTS

- Adolescent alcohol consumption is linked to an array of health and developmental problems.
- Understanding how alcohol is accessed may reduce early age use and improve healthy child development.
- We examined whether density of outlets is associated with adolescent alcohol consumption.
- We identified that a greater density is associated with an increased risk of alcohol consumption.
- Managing the number of alcohol outlets per area may be a method of reducing access and consumption.

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ABSTRACT

Objective: To assess whether the density of alcohol sales outlets in specific geographic communities is associated with adolescent alcohol consumption.
Method: A cross-sectional representative sample of secondary school students from Victoria, Australia (N = 10,143), aged between 12 and 17 years, self-reported on alcohol use in the last 30 days in 2009. The density of alcohol outlets per local community area was merged with this information.
Results: After controlling for risk factors, multilevel modelling (MLM) revealed a statistical interaction between age and density on alcohol consumption. While older adolescents had higher alcohol consumption, increases in the density of alcohol outlets were only significantly associated with increased risk of alcohol consumption for adolescents between the ages of 12 and 14.
Conclusion: Increased alcohol availability was associated with an increased risk of alcohol consumption specifically for early adolescents (12 and 14 years). Potential mechanisms as to how density is associated with direct and indirect alcohol availability, such as through parents or older siblings, need to be explored in future research.

1. Introduction

In Australia, the National Drinking Guidelines discourage children and adolescents from consuming alcohol under the age of 18, the legal age for purchasing alcohol (NHMRC, 2009). Despite this recommendation, 61% of Australian children aged between 12 and 17 have consumed alcohol (White & Smith, 2009). Further, Australian children have high rates of alcohol use relative to children in the United States (Toumbourou, Hemphill, McMorris, Catalano, & Patton, 2009) and consume alcohol at younger ages relative to children in Europe (Jonkman, Steketee, Toumbourou, Cini, & Williams, 2012). In many countries, adolescent consumption increases with age (AIHW, 2011; Johnston, O'Malley, Bachman, & Schulenberg, 2011).

The early uptake and consumption of alcohol by adolescents are associated with an array of poor physical, psychological, and psychosocial outcomes. These include greater risk of progressing to heavier adolescent alcohol use (Mason et al., 2011), poor academic outcomes (Koch & McGeary, 2005), greater risk of becoming dependent (Bonomo, Bowes, Coffey, Carlin, & Patton, 2004), problem drinking in adult life (McCambridge, McAlaney, & Rowe, 2011), and adverse mental and physical health in the adult years (Andreasson, Romelsjo, & Allebeck, 2006). Given these consequences, it behoves us to identify modifiable factors that may influence alcohol use by this population group.

* Corresponding author at: Deakin University, School of Psychology, Faculty of Health, 221 Burwood Highway, Burwood, VIC 3125, Australia. Tel.: +61 3 9244 3002.
E-mail address: bosco.rowland@deakin.edu.au (B. Rowland).

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A range of factors are known to increase the risk, or protect, an adolescent from using or taking up alcohol. Hawkins, Catalano, and Miller (1992) have organized these factors into domains at the community, school, family, peer and individual levels. While risk factors in each domain can be targeted as a means of changing alcohol-related behaviour, community influences may be particularly important factors affecting the supply of alcohol (Livingston, Chikritzhs, & Room, 2007), alcohol availability being a necessary precondition for its consumption.

Although research examining adolescents is lacking, cross-sectional and longitudinal studies in adults have shown strong evidence for an associations between the density of alcohol outlets and the levels of alcohol consumption and alcohol related harm (Gruenewald, 2007; Livingston et al., 2007; Stockwell & Gruenewald, 2004). Further evidence for this association comes from natural experiments, where alcohol related behaviour is measured in locations where alcohol outlets have increased or decreased in number due to changes in legislation (Babor et al., 2010).

In Australia, data gathered over 9 years (1996–2005) in the south-eastern state of Victoria, found that more relaxed alcohol policy regulations led to increased density of alcohol outlets within the community and that this was associated with both increased violence (Livingston, 2011) and an increase in the rate of physical assault (Livingston, 2008). Two Australian studies examining the relationship between outlet density and consumption, found significant associations between off-premise outlet densities and heavy episodic drinking in adults (Kavanagh et al., 2011; Livingston, Laslett, & Dietze, 2008).

The evidence linking density with adolescent consumption is gradually building. Studies in New Zealand and the USA have shown an association between density and the typical amount consumed, binge drinking, and the driving after drinking (Huckle, Huakau, Sweetsur, Huisman, & Casswell, 2008; Truong & Sturm, 2007). Further, recently, large national studies in Switzerland (Kuntsche, Kuendig, & Gmel, 2008) and the USA (Stanley, Henry, & Swaim, 2011) controlling statistically for "perceived availability", a proxy measure for the degree to which families and the community may be more permissive of adolescents consuming alcohol have been undertaken. These studies have shown significant associations between the density of alcohol outlets and adolescent consumption.

However, to date, no study has examined such associations with an Australian population. As the likelihood of adolescent consumption increases with age, it is possible that the association of density with consumption also differs by age. Further, as the availability of alcohol physically differs by venue type (i.e. packaged outlets vs. on-premises), it is likely that the association of consumption with density also differs by venue type. Using a representative sample of Australian secondary school children across the State of Victoria, in Australia, the present study examined these possibilities while controlling for a variety of risk factors known to influence adolescent alcohol consumption.

Variables controlled included demographic, socioeconomic and family factors, adolescent adjustment (indicated by tobacco use and mental health) peer risk factors, and perceived availability of alcohol. We hypothesised that a greater community density of alcohol outlets would be associated with a higher risk of adolescent alcohol consumption. Given that adolescents report different sources of alcohol supply at different ages (AIHW, 2011; White & Smith, 2009), we further hypothesised that density would have different effects for different adolescent age-groups.

2. Methods

2.1. Design

Data were collected in 2009 through the "HowRu" secondary student survey that was designed to provide representative epidemiological estimates of adolescent health and wellbeing indicators for all metropolitan local government communities and non-metropolitan regions across the state of Victoria (Department of Education & Early Childhood Development, 2009). The survey instrument was developed under the guidance of a steering committee convened by the State Government Department of Education and Early Childhood Development. The instrument was designed to provide data for key adolescent health and wellbeing indicators that could not be addressed through other sources of data.

Scales that had been validated in national and/or international studies for use in adolescents were chosen to address each indicator whenever possible. A two-stage cluster sample design was used to recruit students. In the first stage, schools were randomly selected based on a probability proportional to each community's grade-level size from a stratified sampling frame of all schools in Victoria (government, Catholic, and independent).

In the second stage of the data collection, whole classes in school years 7, 9 and 11 were chosen at random and tested. At the outset the study and survey procedures were approved through the Royal Children's Hospital Ethics Office. Following this, ethics approval was then sought from the all the education sectors (government schools, Catholic schools, and Independent schools). After this permission was sought from the principal from each school that was approached to participate in the study.

Prior to data collection, a letter was mailed directly to students and their parents describing the study, along with an information statement and a consent form. Passive consent was required from parents for student participation. On the day of the survey, students were informed of the survey purpose, content and implementation process. At that stage the students were given the option to "opt out" and "not participate". A plain language statement was provided at the start of the survey indicating that all information collected would be anonymous, and no school or individual would be reported or be able to be identified through the data or in any of the published findings.

Of the 13,501 eligible students, 10,242 (77.2%) consented and participated. The analysis sample for this paper (N = 10,143) included only those who were under the age of 18, the legal purchasing age for alcohol in Victoria. As there was only 19 individuals aged 11, these individuals were also excluded from the analysis. Community sampling was based on the school location within local government areas across metropolitan Melbourne. Outside Melbourne, sampling was based on Education Department Regions, reflecting the major community units responsible for youth services. The number of participants in each LGA/region ranged from 117 to 322 with a mean of 219 respondents.

2.2. Measures

2.2.1. Dependent variable, alcohol consumption and supply

Alcohol consumption in last 30 days was measured by asking adolescents: "In the past 30 days on how many occasions (if any) have you had more than just a few sips of an alcoholic beverage (like beer, wine, spirits or pre-mixed drinks such as Bacardi Breezers or UDL's)? "This is based on similar questions used extensively in national drug and alcohol surveys of youth (e.g., (Johnston et al., 2011; White & Smith, 2009). For adolescent's, the measure of last 30 days, is a strong predictor of heavy alcohol use in the future for adolescents (McCambridge et al., 2011). It is also a measure that is commonly used in adolescent alcohol prevalence studies (Johnston, O'Malley, Bachman, & Schulenberg, 2011). Response options were "*Never*" (i.e. no current use), 1–2 times, 3–5 times, 6–9 times, 10–19 times, 20–29 times, 30 39 times and 40+ times. Responses were coded into a binary variable —"no", for never used alcohol in the last 30 days; "yes", for all other options.

Adolescents were also asked if they had ever consumed more than a few sips of alcohol in the last 12 months. Those who reported to have consumed more than a few sips of alcohol in the last 12 months were then asked how they got their last alcoholic drink. The options were "they bought the alcohol", or "whether someone else bought or supplied