

A cross-sectional analysis examining the association between dieting behaviours and alcohol use among secondary school students in the COMPASS study

Karen A. Patte, Scott T. Leatherdale

School of Public Health and Health Systems, University of Waterloo, 200 University Avenue, Waterloo, ON, Canada N2L 3G1
Address correspondence to Karen A. Patte, E-mail: kpatte@uwaterloo.ca

ABSTRACT

Background Unhealthy weight-control methods and problematic alcohol use appear linked, with individuals engaging in both behaviours at greater risk of adverse consequences. Most studies have been conducted among females and young adults, yet both dieting and binge drinking emerge at earlier stages of development. Moreover, gender differences are likely due to contrasting body ideals. This study investigated the co-occurrence of dieting and alcohol use among youth, focusing on varying weight goals in males and females, and meal skipping, as a form of food restriction.

Methods Cross-sectional analyses were conducted in sample of 44 861 Grade 9–12 students from Year 2 (2013–14) of the COMPASS study.

Results and conclusions The majority of females were trying to lose weight, while males tended to report efforts to gain and these two groups demonstrated the highest odds of alcohol use and binge drinking. Breakfast and lunch skipping predicted binge drinking and alcohol use in females, but only the former was related to drinking behaviour in males. Breakfast skipping rarely occurred for weight loss purposes, although more females reported this reason for missing meals than males. Results support hypothesized gender variations in weight goals and meal skipping, and differing associations with drinking behaviour.

Keywords alcohol, body image, dieting, drunkorexia, gender, Youth

Introduction

Dieting may reflect a largely overlooked correlate of adolescent risk behaviours, and indicator of future health-compromising patterns, such as problematic alcohol use (i.e. high-risk drinking or binge drinking). Several studies have documented the high co-morbidity of eating disorders and substance abuse, and the association appears to extend in a step-wise manner to sub-threshold levels of weight-control and drinking behaviours,^{1,2} with worse outcomes among individuals exhibiting both conditions.^{3,4} Studies of college-aged women suggest that dieting behaviours predict the frequency and intensity of alcohol use, potentially better than some commonly cited indicators (e.g. depression, parental drinking, early-onset drinking).¹ Despite pervasive dieting and alcohol use during the secondary school years,^{5,6} only a handful of studies have examined the co-occurrence of these behaviours among youth.^{7–9}

Various theories have been proposed to account for the suggested link between food restriction and binge drinking. For instance, some dietary changes may result from the adverse consequences of intoxication (e.g. nausea). Alternatively, the association may reflect shared risk factors. Alcohol abuse and disordered eating have overlapping genetic predispositions, and links to emotional distress, abuse/trauma and impulsivity.^{4,10,11} According to self-medication theories, both problematic eating and alcohol use may serve as coping mechanisms for negative affect.^{7,12} On the other hand, some researchers have cited social conformity theories, where these behaviours reflect

Karen A. Patte, Post-doctoral Fellow

Scott T. Leatherdale, Associate Professor, CIHR-PHAC Chair in Applied Public Health Research

efforts to meet conflicting pressures from peers to both drink and maintain a desired body shape.^{7,13,14}

Relatedly, an alarming trend has been recognized among college students to purposefully restrict food prior to anticipated drinking episodes, as a means to prevent weight gain from alcohol calories or to magnify intoxicating effects.^{13,15–18} The colloquial term ‘drunkorexia’ was coined by the media and popular literature to describe the concept and has since appeared in a number of scholarly publications,^{13,14} although its appropriateness is debated.¹⁹ Prevalence estimates of this phenomena vary greatly, likely due to inconsistent definitions.¹⁹ Among undergraduate samples, from 13 to 79% of students reportedly restrict food in order to ‘save’ calories for alcohol or become intoxicated faster.^{13,15–18}

To date, research on so-called ‘drunkorexia’ has been conducted among university students, yet both dieting and binge drinking emerge at much earlier stages of development. Sub-threshold disordered eating is widespread among youth.⁵ For instance, in a population-based adolescent sample, 57% of girls and 33% of boys were using weight-control methods considered to be unhealthy.⁵ These behaviours demand further study as youth engaging in them have a greater risk of progressing to extreme methods of disordered eating and experiencing poor health outcomes.^{5,8,20}

Alcohol use is similarly prevalent among adolescents, and escalates over the secondary school years.^{6,21} In the COMPASS study, binge drinking was reported by 1/4 of students, rising to 37.1% by Grade 12.²¹ Alcohol is associated with the leading causes of death and serious injury (motor vehicle accidents, suicide) among adolescents, and recent evidence suggests excessive consumption at this age can hinder brain development.⁶ Food deprivation compounds these risks. Women who restrict calories are more likely to report alcohol-related blackouts and injuries, driving while inebriated, and unprotected and unintended sexual activity, compared with non-dieting female drinkers^{1,15,22}; whereas, food restriction among males was associated with physical fights while drinking.¹⁵

As meal skipping and other dieting behaviours are more common among females,^{5,8} they may be more likely to restrict food out of concern for the calories in alcohol. Studies among university students support this hypothesis.^{13,17} In fact, Roosen and Mills¹⁸ found males tended to consume *extra* food prior to planned alcohol consumption, with the aim of preventing sickness or hangovers. Gender differences in body ideals may account for the discrepancy. In general, research on male dieting and body image is relatively scarce, despite evidence of prevalent shape concerns and use of unhealthy weight-control methods.^{5,23}

Theories on the development of dieting behaviours in relation to alcohol use remain speculative, at best. Based

on concerning findings witnessed in university student samples,^{1,15,22} further study of this relationship in younger populations is necessary to inform prevention and early intervention efforts. However, related research has predominantly been conducted among females, young adults, and/or clinical samples. The purpose of this paper is to use data from a large school-based host study that includes measures of alcohol use and eating/dieting behaviours of youth (the COMPASS study) to examine gender differences in weight goals, meal skipping and alcohol use, and to inform a planned follow-up longitudinal study of their temporal relationship moving forward.

Methods

Design

COMPASS is a cohort study designed to collect hierarchical longitudinal data from a sample of secondary school students (Grades 9–12) and the schools they attend in Ontario and Alberta, Canada.²⁴ The current study utilized cross-sectional student-level data from Year 2 (2013–14) of the COMPASS host study. A full description of the COMPASS host study methods is available in print²⁵ or online (www.compass.uwaterloo.ca).

Participants

In Year 2, 79 Ontario and 10 Alberta schools were purposefully recruited because they permitted the use of active-information passive-consent parental permission protocols²⁴; this approach is critical for collecting robust data within studies examining substance use among youth.²⁶ Students could decline to participate at any time. A total of 57 229 students were enrolled, with 79.15% ($n = 45\,298$) of eligible students completing the questionnaire during the scheduled data collection, 1.2% of respondents missing because of parental refusal, and the remainder due to absenteeism, classroom spares or student refusal. An additional 437 students were removed due to missing data on gender, resulting in a final sample of 44 861.

Data collection tool

The student-level questionnaire for COMPASS (Cq) collects individual student data pertaining to multiple behavioural domains (e.g. substance use, obesity, physical activity, diet etc.), correlates of the behaviours, and demographic characteristics. In each school, the Cq was used to collect whole-school samples during class time. The Cq items were based on national standards or current public health guidelines as described elsewhere.²⁴

Measures

Alcohol use variables

To measure the *frequency of alcohol use* respondents were asked, 'In the last 12 months, how often did you have a drink of alcohol that was more than just a sip?' Responses were recoded to classify participants as 'rare or non-drinkers' if they reported drinking less than once a month, and 'regular drinkers' if they drank at least once a month. *Binge drinking* was assessed by asking participants, 'In the last 12 months, how often did you have five or more drinks of alcohol on one occasion?', with students who reported doing so at least once a month considered to regularly binge drink. While the available Cq measure does not align with the low-risk drinking guideline for binge drinking among females,²⁵ the student-level measure of current binge drinking (past 30 days) used in this manuscript is consistent with previous research^{24,27} and national surveillance tools for youth populations.²⁸

Dieting variables

Meal skipping was included as a specific form of dieting behaviour. Participants were asked how many breakfasts and lunches they consumed in a week. Regularly skipping breakfast was considered missing it three times a week or more, and likewise for lunch, consistent with past research.²⁹ If participants missed breakfast, they were asked to indicate the reasons for missing it, with 'I'm trying to lose weight' as one of the options provided, in order to determine if the behaviour was intended as a dieting strategy.

Weight goal was assessed by the question, 'which of the following are you trying to do about your weight?' The following possible responses were provided: 'lose weight', 'gain weight', 'stay the same weight', and 'I am not trying to do anything about my weight'.

Covariates

Covariates measures included grade (9–12), ethnicity (recoded as White, off-reserve Aboriginal and other/mixed/missing), cigarette smoking status (recoded as current, former and never), and weight status [i.e. body mass index (BMI; kg/m²) category based on reported height and weight and adjusted for age and sex³⁰]. Age was not included due to the correlation with grade, and school-based planning is done by grade.

Analyses

Frequency statistics and χ^2 analyses of all measures were examined by gender. Separate logistic regression analyses were performed in males and females to test weight goals and the meal skipping variables as predictors of alcohol use and binge drinking, with the addition of the covariates as potential

confounders. Statistical significance was set at $\alpha = 0.01$ because of the large sample size. Analyses were performed using SPSS version 23.

Results

Descriptive statistics are presented by gender in Table 1. Over half (56.1%) of females were trying to lose weight; whereas, males were more likely to report trying to gain (31.9%) or not trying to do anything about their weight (26.0%). Similarly, a larger proportion of females regularly skipped breakfast (44.3%) and lunch (16.3%) in comparison to males (36.8 and 14.8%, respectively). Lack of time was the most frequent reason provided for missing breakfast in both males (24.2%) and females (34.6%), followed by not feeling hungry in the morning. Few participants indicated skipping breakfast because they were trying to lose weight, although females (6.6%) were more likely to report this reason than males (1.2%). In terms of drinking behaviour, males had relatively higher rates of binge drinking (26.3 versus 21.9%), but no gender differences were found in regular alcohol use.

Separate models were performed for breakfast and lunch skipping due to their correlation ($r = 0.23$, $P < 0.0001$). In the first set of regression analyses (Table 2), breakfast skipping and weight goal were modelled as predictors of alcohol use and binge drinking, with weight status, grade, ethnicity and smoking as covariates. The second set of regression models (Table 3) analyzed lunch skipping in the same manner. Both breakfast and lunch skipping increased the risk of alcohol use and binge drinking among females, with the former having stronger effects. In males, only breakfast skipping predicted alcohol use and binge drinking, and to a lesser degree than in their female counterparts. In terms of weight goal, males trying to gain weight had the highest odds of alcohol use and binge drinking. Males trying to lose weight were also more likely to drink alcohol than males not trying to control their weight, but were no more likely to binge drink. In contrast, females trying to lose weight had stronger odds of drinking, although, females who reported trying to gain weight were also more likely to binge drink and use alcohol.

Discussion

Main finding of this study

Results support hypothesized gender differences in the relationships among weight goals, meal skipping and drinking behaviour. Females trying to control their weight in any direction had increased odds of problematic drinking;

Table 1 Descriptive statistics of measures by gender in a sample of secondary school students in the COMPASS study (2013/2014 data)

	Female (n = 22 149) M (SD)	Male (n = 22 712) M (SD)	T-test
Age	15.61 (1.213)	15.66 (1.252)	-4.276, $P < 0.0001$
	<i>n</i> (%) ^a	<i>n</i> (%) ^a	χ^2
Weight status ^b			
Underweight	307 (1.4%)	382 (1.7%)	690.965
Normal-weight	13 596 (61.4%)	11 909 (52.4%)	$P < 0.0001$
Overweight	2540 (11.5%)	3793 (16.7%)	
Obese	943 (4.3%)	1914 (8.4%)	
Missing	4763 (21.5%)	4714 (20.8%)	
Grade			
9	5709 (25.8%)	6016 (26.5%)	13.931
10	5926 (26.8%)	5833 (25.7%)	$P = 0.008$
11	5561 (25.1%)	5604 (24.7%)	
12	4927 (22.2%)	5217 (23.0%)	
Ethnicity			
White	16 649 (75.2%)	16 605 (73.1%)	34.882
Off-reserve Aboriginal	808 (3.6%)	773 (3.4%)	$P < 0.0001$
Other/mixed/missing	4692 (21.2%)	5334 (23.5%)	
Cigarette smoking			
Current	1103 (5.0%)	1822 (8.0%)	188.469
Former	161 (0.7%)	245 (1.1%)	$P < 0.0001$
Never	20 885 (94.3%)	20 645 (90.9%)	
Weight goal			
Trying to lose weight	12 716 (58.1%)	5394 (24.2%)	7869.569
Trying to gain weight	975 (4.5%)	7131 (31.9%)	$P < 0.0001$
Trying to stay the same weight	3954 (18.1%)	3999 (17.9%)	
Not trying to do anything about weight	4253 (19.4%)	5797 (26.0%)	
Breakfast			
Rarely skips	12 244 (55.7%)	14 111 (63.2%)	258.712
Skips 3+ week	9731 (44.3%)	8209 (36.8%)	$P < 0.0001$
Reason for skipping breakfast			
I do not have time	7674 (34.6%)	5492 (24.2%)	592.386, $P < 0.0001$
The bus comes too early	2459 (11.1%)	1833 (8.1%)	119.104, $P < 0.0001$
Slept in	3415 (15.4%)	2933 (12.9%)	57.896, $P < 0.0001$
I am not hungry in the morning	5589 (25.2%)	3901 (17.2%)	436.503, $P < 0.0001$
I feel sick when I eat breakfast	3932 (17.8%)	1401 (6.2%)	1436.532, $P < 0.0001$
I am trying to lose weight	1464 (6.6%)	282 (1.2%)	863.882, $P < 0.0001$
There is nothing to eat at home	915 (4.1%)	612 (2.7%)	70.376, $P < 0.0001$
Other	525 (2.4%)	638 (2.8%)	8.549, $P = 0.003$
Lunch			
Rarely skips	18 447 (83.7%)	19 058 (85.2%)	19.167
Skips 3+ week	3583 (16.3%)	3300 (14.8%)	$P < 0.0001$
Alcohol use			
Regularly uses alcohol	12 554 (57.6%)	12 652 (57.4%)	0.082
Rare or non-drinker	9260 (42.4%)	9384 (42.6%)	$P = 0.775$
Binge drinking			
Regularly binge drinks	4847 (21.9%)	5946 (26.3%)	114.900
Rare or non-binge drinker	17 236 (78.1%)	16 672 (73.7%)	$P < 0.0001$

^aNumbers may not add to total because of missing values.

^bBody mass index (BMI) values used to determine weight status have been adjusted for age and gender.

Table 2 Logistic regression analyses with weight goals, breakfast skipping, and covariates as predictors of regular alcohol use and binge drinking among secondary school students in the COMPASS study (2013/2014 data)

	<i>Female</i>		<i>Male</i>	
	<i>Odds ratio</i>	<i>99% CI</i>	<i>Odds ratio</i>	<i>99% CI</i>
Binge drinking				
Weight goal	Reference category 'I'm not trying to do anything about my weight'			
Lose	1.88, <i>P</i> < 0.0001	1.65–2.15	1.09, <i>P</i> = 0.094	0.95–1.25
Gain	1.61, <i>P</i> < 0.0001	1.27–2.05	1.92, <i>P</i> < 0.0001	1.71–2.16
Stay the same	1.19, <i>P</i> = 0.006	1.01–1.40	1.24, <i>P</i> < 0.0001	1.08–1.43
Breakfast skipping	Reference category: does not skip breakfast regularly			
Skips 3+ times a week	1.57, <i>P</i> < 0.0001	1.43–1.72	1.44, <i>P</i> < 0.0001	1.32–1.58
Grade	Reference category: grade 9			
10	2.10, <i>P</i> < 0.0001	1.81–2.44	2.35, <i>P</i> < 0.0001	2.03–2.71
11	3.42, <i>P</i> < 0.0001	2.96–3.95	3.68, <i>P</i> < 0.0001	3.20–4.24
12	4.62, <i>P</i> < 0.0001	3.99–5.34	5.33, <i>P</i> < 0.0001	4.63–6.13
Weight status	Reference category: normal weight			
Underweight	1.05, <i>P</i> = 0.746	0.70–1.57	0.40, <i>P</i> < 0.0001	0.26–0.60
Overweight	0.72, <i>P</i> < 0.0001	0.62–0.83	1.45, <i>P</i> < 0.0001	1.28–1.64
Obese	0.55, <i>P</i> < 0.0001	0.43–0.70	1.16, <i>P</i> = 0.029	0.97–1.37
Missing	0.86, <i>P</i> = 0.001	0.76–0.96	0.83, <i>P</i> < 0.0001	0.73–0.94
Cigarette smoking	Reference category: never			
Current	7.47, <i>P</i> < 0.0001	6.19–9.02	8.34, <i>P</i> < 0.0001	7.13–9.75
Former	3.50, <i>P</i> < 0.0001	2.27–5.39	3.44, <i>P</i> < 0.0001	2.40–4.93
Ethnicity	Reference category: White			
Off-reserve Aboriginal	1.17, <i>P</i> = 0.072	0.93–1.48	0.97, <i>P</i> = 0.716	0.76–1.23
Other/mixed/missing	0.61, <i>P</i> < 0.0001	0.54–0.69	0.79, <i>P</i> < 0.0001	0.71–0.88
Regular alcohol use				
Weight goal	Reference category 'I'm not trying to do anything about my weight'			
Lose	1.95, <i>P</i> < 0.0001	1.76–2.16	1.12, <i>P</i> = 0.009	1.00–1.26
Gain	1.44, <i>P</i> < 0.0001	1.17–1.77	1.83, <i>P</i> < 0.0001	1.65–2.03
Stay the same	1.24, <i>P</i> < 0.0001	1.09–1.40	1.08, <i>P</i> = 0.094	0.96–1.21
Breakfast skipping	Reference category: does not skip breakfast regularly			
Skips 3+ times a week	1.74, <i>P</i> < 0.0001	1.61–1.88	1.48, <i>P</i> < 0.0001	1.37–1.60
Grade	Reference category: grade 9			
10	2.31, <i>P</i> < 0.0001	2.08–2.56	2.13, <i>P</i> < 0.0001	1.92–2.36
11	4.10, <i>P</i> < 0.0001	3.67–4.57	3.27, <i>P</i> < 0.0001	2.93–3.64
12	6.10, <i>P</i> < 0.0001	5.42–6.87	4.94, <i>P</i> < 0.0001	4.40–5.55
Weight status	Reference category: normal-weight			
Underweight	0.64, <i>P</i> = 0.001	0.46–0.90	0.42, <i>P</i> < 0.0001	0.31–0.57
Overweight	0.76, <i>P</i> < 0.0001	0.67–0.87	1.31, <i>P</i> < 0.0001	1.17–1.47
Obese	0.64, <i>P</i> < 0.0001	0.52–0.78	1.05, <i>P</i> = 0.403	0.90–1.23
Missing	0.57, <i>P</i> < 0.0001	0.52–0.63	0.57, <i>P</i> < 0.0001	0.52–0.64
Cigarette smoking	Reference category: never			
Current	9.03, <i>P</i> < 0.0001	6.63–12.31	8.76, <i>P</i> < 0.0001	6.88–11.16
Former	3.81, <i>P</i> < 0.0001	2.07–7.03	4.90, <i>P</i> < 0.0001	2.81–8.53
Ethnicity	Reference category: White			
Off-reserve Aboriginal	0.75, <i>P</i> = 0.001	0.60–0.94	0.76, <i>P</i> = 0.002	0.61–0.96
Other/mixed/missing	0.50, <i>P</i> < 0.0001	0.46–0.55	0.64, <i>P</i> < 0.0001	0.58–0.70

Table 3 Logistic regression analyses with weight goals, lunch skipping and covariates as predictors of alcohol use and binge drinking among secondary school students in the COMPASS study (2013/2014 data)

	Female		Male	
	Adj. odds ratio	99% CI	Adj. odds ratio	99% CI
Binge drinking				
Weight goal	Reference category 'I'm not trying to do anything about my weight'			
Lose	1.92, $P < 0.0001$	1.68–2.18	1.12, $P = 0.034$	0.98–1.28
Gain	1.67, $P < 0.0001$	1.32–2.12	1.89, $P < 0.0001$	1.68–2.12
Stay the same	1.18, $P = 0.010$	1.00–1.38	1.23, $P < 0.0001$	1.07–1.42
Lunch skipping	Reference category: does not skip lunch regularly			
Skips 3+ times a week	1.16, $P < 0.0001$	1.05–1.29	1.04, $P = 0.301$	0.94–1.16
Grade	Reference category: grade 9			
10	2.08, $P < 0.0001$	1.79–2.41	2.38, $P < 0.0001$	2.06–2.75
11	3.33, $P < 0.0001$	2.88–3.84	3.78, $P < 0.0001$	3.29–4.35
12	4.48, $P < 0.0001$	3.87–5.18	5.52, $P < 0.0001$	4.80–6.35
Weight status	Reference category: normal-weight			
Underweight	1.06, $P = 0.732$	0.71–1.57	0.40, $P < 0.0001$	0.27–0.61
Overweight	0.72, $P < 0.0001$	0.62–0.84	1.45, $P < 0.0001$	1.28–1.64
Obese	0.57, $P < 0.0001$	0.45–0.72	1.18, $P = 0.014$	0.99–1.40
Missing	0.88, $P = 0.004$	0.78–0.99	0.85, $P = 0.001$	0.75–0.97
Cigarette smoking	Reference category: never			
Current	7.90, $P < 0.0001$	6.54–9.54	8.96, $P < 0.0001$	7.66–10.47
Former	3.56, $P < 0.0001$	2.31–5.46	3.60, $P < 0.0001$	2.52–5.16
Ethnicity	Reference category: White			
Off-reserve Aboriginal	1.21, $P = 0.030$	0.96–1.53	1.00, $P = 0.985$	0.79–1.28
Other/mixed/missing	0.62, $P < 0.0001$	0.55–0.70	0.80, $P < 0.0001$	0.72–0.89
Regular alcohol use				
Weight goal	Reference category 'I'm not trying to do anything about my weight'			
Lose	1.96, $P < 0.0001$	1.77–2.17	1.15, $P = 0.002$	1.03–1.29
Gain	1.50, $P < 0.0001$	1.22–1.85	1.79, $P < 0.0001$	1.62–1.99
Stay the same	1.22, $P < 0.0001$	1.08–1.38	1.07, $P = 0.131$	0.95–1.20
Lunch skipping	Reference category: does not skip lunch regularly			
Skips 3+ times a week	1.37, $P < 0.0001$	1.25–1.51	1.06, $P = 0.142$	0.96–1.16
Grade	Reference category: grade 9			
10	2.26, $P < 0.0001$	2.04–2.51	2.15, $P < 0.0001$	1.94–2.39
11	3.91, $P < 0.0001$	3.51–4.36	3.35, $P < 0.0001$	3.01–3.73
12	5.82, $P < 0.0001$	5.17–6.54	5.10, $P < 0.0001$	4.54–5.72
Weight status	Reference category: normal-weight			
Underweight	0.64, $P < 0.0001$	0.46–0.89	0.43, $P < 0.0001$	0.32–0.57
Overweight	0.77, $P < 0.0001$	0.68–0.88	1.32, $P < 0.0001$	1.18–1.48
Obese	0.67, $P < 0.0001$	0.55–0.81	1.07, $P = 0.235$	0.92–1.25
Missing	0.58, $P < 0.0001$	0.53–0.64	0.59, $P < 0.0001$	0.53–0.66
Cigarette smoking	Reference category: never			
Current	9.27, $P < 0.0001$	6.81–12.62	9.56, $P < 0.0001$	7.50–12.20
Former	3.89, $P < 0.0001$	2.12–7.14	5.17, $P < 0.0001$	2.97–8.99
Ethnicity	Reference category: White			
Off-reserve Aboriginal	0.79, $P = 0.005$	0.63–0.98	0.80, $P = 0.010$	0.64–1.00
Other/mixed/missing	0.51, $P < 0.0001$	0.46–0.56	0.64, $P < 0.0001$	0.59–0.71

although the majority were trying to lose weight, and this group had the greatest likelihood of alcohol use and binge drinking. In males, trying to gain weight was reported most frequently, and resulted in the highest odds for regular alcohol use and binge drinking. In contrast to females, males trying to lose weight did not have a greater likelihood of binge drinking.

As expected, a higher proportion of females reported missing meals and indicated doing so as a weight loss strategy than males. However, while over half of females were trying to lose weight, a surprisingly small proportion reported this reason for not eating breakfast. Regardless of motive, breakfast skipping predicted drinking behaviour in both males and females, while lunch skipping only increased the risk of alcohol use among females.

What is already known on this topic

Dieting and substance use are shown to co-exist from extreme to more minor levels of severity, based on research of young adult females and clinical samples.^{1,2} While several overlapping risk factors may account for the co-occurrence, recent reports draw attention to an alarming trend referred to as 'drunkor-exia'. Studies among university samples reveal some students are compensating for alcohol calories by dieting, while others skip meals to increase the intoxicating effects.^{13,15–18} These findings are a public health concern as food deprivation increases the risk of alcohol-related consequences.^{1,15,22}

In contrast to females, the available evidence on dieting and alcohol use among males has demonstrated weak, non-significant or conflicting relationships,^{13,17,18} which may reflect gender differences in body ideals. Females are more likely want to lose weight,^{8,31} while males typically want to be both lean and muscular.³² In support, a prospective study by Field *et al.*²³ found males who were highly concerned about muscularity were more likely to start binge drinking frequently than their peers, but no indication of elevated risk was associated with thinness concerns.

What this study adds

Considering the prevalence of dieting and binge drinking in youth,^{5,8,27} these behaviours represent a potential prevention target, yet their co-occurrence remains relatively unexplored among younger populations. In addition, limited research has examined correlations to dieting and body dissatisfaction among males. Accordingly, the current study examined alcohol use in relation to meal skipping and weight goals in among secondary school students. In addition, the reasons provided for breakfast skipping were explored to test whether dietary changes were indeed reflective of weight concerns.

Results highlight the importance of including males in research and prevention efforts targeting body image and

weight-control behaviours, addressing the full range of possible weight goals in all youth. As expected, the majority of females reported trying to lose weight and had the highest odds using alcohol. Interestingly, females trying to gain weight were also more likely to drink, although they represented a relatively small portion of the sample. In contrast, males were more frequently trying to gain weight, and this group had the highest odds of alcohol use and binge drinking. About half of the remaining male responses were divided between not trying to do anything about weight and trying to lose. Trying to lose weight predicted regular alcohol use but not binge drinking in males.

This study adds to existing literature by clarifying the reasons behind meal skipping, which were rarely weight-related, especially among males. Skipping breakfast due to sleeping in or a lack of time could theoretically reflect overlapping risk factors contributing to a more chaotic or disorganized life. For instance, depression, negative affect, and attention-deficit/hyperactivity disorder are all related to changes in sleep, alcohol use and appetite.^{33,34} Research on the temporal relationship between meal skipping and alcohol use, and possible contributing mental health symptoms, may assist in interpreting findings. In addition, behaviours that more closely align to goals of muscularity may prove better predictors of male drinking behaviour.

In recognition of gender differences, prevention efforts focusing on youth with body dissatisfaction are advised to assess motivations to alter weight in either direction, to avoid missing high-risk groups. Males trying to gain weight and females trying to lose appear most likely to engage in problematic drinking; however, all active weight control intentions increased the odds of drinking compared with youth not trying to control their weight. Moreover, while meal skipping rarely occurred for weight loss purposes, youth missing breakfast had a higher likelihood of alcohol use, as did females skipping lunch. Educating youth on the heightened risks associated with drinking on an empty stomach is recommended in substance use prevention and harm reduction programmes. Food deprivation places youth at heightened risk of adverse consequences of alcohol use.¹ Likewise, nutrition and eating disorder interventions should assess the role of alcohol use in dietary changes. Some researchers have recommended addressing adolescents' attempts to negotiate conflicting pressures to drink with desires to obtain a particular body, by promoting healthy eating, reducing weight preoccupation and discussing moderation in alcohol use.^{13,15} Public health strategies addressing the drive to conform may prove valuable for preventing both unhealthy weight control behaviours and problematic alcohol use among youth, prior to the escalation of these behaviours that occurs with age, and the 'drunkor-exia' trends witnessed among young adults.

Binge drinking was more common in males, but no gender differences were present in regular alcohol use. However, rates may have been underestimated. While the passive-consent procedures utilized in the COMPASS study vastly improve participation and representativeness,³⁵ males and adolescents who use substances are less likely to participate, as are older students and binge drinking rates increase by grade.^{27,35} To be consistent with previous research^{21,27} and tools,²⁸ binge drinking was defined as consuming five or more alcoholic beverages on one occasion. Lower cut-off points have been suggested for females and/or youth as they typically weigh less than adult males, meaning the same amount often results in higher blood ethanol levels.⁶ Therefore, females who use alcohol in lower quantities may still be drinking to intoxication, placing them at similarly high risk of negative outcomes. Moreover, this risk may be elevated based on female drinkers' greater tendency to skip meals. Regardless of food intake, females progress more quickly from habitual use to dependence, and experience more damaging health effects from drinking than males.³⁶

Limitations of this study

The sample may not be representative due to self-selection of schools. Also, analyses were limited to items on the COMPASS survey, meaning direct assessment of 'drunkorexia' was not possible. Therefore, it is not known whether female drinkers who skipped meals for weight loss motives were compensating for alcohol consumption. Also, assumptions cannot be made on whether meal skipping preceded, followed or developed in tandem with alcohol use. Follow-up longitudinal analyses are planned to test whether weight-control efforts predict later problematic drinking. Lastly, other than meal skipping, further detail on dieting behaviours was not measured. Future studies should assess additional weight-control practices, including weight gain strategies (e.g. supplements).

Conclusion

Results support reports of an increased risk for problematic alcohol use among youth who skip breakfast and/or experience body dissatisfaction; however, surprisingly few students were skipping meals for the purposes of weight loss. This study highlights the importance of addressing weight-control intentions in both males and females, and not limiting the focus to weight loss efforts. Further longitudinal research addressing the full range of weight-control behaviours in relation to youth alcohol use is advised to advance understanding of 'drunkorexia' trends. Public health approaches promoting healthy eating and body image may also prove valuable in

substance use prevention programmes targeting this cohort, which have been identified as a key strategic priority moving forward.^{37–39}

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