

Research Article

Binge Drinking among 12-to-14-Year-Old Canadians: Findings from a Population-Based Study

Esme Fuller-Thomson,¹ Tamara Grundland,¹ Matthew P. Sheridan,² and Cathy Sorichetti¹

¹ Factor-Inwentash Faculty of Social Work, University of Toronto, 246 Bloor Street West, Toronto, ON, Canada M5S 1A1

² Kinark Child and Family Services, Suite 200, 500 Hood Road, Markham, ON, Canada L3R 9Z3

Correspondence should be addressed to Esme Fuller-Thomson; esme.fuller.thomson@utoronto.ca

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Purpose. This study's objective is to document which factors are associated with binge drinking behaviour in a population-based sample of Canadian youth aged 12 to 14. Middle school is a key period in which binge drinking behaviour is initiated. Binge drinking is an important risk factor for alcohol-related injuries, accidental death, unsafe sexual behaviour, and substance abuse problems. Understanding the drinking patterns of this population can serve to better inform prevention programs and interventions targeted to middle school youth. *Methods.* This study was based on a secondary analysis of a regionally representative community-based sample drawn from the 2005 Canadian Community Health Survey (CCHS) cycle 3.1. Crude and adjusted logistic regression analyses of binge drinking were conducted using the 6,172 respondents aged 12 to 14 in the sample. *Results.* Approximately one in every twenty-five 12-to-14-year-olds had binged in the past year. The odds of binge drinking were higher among Whites, poorer adolescents, those with several chronic health conditions, and those with mood disorders. Neither sex, immigrant status, nor self-rated health was significantly associated with binge drinking in either the adjusted or the unadjusted analyses. *Conclusions.* These findings underline the importance of binge drinking as a public health issue for middle school adolescents.

1. Introduction

Although purchasing and drinking alcohol while underage is illegal, 30% of eighth grade students have consumed alcohol [1]. Of particular concern are the minority of middle schoolers who binge drink. Binge drinking is defined as consuming five or more drinks on one occasion. One study suggests that 8% of seventh grade and 17% of eighth grade adolescents have engaged in binge drinking [2]. In a US national study investigating the relationship between age of onset of alcohol consumption and long term alcohol abuse, 40% of those who identified themselves as alcohol dependent at some point in their lives reported initiating their first drink at the age of 14 or younger [3].

Binge drinking almost always results in intoxication and, unlike having a single or infrequent drink, has distinct health and psychological risks [4]. The binge drinking activities of older adolescents and the corresponding adverse effects have

been well documented [5–11]. Less research has focused on factors associated with binge among younger adolescents, aged 12–14.

Binge drinking has been linked to problem behaviours and negative outcomes. Middle school and adolescent binge drinkers are susceptible to alcohol related injuries and deaths brought on by alcohol poisoning and choking on one's vomit [12]. There is also a greater likelihood for binge-drinking youth to be involved in physical fighting [13]. Binge drinking among adolescents can lead to unsafe sexual behaviour including being drunk during intercourse, initiation of sex at an earlier age, a greater number of sexual partners, and increased incidence of unprotected sex [14]. Young women who binge drink are particularly vulnerable to sexual victimization, teen pregnancy, and teen parenting [15].

Binge drinking can also make youth susceptible to numerous negative long term consequences. Previous research has

revealed that alcohol related experiences in middle school can be strong precursors for adverse outcomes, including greater rates of binge drinking in high school and harmful lifelong drinking patterns [2, 3]. By mid to late adolescence, binge drinkers have higher rates of driving while under the influence of alcohol and corresponding alcohol-related accidents [16]. While there is no conclusive evidence linking binge drinking and school drop-out, studies have shown that heavy drinking in adolescence can negatively affect academic performance in high school students and decreases the probability of graduating in the appropriate amount of time [17–20].

Research suggests that early drinking initiation is closely tied to subsequent alcohol abuse and problem behaviours in later adolescence, including alcohol related violence and absenteeism from school or work [16]. Early binge drinking can lead to much higher rates of illicit drug use than nonbingers. Moreover, binge drinking can put young adolescents at risk for cognitive impairments and permanent brain damage [21]. Alcohol misuse and binge drinking have been linked to suicidal behaviour, with young binge drinkers shown to have higher susceptibility than older binge drinkers [19, 22].

There are several hypotheses that inform our understanding of why middle school students initiate binge drinking. Children and adolescents are legally restricted from purchasing alcohol and, as a result, it is less available to them. They may therefore be more likely to binge drink when they are able to access alcohol [4]. Alcohol consumption is embedded in the social context. Peer drinking behaviours strongly influence heavy drinking in young adolescents [23–25]. Youth transitioning from elementary to middle school are confronted by new and unfamiliar physical and social environments. Alcohol and binge drinking can be used as a coping strategy as youth begin to navigate through a new life stage [2]. Drinking may become a form of self-medication to alleviate life stressors or to deal with ongoing psychiatric illnesses such as depression and anxiety [4]. Binge drinking may also manifest in individuals who are distressed or suicidal, as an expression of self-harm [26].

Although later adolescent and adult drinking patterns show males as having a higher propensity to drink than females, girls of age 12–14 are more likely to binge drink at the same rate as their male counterparts [19, 27]. White youth binge drink more than non-White youth [1]. A relationship has been established between family poverty and risky health behaviours, including heavier levels of drinking [28]. More acculturated immigrant youth have higher rates of binge drinking than their less acculturated peers, mediated by the process of acculturation [29, 30]. Binge drinking in early adolescence is an underresearched topic and represents a major public health issue that demands greater attention from researchers, policy makers, human service agencies, and health care providers. Previous research has focused primarily on older adolescents rather than those in middle school (e.g., [5–7, 9, 11, 13, 17, 18, 23, 24]). Among those studies examining binge drinking among middle schoolers, the majority are from the USA (e.g., [2, 4, 8, 14, 25]). With most research in this area focusing on drinking patterns of

older adolescents, largely in the American context, this study's objective is to fill a significant gap in the literature through documenting which factors are associated with binge drinking behaviour in a population-based sample of Canadian youth aged 12–14. Understanding the drinking patterns of this population can serve to better inform prevention programs and interventions targeted to middle school youth.

2. Materials and Methods

2.1. Data Source and Sample. The data were drawn from the Public Use Microdata File of the 2005 Canadian Community Health Survey (CCHS) cycle 3.1. The CCHS 3.1 is a representative, community-based survey of health and health behaviors conducted by Statistics Canada [31]. The CCHS's target population was persons aged 12 years and older who are living in private dwellings, excluding those who were living in institutions or certain remote regions, and those residing on Indian reservations. The CCHS used a multistage, stratified cluster design. The response rate was 78.9%. Our subsample was restricted to the 6,172 respondents aged 12 to 14. Of these, 285 reported binge drinking in the last year (males $n = 138$, females $n = 147$). In total, 445 (7.2%) were missing data on one or more of the variables included in the fully adjusted logistic regression, resulting in a final sample size of 5,727.

2.2. Data Analysis. Using the CCHS subsample of respondents aged 12 to 14, discussed above, the gender-specific prevalence of binge drinking at least once per year was calculated. Next, a series of logistic regression models of binge drinking were run to estimate the unadjusted odds (i.e., crude odds) of binge drinking for each of the following 10 factors: 4 sociodemographic characteristics (i.e., sex, race, immigrant status, and household income), 3 health characteristics (self-reported health status, number of chronic physical health conditions, and limitations in activities of daily living), physical activity level, and 2 mental health conditions (anxiety disorders and/or mood disorders). Lastly, a multivariate logistic regression of binge drinking including all the above factors was calculated. Due to the complex sampling design of the CCHS, all prevalence data, odds ratios, P values, and confidence intervals reported were weighted to adjust for the probability of selection and nonresponse. Sample sizes were reported in their unweighted form.

2.3. Measures

2.3.1. Binge Drinking. Respondents were identified as binge drinkers if they reported that, at least one time in the past 12 months, they had 5 or more drinks on one occasion. The interviewers told the respondents “When we use the word drink it means: one bottle or can of beer or a glass of draft, one glass of wine or a wine cooler, one drink or cocktail with 1 and a 1/2 ounces of liquor.”

2.3.2. Demographic Characteristics. In addition to gender, the following demographic characteristics were also investigated among respondents: (1) self-reported race (classified as

White versus non-White), (2) immigrant status (immigrant versus born in Canada), and (3) household income ($\leq 29,999$, $\$30,000-49,999$, $\geq \$50,000$, and missing data).

2.3.3. Health Characteristics. Three health characteristics were investigated: self-reported health status was based on individual's response when asked "In general, would you say your health is excellent, very good, good, fair, poor." Response categories were dichotomized into excellent, very good, or good, versus fair or poor. Self-reported number of chronic conditions diagnosed by a health professional was categorized into 0, 1 or 2, and 3 or more. A wide range of chronic physical health conditions were investigated including migraine, asthma, back pain, diabetes, epilepsy, cancer, ulcers, chronic fatigue, and arthritis. Limitations in activities of daily living (ADL) were based upon the response to two questions: "Because of any physical condition or mental condition or health problem, do you need the help of another person: (1) with personal care such as washing, dressing, eating or taking medication? Or (2) with moving about inside the house?" Those who reported yes to one or both of these questions were classified as having an ADL limitation.

2.3.4. Recreational Physical Activity Level. Individuals were defined as "active" if they spent a sum total of at least 3 kcal/kg/day on any combination of 22 recreational activities including soccer, swimming, gardening, or yard work. Individuals were defined as "moderately active" if they spent at least 1.5 but less than 3 kcal/kg/day, or "inactive" if they spent expended less than 1.5 kcal/kg/day.

2.3.5. Mental Health. In the section asking about a wide range of chronic conditions, respondents were asked if they had "long-term conditions which are expected to last or have already lasted 6 months or more and that have been diagnosed by a health professional." In the list, questions were asked if they had been diagnosed with "a *mood disorder* such as depression, bipolar disorder, mania or dysthymia?" and "an *anxiety disorder* such as a phobia, obsessive compulsive disorder or a panic disorder."

3. Results

Approximately one in every twenty-five respondents aged 12 to 14 had binged in the past year. Boys and girls were equally likely to be binge drinkers (4.2% versus 4.5%, resp.; $P = 0.63$).

Whites had 74% higher odds of binge drinking in the unadjusted analyses and 88% higher odds in the fully adjusted analyses than non-Whites (see Table 1). In comparison to those middle schoolers from households with income above \$50,000, those from households with incomes under \$30,000 had 69% higher odds of binge drinking in the unadjusted analyses and 92% higher odds in the fully adjusted logistic regression. In both analyses, those whose income was between \$30,000 and \$50,000 had approximately 60% higher odds of binge drinking than individuals in the \$50,000+ income bracket. In both the unadjusted and fully adjusted

logistic regression analyses, those with one or two chronic conditions had approximately 70% higher odds of binge drinking, and those with three or more chronic conditions had more than twice the odds of binge drinking in comparison to those with no chronic physical health conditions. In both analyses, those classified as active and those classified as inactive had approximately 50% higher odds of binge drinking in comparison to those who were classified as "moderately active."

In the unadjusted analysis, those with mood disorders had four times the odds of binge drinking in comparison to those without mood disorders. After adjustment for the other characteristics, this odds ratio declined to three. The crude odds ratio of binge drinking for those with anxiety disorders was twice that of those without anxiety disorders. However, after accounting for mood disorders and all the other examined characteristics, anxiety disorders no longer remained statistically significant in the fully adjusted analysis. ADL limitations were not significantly associated with binge drinking in the unadjusted analyses but reached significance in the fully adjusted analyses.

Neither sex, immigrant status, nor self-rated health was significantly associated with binge drinking in either the adjusted or the unadjusted analyses.

4. Discussion

Approximately one in twenty-five Canadians aged 12 to 14 had consumed at least five alcoholic drinks on one occasion in the preceding year. The analyses of Canadian middle schoolers suggest that Whites, those from lower income households, those with more chronic conditions, and those with mood disorders, were more likely to binge drink. Anxiety disorders were significantly associated with binge drinking in the unadjusted analyses, but this relationship was reduced to insignificance once mood disorders and other characteristics were accounted for in the analyses. Our findings suggesting that non-Whites binge drink less than White young teens is in keeping with a recent study of the 6th through 10th graders, which concluded that black youth reported binge drinking five times less than White youth [32]. Our finding that youth with lower family incomes were more likely to engage in binge drinking mirrors a study of eighth grade students that examined another measure of socioeconomic status, parental education.

Pain has been correlated with alcohol abuse in both adolescents and older adults. Research proposes that alcohol use may in some cases be used to self-medicate when feeling physical pain [33, 34]. Although this study did not have a measure of pain, it is possible that the association we found between number of chronic conditions and limitations in ADL and binge drinking may be partially mediated by pain and "self-medication."

With three times the odds of binge drinking among those with mood disorders, it appears that mental health is an important factor to consider in targeting outreach for binge drinking prevention and cessation programs. Unfortunately, the direction of the association between depression and

TABLE 1: Unadjusted and adjusted odds ratio of binge drinking at least once in past 12 months among 12-to-14-year-olds.

	Unadjusted odds (<i>n</i> = 6,172)		<i>P</i> value	Fully adjusted odds (<i>n</i> = 5727)		<i>P</i> value
	OR	95% CI		OR	95% CI	
Sex						
Male	1.00	Referent		1.00	Referent	
Female	1.07	(0.83, 1.37)	<0.001	1.06	(0.82, 1.37)	0.65
Race						
White	1.74	(1.21, 2.52)	0.003	1.88	(1.26, 2.80)	0.002
Non-White	1.00	Referent		1.00	Referent	
Immigrant						
No	1.73	(0.98, 3.07)	0.06	1.25	(0.68, 2.30)	0.48
Yes	1.00	Referent		1.00	Referent	
Household income						
Missing data	1.30	(0.92, 1.83)	0.13	1.37	(0.96, 1.95)	0.08
<\$29,999	1.69	(1.19, 2.41)	0.004	1.92	(1.33, 2.76)	<0.001
\$30,000–\$49,999	1.66	(1.18, 2.33)	0.004	1.62	(1.14, 2.31)	0.007
≥\$50,000	1.00	Referent		1.00	Referent	
Self-rated health						
Good to excellent	0.88	(0.48, 1.60)	0.67	1.12	(0.60, 2.08)	0.73
Poor to fair	1.00	Referent		1.00	Referent	
Chronic health conditions						
0	1.00	Referent		1.00	Referent	
1 or 2	1.74	(1.31, 2.31)	<0.001	1.70	(1.27, 2.28)	<0.001
3 or more	2.75	(1.70, 4.45)	<0.001	2.41	(1.44, 4.02)	0.001
ADL ¹ limitations						
Yes	1.68	(0.66, 4.26)	0.27	3.42	(1.20, 9.70)	0.02
No	1.00	Referent		1.00	Referent	
Recreational physical activity level						
Active	1.52	(1.08, 2.14)	0.02	1.48	(1.04, 2.11)	0.03
Moderate	1.00	Referent		1.00	Referent	
Inactive	1.53	(1.04, 2.24)	0.03	1.58	(1.07, 2.34)	0.02
Mood disorder						
No	1.00	Referent		1.00	Referent	
Yes	4.13	(2.27, 7.55)	<0.001	3.12	(1.54, 6.32)	0.002
Anxiety disorder						
No	1.00	Referent		1.00	Referent	
Yes	2.28	(1.17, 4.46)	0.02	0.92	(0.41, 2.10)	0.85

¹ADL: activities of daily living.

Source: Canadian Community Health Survey cycle 3.1.

binge drinking is not clear in this cross-sectional data set. It may be that depressed young adolescents turn to drinking. Alternatively, it may be that binge drinking causes a cascade of problems in the youth's life which subsequently promotes depression.

Interestingly, this study did not uncover a discrepancy between the prevalence of binge drinking in males and females. In contrast, a recent study of youth aged 15–17 indicated that 16.0% of males were binge drinking regularly compared to 10.9% of females. Among adults, binge drinking among men is close to three times more prevalent than in women [35]. A possible explanation of the finding of a similar prevalence of binge drinking in middle school adolescents of both sexes may be connected to the dating

behaviours of youth. In particular, middle school girls are more likely than their male peers to date older individuals [36]. Thus, middle school girls may be dating older boys who binge drink. Research suggests that negative partner behaviour contributes to female delinquency [37]. Of additional concern, research suggests that girls with early alcohol initiation are more likely to report multiple sexual partners, unprotected sex, being high or drunk during intercourse, and pregnancy [14].

A recent review of experimentally evaluated interventions to prevent and/or combat substance abuse among adolescents suggests the importance of several elements which seem to be associated with the success of these programs: (1) the use of an ecological perspective focused on the individual

as well as diverse aspects of their environment including their school, family, community, and the wider media; (2) the value of addressing both alcohol and drug and tobacco in combination; (3) the provision of information on the health consequences of alcohol and other substance abuse; (4) modification of programs to address the needs of specific populations, based on characteristics such as developmental age and gender [38].

We will describe several promising intervention studies that focus on reducing binge drinking behaviors among middle schoolers. One study implemented a Life Skills Training approach with middle school, inner city, and minority youth. The intervention resulted in a 50% lower rate of binge drinking at 1- and 2-year followup in comparison to the control group [39].

Project Northland, a three-year intervention aimed at grades six, seven, and eight students in northeast Minnesota, involved curricula to address behaviour, peer participation, and task force activities involving the community. At the end of eighth grade the intervention group reported significantly lower percentages of students who reported alcohol use in the past month, 23.6% versus 29.2%, respectively. Past week results also yielded significant results with 10.5% of the intervention group reporting having used alcohol as compared to 14.8% of students in the nonintervention group [40].

Environmental strategies that show promise include a study intended to reduce the supply of alcohol to underage drinkers by educating parents about the risks of supplying alcohol to teenagers. The prevalence of underage drinking was reduced in the districts where the campaign occurred [41]. This type of intervention would be highly appropriate given that the family home is a common source of alcohol supply to young teens [42].

Additionally, in a pilot program conducted in New Hampshire by the Concord Police Department and the New Hampshire Liquor Commission in 2002–2004, enhanced penalty enforcement for licensed liquor sellers resulted in a 64% reduction in sales to minors and contributed to a temporary decline in binge drinking and alcohol use among high school students. This substantial and significant reduction in sales to minors contrasted favorably with the very limited and nonsignificant decline evident in other areas of the same state without the enhanced enforcement initiative [43].

This study has several limitations. Unfortunately, the CCHS lacked information on parental, school, and environmental characteristics that are known risk factors for middle school binge drinking. Higher levels of communication within the family and parental use of reasoning and explaining are associated with lower binge drinking rates [2]. Harsh and inconsistent discipline styles are predictors of problem drinking among middle school students [24, 43, 44], and moderate levels of parental control and supervision are associated with lower rates of binge drinking [2]. Other known factors for binge drinking in adolescence which we could not address in this study include parental alcoholism, social alienation [5, 7, 45], and negative peer influences, as well as the availability of alcohol in the adolescent's

community [46]. Future research on the topic would benefit from the inclusion of these important factors.

5. Conclusions

Approximately 4% of Canadians aged 12 to 14 had consumed at least five alcoholic drinks on one occasion in the preceding year. Whites, those from lower income households, those with more chronic conditions, and those with mood disorders, were more likely to binge drink. These findings underline the importance of binge drinking as an urgent public health issue for middle school adolescents. Greater attention to binge drinking in this population is needed from researchers, policy makers, health care providers, educators, and parents.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

Implications and Contribution

This study's findings indicate that one in 25 Canadians aged 12–14 binge drink. Middle school binge drinkers are more likely to be White and poor and to have chronic conditions and mood disorders. Binge drinking is clearly an urgent public health issue among middle school adolescents.

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