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BRIEF REPORT

Proximity to Liquor Stores and Adolescent Alcohol Intake: A Prospective Study

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Introduction: Cross-sectional studies have reported associations between liquor store availability and alcohol use among adolescents, but few prospective studies have confirmed this association. The aim of this study was to examine whether proximity to liquor stores at age 14 years was associated with alcohol intake at ages 14, 17, and 20 years.

Methods: Participants of the Western Australian Pregnancy Cohort (Raine) Study (n=999) self-reported alcohol intake at age 14 years (early adolescence, 2003–2005); age 17 years (middle adolescence, 2006–2008); and age 20 years (late adolescence, 2009–2011). A GIS measured proximity to the closest liquor store from participants' home and school addresses at age 14 years. Regression analyses in 2017 assessed the relationship between distance to the closest liquor store around home, school, or both (≤800 m versus >800 m) and alcohol intake.

Results: In cross-sectional analyses (age 14 years), having a liquor store within 800 m of school was associated with ever having part of an alcoholic drink (OR=2.34, p=0.003). Also, having a liquor store within 800 m of home or school was associated with ever having part of an alcoholic drink (OR=1.49, p=0.029) and ever having engaged in heavy drinking (OR=1.79, p=0.023). In prospective analyses, liquor store proximity at age 14 years was a significant predictor of alcohol intake at age 17 years (OR=2.34, p=0.032) but not at age 20 years.

Conclusions: Liquor store availability in early adolescence may be a risk factor for alcohol intake in early and middle, but not late, adolescence. Improved understanding of the longer-term impacts of liquor store exposure on sensitive populations could help inform future licensing regulations.
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INTRODUCTION

Underage drinking is a major public health issue for many countries.[1] In the U.S., United Kingdom, and Australia, around 20%–30% of secondary school students regularly consume alcohol and drinking to get wasted is perceived as integral to social life.[2–7] Numerous negative health and social consequences are associated with underage drinking, including drug use, aggression and violence, unprotected sex, trouble in school or with the police, and increased risk of injuries and suicide.[8–10] Moreover, the age at which young people start regular drinking is predictive of adult drinking and alcohol-related problems later in life.[11] Accumulating evidence from neurologic research about the impact of adolescent drinking on impaired brain development[12] further adds to the compelling need to identify influencing factors amenable to intervention.

Understanding how liquor store availability impacts underage drinking is an important research avenue as governments can regulate the location and density of liquor stores. International research shows adults living in neighborhoods with greater availability of liquor stores have higher alcohol intakes.[13–16] Plausibly, the impact of widespread alcohol availability on adolescents may be more pronounced, given their receptivity to alcohol

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Table 1. Characteristics of Sample

Characteristic	Early adolescence, 14 years, *n* (%) (*n*=999)	Middle adolescence, 17 years, *n* (%) (*n*=648)	Late adolescence, 20 years, *n* (%) (*n*=696)
Gender			
Female	500 (50.1)	335 (51.7)	360 (51.7)
Male	499 (49.9)	313 (48.3)	336 (48.3)
Family income at 14 years			
<$35,000	222 (23.4)	122 (19.7)	123 (18.5)
$35,001–$50,000	148 (15.6)	90 (14.5)	97 (14.6)
$50,001–$78,000	268 (28.2)	182 (29.4)	199 (30.0)
$78,001–$104,000	145 (15.3)	103 (16.6)	116 (17.5)
≥$104,001	166 (17.5)	123 (19.8)	129 (19.4)
Alcohol consumption			
Ever had part of an alcoholic drink			
Yes	800 (80.1)	616 (95.2)	
No	199 (19.9)	31 (4.8)	
Had an alcoholic drink in the past 12 months			
Yes	595 (59.6)	586 (90.4)	
No	389 (38.9)	62 (9.6)	
Been drunk in the last 6 months			
Yes	113 (11.5)	441 (68.7)	
No	868 (88.5)	201 (31.3)	
Ever engaged in heavy drinking			
Yes	76 (7.7)	395 (61.5)	
No	908 (92.3)	247 (38.5)	
Alcohol consumption (g ethanol/day), M (SD)			696 (17.6, 18.6)
Distance to closest liquor store at 14 years			
From home			
≤800 m	240 (24.0)		
>800 m	759 (76.0)		
From school			
≤800 m	155 (15.5)		
>800 m	844 (84.5)		
Has a liquor store within 800 m of home or school			
Yes	346 (34.6)		
No	653 (65.4)		

normalization, and the importance of proximate access for an age group with limited mobility. Indeed emerging evidence suggests liquor store availability impacts adolescent drinking.[17] However, most studies are cross-sectional, and few measure individual-level liquor store exposure around the home and school or measure an aspect of availability other than density. Therefore, this study aims to examine liquor store proximity around home and school at age 14 years and its association with alcohol intake at ages 14, 17, and 20 years.

METHODS

Study Sample

Participants were from the Western Australian Pregnancy Cohort (Raine) Study (88% Caucasian)[18]; resided in Perth; and self-reported alcohol intake in early adolescence (age 14 years, 2003–2005, *n*=999), middle adolescence (age 17 years, 2006–2008, *n*=648), and late adolescence (age 20 years, 2009–2011, *n*=696). The following ethics committees provided approval: Princess Margaret Hospital, King Edward Memorial Hospital, the University of Western Australia.

Measures

Self-reported alcohol intake at ages 14 and 17 years used the binary items: *Have you ever had even part of an alcoholic drink?* (age 14 years only); *Have you had an alcoholic drink in the past 12 months? Have you been drunk anytime in the last 6 months? Have you ever drunk 6 or more alcoholic drinks at one time or drunk so much alcohol that you threw up (vomited)?* (heavy drinking measure). Self-reported alcohol intake (grams of ethanol/day) at age 20 years was assessed by the Cancer Council of Victoria.[19] (Note: selling or supplying alcohol to anyone aged <18 years on licensed premises is illegal in Western Australia.[20])