PREDICTORS OF UNHEALTHY ALCOHOL CONSUMPTION BEHAVIOUR IN CANADIAN MEN

Nahid Punjani MD MPH[1], Ryan Flannigan MD[2,3,4], Nick Black MA[5], S. Larry Goldenberg MDCM[3,4]

[1]Division of Urology, Western University, London, Ontario

[2]Weill Cornell Medicine, Department of Urology, Male Reproduction & Microsurgery, New York, NY

[3]Department of Urologic Sciences, University of British Columbia, Vancouver, BC

[4]Canadian Men's Health Foundation, Vancouver, BC

[5]Intensions Consulting (http://www.intensions.co), Vancouver, British Columbia, Canada

Corresponding author: E-mail: l.gold@ubc.ca

ABSTRACT

Aims

Men are more likely to engage in alcohol consumption, which can have long-term consequences. The objective of our study was to sample Canadian men to determine predictors of hazardous alcohol hazardous as well as predictors for change.

Methods

Canadian men were surveyed investigating demographics, medical comorbidities, health behaviours, and willingness to change. Alcohol consumption was classified based on validated Audit-C scoring (>3 was positive for dependency or abuse). Stages of change were classified based on the transtheoretical model of change (pre-contemplation, contemplation, preparation, action, and maintenance). Multivariate regression was performed to determine demographic factors as predictors for consumption and change.

Results

After exclusions and sample stratification, 2000 participants were included. Participants were aged 19–94 (median 48, IQR 34–60). Approximately 773 (38.7%) screened positive based on Audit-C scores. On multivariate analysis, minority status, age, work, income, retirement, living situation, geographic location, and level of education were associated with hazardous drinking. Of those engaging in hazardous drinking, the majority were in pre-contemplation or contemplation 488 (63.1%). On multivariate analysis, various demographic factors were associated with the five stages of change.

Conclusion

Our study illustrates that approximately 40% of men screen positive for unhealthy drinking behaviour and associated demographic risk factors for those at highest risk. The majority are in the earliest stages in transtheoretical model for change (>60%), and there exist only a few associated demographic risk factors. This warrants awareness of this national problem, insight for patient education and targeted interventions to address hazardous behaviour and reduce morbidity and mortality.

Keywords: *men's health, unhealthy alcohol consumption, transtheoretical model for change*

Men's health is an emerging issue and includes the assessment of various health behaviours and their associated consequences on overall health.[1] Of these behaviours, men are more inclined to engage in those which are high-risk such as smoking and alcohol consumption.[2] Alcohol consumption is not only more prevalent among men, but men are also more likely to consume more drinks per week, have increased rates alcohol dependence, and increased rates of alcohol abuse.[3,4] Increasing amounts of alcohol have been shown to predispose to various medical comorbidities and even increase mortality.[5]

Alcohol consumption is often classified using standardized and validated questionnaires such as the CAGE or AUDIT-C questionnaires, both of which permit the identification of those with dependency or addiction issues.[6] Alcohol consumption behaviour may be further classified as "healthy" or "unhealthy" based upon Audit-C scoring.[7] Numerous interventions have been developed to assist individuals in managing their addiction, including Alcoholics Anonymous, motivational enhancement therapy and cognitive behavioural therapy.[8] It is essential that these interventions are not only feasible and accessible but also appropriate for an individual's willingness to change, based upon the transtheoretical model for change. This model classifies individuals into various stages of readiness to change including pre-contemplation, contemplation, preparation, action, and maintenance.[9]

Currently, the literature has reported inconsistent reports for demographic and socioeconomic (SES) risk factors of alcohol consumption. For example, greater income has been shown to increase rates on alcohol abuse, but decrease the rates of alcohol dependence.[10] A meta-analyses regarding the association of (SES) and alcohol consumption illustrates that while many studies demonstrate that higher SES is associated with increased alcohol dependence, these studies do not all consider other modifying factors such as race, gender, and ethnicity.[11] Further studies have highlighted that lower SES individuals were at greater risk of higher alcohol consumption rates.[12] Other factors such as an individual's childhood and home situation, including the presence of a parent who had poor drinking habits may also increase future alcohol consumption.[13]

Additionally, higher education and being employed are predictors for increased alcohol consumption.[14]

Our study aimed to examine socio-economic and demographic risk factors for alcohol consumption among Canadian men with unhealthy drinking behaviours. We also aimed to identify if these risk factors were associated with an individual willingness to change based on the transtheoretical model. These risk factors may permit recognition of men who are at risk and therefore establish target populations for future interventions and disease prevention.

METHODS

Recruitment

From April 20–28th 2017, a total of 5,362 Canadian respondents were sourced from an online sample provider to complete a 15-minute online survey. Incomplete surveys were excluded, as well as those who were female or completed the survey significantly faster than average. Inclusion criteria included those who were male, aged 19 or older, and able to read French of English. The sample was stratified to reflect an accurate distribution of the Canadian population by both age and location as per the 2016 Canadian Census. Men were incentivized with proprietary panel points to be used later for various rewards. IRB (Institutional Review Board) approval was obtained through the University of British Columbia.

Survey

The survey consisted of components of health behaviours as well as medical comorbidities. Amongst these health behaviours is alcohol consumption, which was further classified into 'healthy' or 'unhealthy' based on the validated Audit-C questionnaire with a sensitivity of 86% and specificity of 89%.[15] A score of 3 or less was considered 'healthy' but a score greater than 3 was considered 'unhealthy' consumption.[7,16]

Alcohol consumption was captured based on frequency (never, monthly, number of times per month, number of times per week or weekly). The total number of drinks per day was recorded as well as the number of occasions where excessive (binge) drinking occurred, defined as >6 alcoholic drinks during a single episode.[17]

Demographic variables pertinent to SES were obtained from the questionnaire data and included age, ethnicity, geographic region, education status, employment, living arrangements as well as income.

Participant stages of change were categorized into one of five groups: pre-contemplation, contemplation, preparation, action, and maintenance based on their response to corresponding survey questions.

Statistical Methods

A descriptive analysis was performed of the included participants. Multivariate logistic regression was conducted to analyze predictive factors for various medical comorbidities. Referent categories for demographics were chosen based on the group with the greatest number of individuals. Multinomial regression was used to evaluate predictors of the various stages of change, using the pre-contemplation stage as the referent category. A two-sided p-value of <0.05 was considered significant. Statistical analyses were performed with Stata 14.1

RESULTS

Demographics

A total of 2000 men aged 19–94 years of age were included in the study after both inclusion and exclusion criteria were met. Demographic data is listed in Table 1. The age distribution and geographic distribution is in alignment with the Canadian Census. Median age was 48 (IQR 34–60) for the whole cohort. Men reporting unhealthy drinking behaviour demonstrated similar demographics compared to men with healthy drinking behaviours. Minor differences were only observed in the number of minorities, incomes, and those that are retired.

TABLE 1 Demographics (n=2000) by Drinking Behaviour

Demographics & Baseline Characteristics		Healthy Drinking (n=1227)	Unhealthy Drinking (n=773)
Sex			
	Male	1227 (100.0)	773 (100.0)
Age			
	19–29	238 (19.4)	141 (18.2)
	30–54	572 (46.6)	362 (46.8)
	55+	417 (34.0)	270 (34.9)
Province			
	British Columbia	166 (13.5)	99 (12.8)
	Alberta	125 (10.2)	92 (11.9)
	Saskatchewan & Manitoba	87 (7.1)	44 (5.7)
	Ontario	486 (39.6)	282 (36.5)
	Quebec	271 (22.1)	205 (26.5)
	Maritime Provinces	91 (7.4)	51 (6.6)
	Territories	1 (0.1)	0 (0.0)

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Demographics & Baseline Characteristics		Healthy Drinking (n=1227)	Unhealthy Drinking (n=773)
Minority			
	Yes	159 (13.0)	59 (7.6)
	No	1068 (87.0)	714 (92.4)
Household Income			
	< $20,000	95 (7.7)	34 (4.4)
	$20,000 to $39,999	195 (15.9)	87 (11.3)
	$40,000 to $59,999	214 (17.4)	122 (15.8)
	$60,000 to $79,999	215 (17.5)	140 (18.1)
	$80,000 to $99,999	161 (13.1)	117 (15.1)
	$100,000 to $119,999	127 (10.4)	95 (12.3)
	$120,000 to 139,999	70 (5.7)	64 (8.3)
	$140,000 +	150 (12.2)	114 (14.7)
Highest level of education			
	Primary School or less	5 (0.4)	1 (0.1)
	Some high school	25 (2.0)	23 (3.0)
	High school graduate	189 (15.4)	112 (14.5)
	Some college/trade school	135 (11.0)	90 (11.6)
	Graduated college/trade school	241 (19.6)	181 (23.4)
	Some university	110 (9.0)	65 (8.4)
	University undergraduate degree	322 (26.2)	173 (22.4)
	University graduate degree	200 (16.3)	128 (16.6)
Sexual Preference			
	Heterosexual	1805 (90.3)	696 (90.0)
	Homosexual	118 (5.9)	51 (6.6)
	Bisexual	48 (2.4)	21 (2.7)
	Not sure or questioning	25 (1.3)	4 (0.5)
	Other	4 (0.2)	1 (0.1)

Demographics & Baseline Characteristics		Healthy Drinking (n=1227)	Unhealthy Drinking (n=773)
Number of children age <19 living with participant			
	None	1109 (90.4)	696 (90.0)
	One	67 (5.5)	51 (6.6)
	Two	27 (2.2)	21 (2.7)
	Three	21 (1.7)	4 (0.5)
	Four +	3 (0.2)	1 (0.1)
Living Arrangement			
	Partner	114 (9.3)	64 (8.3)
	Alone	18 (1.5)	23 (3.0)
	Partner & children	288 (23.5)	161 (20.8)
	Parent	12 (1.0)	2 (0.3)
	Non-relatives	35 (2.9)	19 (2.5)
	Children	482 (39.3)	336 (43.5)
	Relatives	247 (20.1)	145 (18.8)
	University or College Campus	27 (2.2)	22 (2.8)
	Other	4 (0.3)	1 (0.1)
Employment			
	Employed full-time	596 (48.6)	407 (52.7)
	Employed part-time	115 (9.4)	40 (5.2)
	Self-employed	113 (9.2)	57 (7.4)
	Looking for employment	61 (5.0)	32 (4.1)
	Unable to work	44 (3.6)	19 (2.5)
	Retired	254 (20.7)	199 (25.7)
	Studying full-time	73 (5.9)	35 (4.5)
	Studying part-time	27 (2.2)	20 (2.6)
	Home caregiver	9 (0.7)	5 (0.6)

Alcohol Consumption

Alcohol consumption was further subdivided into the frequency of consumption and binge drinking as highlighted in Table 2. The unhealthy drinking behaviours group had an increasing trend for the number of individuals who consume alcohol on a regular basis compared to the healthy drinking group. None of the healthy drinkers consumed more than 4 drinks per day whereas almost half (46%) of the unhealthy group consumed 3 or more drinks a day. The majority of healthy drinkers did not consume excess amounts of alcohol (binge drinking), whereas almost half (46%) of unhealthy drinkers had excessive drinking events at least monthly.

Transtheoretical Model of Change

With respect to transtheoretical model of change, the highest proportion of unhealthy drinkers were in the pre-contemplation stage (33.6%) as outlined in Table 3. Decreasing proportions of unhealthy drinkers were actively progressing through the stages of change model with only 8.0% of individuals at the maintenance stage (Figure 1).

TABLE 2 Alcohol Consumption by Drinking Behaviour

Alcohol Consumption		Healthy Drinking (n=1227)	Unhealthy Drinking (n=773)
How Often			
	Never	354 (28.9)	0 (0.0)
	Monthly or Less	389 (31.7)	23 (3.0)
	2–4 Times per Month	350 (28.5)	129 (16.7)
	2–3 Times per Week	134 (10.9)	304 (39.3)
	>4 Times per Week	0 (0.0)	317 (41.0)
How Many Per Day			
	0	354 (28.9)	0 (0.0)
	1–2	856 (69.8)	416 (53.8)
	3–4	17 (1.4)	222 (28.7)
	5–6	0 (0.0)	98 (12.7)
	7–9	0 (0.0)	24 (3.1)
	>/=10	0 (0.0)	13 (1.7)
More Than 6 Drinks at One Time			
	Never	953 (77.7)	111 (14.4)
	Less than Monthly	265 (21.6)	306 (39.6)
	Monthly	9 (0.7)	185 (23.9)
	Weekly	0 (0.0)	159 (20.6)
	Daily or Almost Daily	0 (0.0)	12 (1.6)

TABLE 3 Willingness to Change for Unhealthy Drinkers

Transtheoertical Stage of Change	Unhealthy Drinking (n=773)
Pre-Contemplation	260 (33.6)
Contemplation	228 (29.5)
Preparation	135 (17.5)
Action	88 (11.4)
Maintenance	62 (8.0)

FIG. 1 Willingness to Change based on the Transtheoretical Model.

Willingness to Change Based on Transtheoretical Model
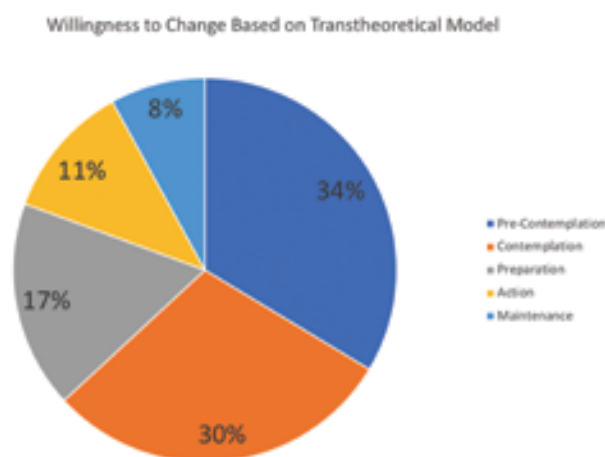
Multivariate Analysis

A multivariate analysis was performed to identify demographic and SES variables that contribute to unhealthy drinking behaviours (Table 4). Men identifying as a minority (OR 0.58, 95%CI 0.42–0.82, p<0.01), increasing age (OR 0.99, 95%CI CI 0.98–1.00, p=0.03), part-time employment (OR 0.57, 95%CI 0.36–0.92, p=0.02), and low income (<39,999$, OR 0.65, 95%CI 0.45–0.92, p=0.02) protected against unhealthy drinking behaviour. Contrarily, men who were retired (OR 1.50, 95%CI 1.07–2.10, p=0.02), living with relatives (OR 2.16, 95%CI 1.09–4.28, p=0.03), had higher income (120,000–139,999$, OR 1.60, 95%CI 1.05–2.45, p=0.03), live in Quebec (OR 1.30, 95%CI 1.01–1.66, p=0.04) and educationally had some high school (OR 2.19, 95%CI 1.15–4.19, p=0.02), some college (OR 1.42, 95%CI 1.00–2.00, p=0.05) or were college graduates (OR 1.55, 95%CI 1.17–2.06, p<0.01) were associated with unhealthy drinking behaviour.

Multinomial regression was performed to identify demographic or SES factors that contributed to men's willingness to change status and are depicted in Table 5. Men living with parents were found to be associated with the contemplation stage of change (OR 1.97, 95%CI 1.12–3.48, p=0.02). There were no associations for preparation. For the action stage, increasing age (OR 0.98, 95%CI 0.96–1.00, p=0.03), living alone

TABLE 4 Multivariate Analysis of Demographic Associations of Unhealthy Drinking

Demographics & Baseline Characteristics		OR (95% CI)	*p-value*
Age		**0.99 (0.98–1.00)**	**p=0.03**
Minority		**0.58 (0.42–0.82)**	**p<0.01**
Province			
	British Columbia	1.13 (0.83–1.54)	p=0.43
	Alberta	1.22 (0.89–1.68)	p=0.22
	Saskatchewan & Manitoba	0.78 (0.52–1.18)	p=0.24
	Ontario	ref	ref
	Quebec	**1.30 (1.01–1.66)**	**p=0.04**
	Maritime + Territories	0.94 (0.64–1.39)	p=0.76

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Demographics & Baseline Characteristics		OR (95% CI)	*p-value*
Orientation (Gay or Lesbian)		1.06 (0.77–1.48)	p=0.71
Household Income			
	< $20,000	**0.52 (0.32–0.87)**	**p=0.01**
	$20,000 to $39,999	**0.65 (0.45–0.92)**	**p=0.02**
	$40,000 to $59,999	0.84 (0.60–1.15)	p=0.28
	$60,000 to $79,999	ref	ref
	$80,000 to $99,999	1.18 (0.85–1.65)	p=0.32
	$100,000 to $119,999	1.27 (0.89–1.82)	p=0.19
	$120,000 to 139,999	**1.60 (1.05–2.45)**	**p=0.03**
	$140,000 +	1.39 (0.98–1.97)	p=0.07
Highest level of education			
	Primary School or less	0.38 (0.04–3.48)	p=0.39
	Some high school	**2.19 (1.15–4.19)**	**p=0.02**
	High school graduate	1.29 (0.93–1.79)	p=0.12
	Some college/trade school	**1.42 (1.00–2.00)**	**p=0.05**
	Graduated college/trade school	**1.55 (1.17–2.06)**	**p<0.01**
	Some university	1.12 (0.77–1.64)	p=0.55
	University undergraduate degree	ref	ref
	University graduate degree	1.16 (0.86–1.56)	p=0.34
Living Arrangement			
	Partner	ref	ref
	Alone	1.02 (0.77–1.34)	p=0.90
	Partner & children	0.83 (0.63–1.09)	p=0.18
	Parent	0.96 (0.64–1.45)	p=0.86
	Non-relatives	1.12 (0.60–2.10)	p=0.73
	Children	1.47 (0.80–2.70)	p=0.22
	Relatives	**2.16 (1.09–4.28)**	**p=0.03**
	University or College Campus	0.36 (0.07–1.70)	p=0.20
	Other	0.42 (0.04–4.13)	p=0.46
Employment			
	Employed full-time	Ref	Ref
	Employed part-time	**0.57 (0.36–0.92)**	**p=0.02**
	Looking for employment	0.93 (0.56–1.55)	p=0.78
	Unable to work	0.89 (0.48–1.64)	p=0.70
	Retired	**1.50 (1.07–2.10)**	**p=0.02**
	Studying full-time	0.85 (0.52–1.41)	p=0.54
	Studying part-time	1.35 (0.72–2.54)	p=0.35
	Home caregiver	0.62 (0.13–3.08)	p=0.56
	Healthcare	1.17 (0.72–1.90)	p=0.54
	Not Reported	0.82 (0.56–1.22)	p=0.34

TABLE 5 Multinomial Regression for Associations of Change of Unhealthy Drinking Behaviour

Demographics & Baseline Characteristics		OR (95% CI)	*p-value*
Contemplation vs. Pre-Contemplation			
Living Arrangement			
	Living with Parents	1.97 (1.12–3.48)	p=0.02
Preparation vs. Pre-Contemplation			
None			
Action vs. Pre-Contemplation			
Age		0.98 (0.96–1.00)	p=0.03
Living Arrangement			
	On Own	0.54 (0.31–0.95)	p=0.03
Income			
	< $20,000	0.19 (0.05–0.75)	p=0.02
Education			
	University Graduate Degree	1.98 (1.12–3.49)	p=0.02
Maintenance vs. Pre-Contemplation			
Age		1.02 (1.00–1.04)	p<0.01

(OR 0.54, 95%CI 0.31–0.95, p=0.03) and income <20,000$ (OR 0.19, 95%CI 0.05–0.75, p=0.02) had decreased risk. However, having a university graduate degree was associated with the action stage of change (OR 1.98, 95%CI 1.12–3.49, p=0.02). Increasing age (OR 1.02, 95%CI 1.00–1.04, p<0.01) was associated with the maintenance stage of change.

DISCUSSION

Men's health outcomes may be directly affected by lifestyle behaviours, such as alcohol consumption, and ultimately contribute to individual morbidity and mortality.[7,18] Unhealthy alcohol consumption behaviours may be easily modified through early intervention which may subsequently reduce the associated morbidity and potential mortality. Our study has identified and characterized men who are at risk for unhealthy drinking behaviours as well as their potential willingness to change based upon the transtheoretical model of change.

We identified that men of minority groups, older age, part-time workers and low-income individuals were less likely to engage in hazardous drinking behaviour. Numerous studies have shown that minority groups are often of lower income and SES, and therefore may have less access to alcohol, ultimately inhibiting their ability to engage in unhealthy drinking behaviours.[19] Another explanation may be due to cultural differences, where alcohol consumption at a younger age is more acceptable in European culture (non-visible minorities); however, abstention is more common among some Asian cultures and prohibition among Muslim religions.[20,21] Elderly individuals may have a reduced risk secondary to decreased accessibility to alcohol in group homes, or related to less frequent social gatherings.[22] Alternatively, the decreased rates seen in the elderly individuals may also be due to increased health precautions and more frequent visits and counselling from their physicians.[23] Part-time work and the lowest income brackets were significantly

protective for unhealthy alcohol consumption. This may be a consequence of financial limitations, as studies have shown that alcohol prices are increasing and are driving decreased consumer consumption.[24]

Contrarily, men that are retired, with greater incomes, living with relatives, living in Quebec and those with high school and graduate degrees were found to have greater risks of unhealthy alcohol consumption. Retirement, independent of age, has been shown in studies to be related to increased alcohol consumption, with theories related to increased time, decreased responsibilities and obligation to be available for work the following day, or as a coping mechanism since they are no longer working.[25] Greater income in our study illustrated increasing rates of unhealthy alcohol consumption and this may be due to variance in lifestyle, a reflection of occupation such as those who regularly interact with clients or have social events, or due to increased stress.[26] The increased risk amongst those living with relatives may be stress induced, including additional roles as caregivers for family members, tension living with in-laws, or due to difficult and tenuous relationships at home.[27] Canadian governmental data has shown that Quebec has the highest consumption of alcohol compared to any other province and therefore would likely explain why this group was found most likely to have unhealthy drinking behaviour in our study.[28] Finally, the increased risk seen amongst those with some high school, some college or a college degree may relate to behaviours learned during school training such as college parties, from behaviours learned as youth and adolescents, or as a consequence of job strain from blue collar jobs.[29]

With respect to stages of change, of the approximate 40% of participants in our study with unhealthy alcohol consumption, the majority were in the pre-contemplation or contemplation stage of change. These statistics are in keeping with known Canadian data which indicate that 38.6% of Canadians are at short term harm from risky drinking.[28] Often individuals do not realize they have an alcohol consumption problem or do not care to change their habits, and therefore may reflect the fewer participants in the latter stages of change.[30] These findings suggest that national public health interventions may benefit from a focus on increasing awareness and education of unhealthy drinking behaviours, while also focusing on engaging men on recognizing their unhealthy behaviour and consideration of change.[31]

When examining risk factors for stages of change the only significant factor that was associated with the contemplation stage was living with one's parents. This may be a direct reflection of approval and/or judgment from their parents as they continue to engage in unhealthy drinking behaviours.[21] With respect to the action stage, older age was associated with a decreased risk, however, was also predictive of the maintenance stage of change. We further separated participants into three age categories (19–29, 30–54, and 55+) and found that in the action group the driving force included the 30–54 age category (OR 0.59, 95%CI 0.33–1.07, p=0.08) and alternatively the 55+ group for the maintenance group (OR 2.39, 95%CI 1.11–5.12, p=0.03). Even though some individuals recognize their problem early, it is not until their 30s and 40s that individuals seek specialty treatment which may reflect this age peak of the action group.[32] Consequently, this may be responsible for the maintenance peak of those in their 50s who have not only recognized their problem but have completed treatment and now working on their maintenance stage. By developing strategies to shift the curve towards the younger population, that is to lower the most prevalent ages for the action and maintenance categories, there is the potential to mitigate the morbidity of chronic long-term alcohol consumption. These strategies could include social media campaigns and web-based modules to target millennials, but must not only focus on earlier intervention but also have methods of support for those who have completed treatment, similar to the buddy-system created by groups such as Alcoholics Anonymous.

Men living on their own or those who have a low income were associated with decreased risk of the action stage of change and may be reflected by poor social support or life stability to correct the unhealthy and risky behaviour.[33] In addition to previously suggested strategies such as public health campaigns and social media interventions, these men may require additional support both financially and supportively. Governmental or healthcare support may provide the

needed resources and funding and may be in their best interest as it may also reduce the downstream costs of treating the associated long-term morbidities. Finally, having a university graduate education was associated with the action stage of change, which may be a direct reflection of the highest educated individuals in our study with the most insight and knowledge of the detrimental effects of unhealthy and risky behaviours as well as resources to initiate change. These findings further support the necessity of educational programmatic intervention to increase awareness for self-recognition of problem drinking and provide the necessary tools for these men to take action.

Limitations to our study include the retrospective nature and recall bias associated with survey-based studies. This may lead to misclassification of data. However, our study is a large sample size, and was conducted to represent the Canadian population and has extensive amounts of available data. Our definition of unhealthy drinking behaviour was also extremely robust as we used a validated questionnaire used regularly in the literature.

CONCLUSION

Our study confirms the association of demographic factors and unhealthy drinking behaviours. Minority status, older age, part-time working status, and low-income individuals were more likely to engage in unhealthy drinking behaviour whereas those who were retired, with greater incomes, living with relatives, Quebec residents and those with increased education were less likely. Problem drinking among Canadian men (approximately 40%) is widespread and most men are pre-contemplative or contemplative about change, and therefore represent the largest target population. Our study also highlights that various demographics associations do exist with regards to the transtheoretical model of change. Insight from our findings suggest potential target groups and provides an avenue for hypothesis generation of possible strategies for intervention such as public health campaigns, social media strategies, and/or patient education.

SOURCE OF FUNDING

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