Original quantitative research

Drinking patterns, alcohol-related harm and views on policies: results from a pilot of the International Alcohol Control Study in Canada

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Abstract

Introduction: We conducted a pilot assessment of the feasibility of implementing the International Alcohol Control (IAC) Study in Ontario, Canada, to allow for future comparisons on the impacts of alcohol control policies with a number of countries.

Methods: The IAC Study questionnaire was adapted for use in the province of Ontario, and a split-sample approach was used to collect data. Data were collected by computer-assisted telephone interviewing of 500 participants, with half the sample each answering a subset of the adapted IAC Study survey.

Results: Just over half of the sample (53.6%) reported high frequency drinking (once a week or more frequently), while 6.5% reported heavy typical occasion drinking (8 drinks or more per session). Self-reported rates of alcohol-related harms from one's own and others' drinking were relatively low. Attitudes towards alcohol control varied. A substantial majority supported more police spot checks to detect drinking and driving, while restrictions on the number of alcohol outlets and increases in the price of alcohol were generally opposed.

Conclusion: This pilot study demonstrated that the IAC Study survey can be implemented in Canada with some modifications. Future research should assess how to improve participation rates and the feasibility of implementing the longitudinal aspect of the IAC Study. This survey provides additional insight into alcohol-related behaviours and attitudes towards alcohol control policies, which can be used to develop appropriate public health responses in the Canadian context.

Keywords: alcohol, policy, Canada, survey instrument, binge-drinking, International Alcohol Control Study, IAC Study

Highlights

- The estimates of average drinks per months from the International Alcohol Control (IAC) Study were significantly higher than those from the Centre for Addiction and Mental Health (CAMH) Monitor (26.3 vs. 19.4).
- The typical drinking session at a public special event or while camping or staying at a cabin/cottage approximated a binge-drinking session (5+ for men, 4+ for women).
- Only 8.3% of respondents were in favour of a policy of increasing the price of alcohol.
- Those who had purchased alcohol in the past six months from a grocery store showed significantly higher rates of over-drinking (53.5% vs. 40.54%) as compared to those who had not.

Introduction

The majority of adults in Canada consume alcohol,[1] and the production and distribution of alcohol creates thousands of jobs, while governments derive significant tax revenues from alcohol production and sales.

At the same time, alcohol causes or contributes to a large number of conditions, diseases and injuries.[2] According to the Global Burden of Disease Study, in 2016, alcohol was responsible for approximately 350 000 disability-adjusted life year (DALYs) and 3.9% of all-cause DALYs in Canada.[3] In the same year, alcohol was the third leading behavioural contributor to the burden of disease globally, and the second leading behavioural contributor in Canada.[3] Alcohol is the largest single contributor to motor vehicle fatalities and was associated with one-third of motor vehicle collision fatalities in 2012, exceeding the number of deaths from assault.[4] In the United States, about one-third of those who die by suicide have been shown to be alcohol positive at the time of death.[5] Excessive use of alcohol causes secondary

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harm to others,[6] including substantial problems in families[7] and in the workplace,[8] and frequently involves aggression and violence.[9,10] Aggression is related to both overall consumption and frequency of intoxication.[11,12]

In Canada, burden related to alcohol in terms of costs that include health care, law enforcement and lost productivity has been estimated to be approximately $14.7 billion annually.[13] In most Canadian provinces, estimates of these burdens exceed revenues collected by governments.[14]

An effective prevention strategy requires a combination of population-level interventions and more focused interventions. The World Health Organization has identified three "best buys" for cost-effective alcohol policy interventions: tax increases, restricted access to retailed alcohol and bans on alcohol advertising.[15] Other population-level strategies include national/provincial/territorial alcohol strategies, alcohol pricing and type of alcohol control and retailing system.[16]

A population-level perspective is essential as the major burden of morbidity and mortality from alcohol is attributable not to the small proportion of the population that exhibit dependence on alcohol, but to the large portion of the population considered to be "moderate" drinkers.[17,18] Population-level interventions tend to avoid victim blaming and stigmatization of those who are alcohol dependent or regularly engage in high-risk drinking.[19] Other common interventions designed to promote population health include drinking and driving countermeasures, server interventions, and screening and brief interventions.

While there is substantial evidence supporting the effectiveness of population-level policies and interventions (e.g. studies by Babor et al.[20] and Anderson et al.[21]), more information is needed on the causal effects of policy on behaviour change.[18] The International Alcohol Control (IAC) Study was designed to address this gap. The IAC Study measures the impact of policy on behaviours such as purchasing and response to marketing to better understand the causal chain between policy and alcohol consumption.[18] The IAC Study also examines and interprets the impact of policies that are introduced as a package, as they tend to be.[18] The IAC

study was modeled on the International Tobacco Control study, which was similarly designed to determine the effects of policy changes on changes in behaviour.[22]

The IAC Study draws on the World Health Organization's (2010) *Global Strategy to Reduce the Harmful Use of Alcohol*[23] and the international analysis of drinking patterns, harm from alcohol and effective interventions by Babor et al.[20] as well as other sources. The main rationale for the IAC Study was the substantial global burden of disease and injury from alcohol and the pressing need for effective policy to reduce the burden.[18]

The IAC Study uses several data sources. These include a longitudinal survey of individuals; a comprehensive literature review drawing on key policy, strategy, reporting and research documents; qualitative interviews with relevant stakeholders; and routinely collected and administrative data such as outlet location, alcohol price and treatment locations.[18] The IAC Study measures alcohol consumption using a within-location beverage-specific framework; this has been shown to provide estimates of consumption that are closer to alcohol sales data. Respondents are asked about mutually exclusive physical locations, types of beverage consumed for an estimate of alcohol content, number of drinks per location-session to estimate total alcohol consumed per drinking session and the frequency of location-sessions for total monthly consumption estimates.[24] As of December 2017, there were IAC Study initiatives in 13 countries, including this pilot study in the province of Ontario.[25]

Results from IAC Study initiatives for a number of countries have been published: Australia,[26] England and Scotland,[27] New Zealand[28] and the Republic of Korea.[29] Of these countries, Canada's social culture, political structures, gross domestic product (GDP) per capita and alcohol policies are similar to those of England, Australia and New Zealand, though per capita alcohol consumption is lower at 8.9 litres per year (in England this is 11.4 L; in Australia, 10.6 L; and in New Zealand, 10.7 L).[30] The research design of a longitudinal survey of drinkers, along with analysis of the policy context, permits the examination of changes over time within and between jurisdictions.

While many organizations in Canada monitor and report on alcohol use and problems,[1,31] there is no comprehensive source of information on drinking behaviour and the factors that influence it. Thus, the important information on levels of alcohol consumption in Canada and alcohol-related problems of youth and adult drinkers typically do not offer insight into how and where alcohol is consumed, how much is spent on alcohol in various environments or other topics salient from a policy perspective.

Several Canadian provinces have recently made, or are considering, major changes to alcohol policies that may significantly affect alcohol use and associated practices. These changes include the introduction of beer and wine sales in grocery stores in Ontario;[32] further privatization of alcohol retailing in several provinces;[33,34] changes to pricing policies;[35] and the increase in sanctions for hazardous alcohol-related behaviours (e.g. the provincial government of Ontario introducing immediate penalties for a blood alcohol concentration of 0.05 mg% when driving).[36,37] The ability to monitor the impact of these changes to help us understand the most appropriate ways to reduce alcohol-related harms is one of the key benefits of the IAC study.[21] The IAC Study has proven to be of substantial value in informing alcohol policy in several countries in recent years.[24]

In this paper, we describe a pilot assessment of the feasibility of implementing the survey component of the IAC Study in Ontario. This pilot assessment had three main purposes:

- To adapt the IAC Study survey instrument, which collects detailed information about drinking practices and contexts, to capture the heterogeneity of drinking in Canada,[38] while still providing data comparable to other IAC Study surveys in other countries;

- To administer the adapted survey in a pilot sample of participants in Ontario, Canada to test survey procedures; and

- To provide a preliminary assessment of what useful additional information could be obtained from using the IAC Study–based instrument

compared with already available information.

Methods

Survey design

The Canadian pilot of the IAC Study implemented a modified version of the New Zealand and Australian versions of the IAC Study.[22] The investigating team examined the original surveys and, after running a small-scale pre-test, determined that the full instrument would likely require well over 30 minutes to administer. A pilot questionnaire was designed, with input from the research firm conducting the surveys to ensure suitability for a computer-assisted telephone survey in Ontario. This questionnaire used a split-sample strategy of questioning with two subsets of questions. This split-sample strategy also took into account the need to conduct the pilot with finite resources. Adaptations included adjustments for Canadian drink size standards, volume of drinks and slang for drink containers.

The adapted questionnaires were assessed by the IAC Study principal investigators, Drs. Sally Casswell and Tasia Huckle, to ensure suitability as IAC Study instruments. The final adapted Canadian versions, available from the authors on request, were used in field testing.

Alcohol variables

Three derived variables representing drinking patterns were calculated according to the method reported by Chaiyasong et al.[39]

"High frequency drinking" refers to engaging in drinking sessions once a week or more frequently, at any location, over a six-month period. For the pilot study, a drinking session was defined as any occasion during which the respondent drank any amount of drink of at least 4% alcohol by volume.

"Typical occasion quantity" was defined as the weighted mean of standard drinks consumed per session across locations, taking into account location frequency. High quantity per session drinking was defined as drinking a mean of 8 or more standard drinks per occasion.

Definitions for standard drink sizes in terms of alcohol content vary across jurisdictions, with Australian standards containing less alcohol than Canadian standards. In comparisons between the results of the Chaiyasong et al. study[39] and this pilot study, numbers reflect the Australian standard drink size.

All other descriptions reflect Canadian standards (13.6 g of pure alcohol). Several variables related to risky drinking practices were also included. Binge-drinking is defined as 5 drinks or more per drinking session for men and 4 drinks or more per session for women. Pre-drinking refers to drinking alcohol before going to a location where drinking is also planned. Over-drinking refers to consuming more alcoholic drinks than planned.

Data collection

Survey participants had to be permanent residents of Ontario; living in private households (institutionalized populations were excluded, as is typical in telephone surveys,[40] because residents often do not have access to a telephone or appear on landline lists); aged 18–65 years; able to complete the survey in English; and have consumed at least one alcoholic beverage in the past six months. The plan was to survey an equal number of male and female respondents. The sample focused on current drinkers as most of the survey is concerned with capturing drinking behaviours.

Data were collected over a six-week period in the winter of 2017 through telephone surveys conducted by Focal Research. Due the limited resources of the pilot project, a sample of 500 participants was sought. Participants were drawn from two primary samples: a simple random sample of Ontario households with landline telephones, and a sample of Ontario residents with only cellphones. A small number were sampled from a research panel of Ontario residents maintained by Focal Research to achieve the desired number of young men.

A two-tiered sampling strategy was used. Households were first screened to identify any adult aged 18–65 years. Among these households, a brief survey was conducted to compile a roster of eligible adults, their age and sex. Each consenting adult was screened for alcohol consumption in the past six months, and one of these adults

was randomly invited to participate in the survey and randomly allocated to either split sample.

About halfway through data collection, it became clear that the simple random sample initially planned might not provide enough younger or male participants for meaningful comparisons. A quota sampling procedure was then introduced to increase the number of men and participants aged under 45 years.

Of 5381 households invited to participate, 1827 (34%) were successfully contacted and agreed to participate. Of these, 1409 households were disqualified because they did not meet the inclusion criteria (i.e. no alcohol was consumed in the past six months) and/or their sex and age quota had been reached (which accounted for the largest number of disqualified households).

Due to low response rates in younger age groups, more respondents were drawn from older age categories. Upon completing an interview, if the respondent said that another eligible adult was in the household and they agreed to participate, that adult was randomly allocated to a split sample and also interviewed.

An average of 1.03, 1.25 and 1 participants per household were in the cellphone only, landline and research panel samples, respectively. A total of 500 participants from 418 households were included in this pilot study, with 87, 387 and 26 participants from the cellphone only, landline and research panel samples, respectively.

Data were cleaned and verified, with ranges examined to identify any responses outside of expected values and ensure that the study dataset included valid and meaningful responses. Data analysis and reporting of preliminary results were designed to address the three principle goals of the research. Results were weighted by age, sex and highest educational attainment, estimated based on the results of the 2016 census data for Ontario. All analyses were conducted using statistical package SPSS version 22 for Windows (IBM Corp., Armonk, NY, USA).

This project received research ethics approval from the Centre for Addiction and Mental Health (CAMH) REB certificate #114/2016.

Results

Consistent with the sampling approach, the participating sample was evenly split between men and women (Table 1). The largest proportion of respondents (30.8%) was aged between 45 and 54 years, followed by those 55 and above (28.6%). The smallest proportion was made up the youngest respondents aged 18 to 24 (8.4%), followed by those aged 25 to 34 (13.6%). These proportions differ from census data, particularly in the overrepresentation of adults aged 45 to 54 years (18.5% in the census).[41]

Most respondents were married (76.6%); born in Canada; not of Indigenous ethnicity (83.4%); and employed for wages (62.8%). Most respondents were living in a household with no children under the age of 18 (56.1%; data not shown). The mean (SD) number of household residents was 3.1 (1.4). Most of the sample reported completing either college (28.2%) or university (24.6%), while 13.8% reported some college or university and 5.6% reported a trade certificate. The proportion of the current sample who had completed some postsecondary training or education (71.2%) was high in comparison to the 2016 census for Ontario (65.2%).[42] Total family incomes were high, with nearly half of those responding (46.1%) reporting an annual family income of $100 000 or more, a higher median income than reported by Statistics Canada ($86 081).[43]

The IAC Study procedures result in higher consumption estimates, in terms of mean drinks per month, than those seen in a well-regarded survey of the adult population in Ontario, the 2016 CAMH Monitor survey (Table 2). The CAMH Monitor obtained its estimates using a typical quantity–frequency method.[44] Among female drinkers, IAC Study procedures resulted in an estimate of number of drinks consumed per month that was 3.12% higher than the CAMH Monitor survey estimate (statistically nonsignificant). Among male drinkers, IAC Study procedures resulted in a 10.13% higher estimate of number of drinks consumed per month ($t = 2.707$, $p < .001$). In the total population of drinkers, IAC Study procedures resulted in an 6.89% higher estimate of monthly number of drinks consumed, which is shown to significant in a two-tailed impendent samples t-test ($t = 3.175$, $p = .002$).

TABLE 1
Demographic characteristics of the combined sample (N = 500)

Characteristic	Number, n	Proportion, %
Sex		
Female	248	49.6
Male	252	50.4
Age (years)		
19–24	42	8.4
25–34	68	13.6
35–44	93	18.6
45–54	154	30.8
55–65	143	28.6
Relationship status		
Married/long-term relationship	383	76.6
Single	74	14.8
Separated/divorced/widowed	41	8.2
Refused to answer	—ˢ	—ˢ
Highest educational qualification		
High school or less	75	15.0
Trade certificate	28	5.6
Non-trade certificate	8	1.6
Some college or university	69	13.8
College diploma	141	28.2
Bachelor's degree	123	24.6
Graduate or professional degree	56	11.2
Household income (if others in household) per year, $		
<20 000	12	2.7
20 000–39 999	23	4.6
40 000–59 999	39	8.8
60 000–79 999	48	10.7
80 000–99 999	43	9.7
≥100 000	206	46.1
Refused	50	11.2
Unsure	26	58.0
Missing (n = 53)	—	—
Born in Canada		
No	62	12.4
Indigenous ethnicity		
No	417	83.4
Yes	21	4.2
Employment (multiple response allowed)		
Student	30	6.0
Employed for wages	314	62.8
Self-employed	81	16.2
Unemployed	15	3.0
Sick or on disability benefits	22	4.4
Retired	58	11.6
Parent / caregiver / doing unpaid work at home	28	5.6

ˢ Counts of 5 or less were suppressed.

TABLE 2
Comparison of average number of drinks per month reported by Ontario drinkers, IAC Study sample 1 (*n* = 255) method and CAMH Monitor Survey

Consumption	Average drinks per month (*n*)	Valid respondents (*n*)	SD
Females			
IAC Study	15.2	124	20.2
CAMH Monitor	12.1	1179	19.7
Males			
IAC Study	36.8*	131	45.9
CAMH Monitor	26.6	1193	40.1
Total			
IAC Study	26.3*	255	37.3
CAMH Monitor	19.4	2372	32.4

Abbreviations: CAMH, Centre for Addiction and Mental Health; IAC, International Alcohol Control; SD, standard deviation.
* Significantly higher than value obtained by the CAMH Monitor, *p* < .05 (*t*-test).

The mean number of drinks consumed per drinking session varied substantially across drinking locations (Table 3). At 1.27 (0.51) and 1.70 (1.38), respectively, the fewest mean (SD) number of drinks per occasion were reported for drinking at work or restaurants. At 3.09 (2.23), about twice as many drinks per occasion were consumed when drinking at home. The average number of drinks per occasion was 6.12 (5.84) when drinking at a cottage/cabin or while camping and 4.24 (3.01) at public special events, indicative of binge-drinking.

Approximately 53.6% of the Ontario pilot study sample reported high frequency drinking, defined as engaging in a drinking session once a week or more frequently at all locations over a six-month period,

while 6.5% of participants drank on average 8 or more drinks per drinking session (Table 4). The Ontario pilot study results are somewhat lower than those of England, Scotland and New Zealand for high frequency drinking, and much lower than all other countries for heavy typical occasion. Data from the WHO *Global Status Report on Alcohol and Health 2018* indicate that total per capita alcohol consumption for Canada is somewhat lower than for England, Scotland and New Zealand, consistent with the survey data we present here. [30]

When asked if they or anyone else had been injured as a result of their drinking, 91.2% said this had never happened and 7.5% said it had happened but not in the past six months (Table 5). When asked if a

relative, friend, doctor or other health care worker had been concerned about their drinking or had suggested they cut down, 92.4% said that this had never happened to them, 5.3% said that this had happened but not in the past six months and 2.2% said that this had happened in the past six months. When asked if they had ever been involved with police as a result of their drinking, 98.1% said that this had never happened to them.

When asked about getting injured as a result of someone else's drinking, 86.4% said that this had never happened to them, 10.3% said that this had happened but not in the past six months and 3.3% said that this had happened in the past six months (Table 5). When asked if they had ever experienced other negative effects on their lives as a result of others' drinking, 63.3% said that this had never happened to them, 25.6% said that this had happened but not in the past six months and 11.2% said that this had happened in the past six months.

When asked if they supported restrictions on the number of alcohol outlets, the largest proportion of participants (44.2%) opposed or strongly opposed them such restrictions, while the next largest proportion (30.5%) neither supported nor opposed them (Table 6). About half of the respondents (51.6%) strongly opposed and about one-quarter (26.3%) opposed an increase in the price of alcohol. While the largest proportion of respondents neither supported nor opposed restrictions on alcohol advertising (35.0%), 31.0% supported and 5.9% strongly supported advertising restrictions. The largest proportion (41.4%) opposed and 20.6% strongly opposed earlier closing times for buying alcohol, while 24.6% neither supported nor opposed this. Of note, almost two-thirds of respondents (64.2%) strongly supported more police spot checks to detect drinking and driving.

A policy change at the time of the survey was the introduction of the sale of beer and wine in large grocery stores in Ontario; this began in 2015.[45] Among those who had purchased alcohol in the previous six months, there was little variation by age or sex between those who had and those who had not purchased alcohol at a large grocery store (Table 7). However, the rate of over-drinking was higher among those who had purchased alcohol

TABLE 3
Mean number of drinks consumed per drinking session in Ontario by location (Sample 1, *n* = 248)

Drinking location	Number of drinks				
	Mean (*n*)	Valid (*n*)	SD	Maximum	Minimum
Home	3.09	234	2.62	15.75	0.44
Someone else's home	3.10	196	2.64	15.12	0.63
Workplace	1.27	7	0.51	2.00	0.70
Cottage/cabin or camping	6.12	39	5.84	36.68	0.63
Unlicensed public spaces	4.00	26	2.95	10.40	1.00
Pubs/bars/hotels	2.72	143	2.32	15.02	0.70
Restaurants	1.70	165	1.38	8.00	0.00
Other public licensed spaces	2.29	52	2.39	15.75	0.69
Public special events	3.09	22	2.23	10.80	0.69
Private special events	4.24	73	3.01	16.00	0.70
Private clubs	3.30	23	3.65	15.75	0.70

Abbreviation: SD, standard deviation.

TABLE 4
Cross-jurisdictional comparison of prevalence of drinking behaviours ranked by per capita consumption per year in litres of pure ethanol (Sample 1, n = 243)

Country	Drinking behaviour		
	High frequency[a]	Heavier typical occasion[a]	Per capita consumption[b]
England	77.8	10.0	11.4[c]
Scotland	74.7	13.8	11.4[c]
New Zealand	75.3	10.2	10.7
Australia	71.0	12.2	10.6
Saint Kitts and Nevis	67.3	15.6	9.4
South Africa	49.1	53.6	9.3
Ontario (Canada)	**53.6**	**6.5**	**8.9[d]**
Viet Nam	59.3	13.1	8.3
Thailand	41.0	10.3	8.3
Mongolia	16.0	14.5	7.4

[a] Source: Chaiyasong et al.[39]
[b] Source: World Health Organization.[30]
[c] Total consumption is for the United Kingdom.
[d] Total consumption is for all of Canada.

TABLE 5
Harms and negative consequences experienced as a result of own or someone else's drinking in the past six months (Sample 2, n = 249)

Consequence	Number of respondents		
	n	%	95% confidence limits (%)
You or someone else injured as the result of your drinking?			
Never	227	91.2	87.16–94.22
Yes, but not in the last 6 months	19	7.5	4.82–11.42
Yes, during the last 6 months	—[s]	—[s]	—
Relative, friend or a doctor or other health worker concerned about your drinking or suggested you cut down?			
Never	230	92.4	88.58–95.18
Yes, but not in the last 6 months	13	5.3	2.96–8.52
Yes, during the last 6 months	6	2.2	1.01–4.90
Involvement with police due to own drinking			
No	243	98.1	95.64–99.23
Yes	5	1.9	0.77–4.36
Not stated	—[s]	—[s]	—
Injured as a result of someone else's drinking			
Never	215	86.4	81.67–90.18
Yes, but not in the last 6 months	26	10.3	7.10–14.69
Yes, during the last 6 months	8	3.3	1.53–5.97
Any other negative effects on your life as a result of someone else's drinking			
Never	157	63.3	56.93–68.87
Yes, but not in the last 6 months	64	25.6	20.58–31.39
Yes, during the last 6 months	28	11.2	7.77–15.61

[s] Counts of 5 or less were suppressed.

from a large grocery store than among those who had not (53% vs. 40%, respectively; p = .039), while there was no statistically significant difference in the prevalence of binge-drinking (62.13% vs. 58.75%, respectively; statistically nonsignificant).

Discussion

The purpose of this study was to pilot the IAC Study instrument in Canada in order to (1) adapt the IAC Study instrument to the Canadian context; (2) pilot the survey tool in a sample of participants in Ontario; and (3) provide a preliminary assessment of the information that can be gathered from the IAC Study–based instrument compared with the data collected by other IAC Study sites.

There were challenges and opportunities in adapting the original IAC Study instrument for use in Canada. A number of terms used in New Zealand for types of alcohol beverages and beverage sizes needed to be adapted. Also, typical drinking occasions differed between the two countries. For example, the Ontario sample showed far fewer heavier typical drinking occasions, as shown in Table 4. Before the instrument was ready for use in Ontario, the specific terminology related to beverages, sizes and drinking locations needed rewording, with care taken to avoid altering the essential meaning.

The decision to use a split-sample approach was a pragmatic one as it allowed all main survey dimensions to be piloted without imposing a time burden on respondents. The final average length for Sample 1 was 27.2 minutes and for Sample 2 was 30.4 minutes. These adjustments demonstrate that, with some reasonably small methodological modifications, the IAC Study instrument can be applied to the Ontario population.

The IAC Study method of collecting information on alcohol consumption based on information session location, type of drink and number of drinks per session results in higher estimates of consumption.[46] The IAC Study method of calculating consumption resulted in 35.6% higher estimates of average monthly consumption for the total sample compared to the standard quantity–frequency method used in the well-regarded CAMH Monitor survey of the Ontario adult population.[44]

TABLE 6
Attitudes related to possible alcohol policies (Sample 1, *n* = 247)

Possible alcohol policy	Number of respondents		
	n	%	Confidence limits (%)
Restrictions on the number of alcohol outlet			
Strongly oppose	22	8.3	5.5–12.3
Oppose	93	35.9	30.0–41.6
Neither support nor oppose	79	30.5	24.9–36.0
Support	51	19.5	15.1–24.7
Strongly support	14	5.5	3.1–8.6
Don't know/refused	—s	—s	—
An increase in the price of alcohol			
Strongly oppose	134	51.6	45.3–57.4
Oppose	69	26.3	21.4–32.0
Neither support nor oppose	33	12.7	9.0–17.1
Support	13	4.8	2.8–8.1
Strongly support	9	3.5	1.7–6.2
Don't know/refused	—s	—s	—
Restrictions on alcohol advertising and promotion			
Strongly oppose	17	6.6	4.0–10.0
Oppose	53	20.4	15.8–25.5
Neither support nor oppose	91	35.0	29.3–40.8
Support	81	31.0	25.7–36.8
Strongly support	15	5.9	3.40–9.07
Don't know/refused	—s	—s	—
Earlier closing times for buying alcohol			
Strongly oppose	54	20.6	16.1–25.9
Oppose	108	41.4	35.5–47.4
Neither support nor oppose	64	24.6	19.6–30.0
Support	22	8.5	5.5–12.3
Strongly support	12	4.7	2.5–7.7
Don't know/refused	—s	—s	—
More police spot checks to detect drinking and driving			
Strongly oppose	8	3.1	1.5–5.7
Oppose	12	4.5	2.5–7.7
Neither support nor oppose	20	7.8	4.9–11.4
Support	51	19.5	15.1–24.7
Strongly support	167	64.2	58.0–69.6
Don't know/refused	—s	—s	—

s Counts of 5 or less were suppressed.

It has long been recognized that survey-based measures of alcohol consumption substantially underestimate population alcohol consumption, as reflected by per capita consumption measures based on alcohol sales data.[47] Thus, while survey-based measures of alcohol use provide useful and valuable indicators of harmful drinking, their underestimation of population alcohol consumption lead to concerns about their utility for health planning and policy purposes.[47] Survey methods, like the IAC Study, that account for some of the "missing" alcohol may provide important additional value to efforts to understand and address harmful alcohol consumption.

The ability of the IAC Study methods to detect a higher level of consumption in Ontario demonstrates consistency between the pilot study and existing research on the IAC and supports the appropriateness of its use in Ontario.

Other results point to the importance of collecting the more comprehensive and nuanced data on alcohol use that is available with the IAC Study instrument. For example, heavy episodic or binge-drinking is widely recognized as a hazardous form of drinking, in part because on binge occasions individuals are more likely to be intoxicated and experience injuries, get into fights, drive while impaired and so on. Data on where binge-drinking occurs are sparse, and there is a common belief that binge-drinking occasions is common in bars.[48] However, we observed that the average number of drinks per drinking occasion was relatively low in bars compared with other locations. This may point to the success of efforts in the past few years to control heavy or excessive drinking in bars, taverns and pubs.[49]

Of particular interest, we found that the average or typical drinking occasion when staying at a cottage/cabin or camping and at public special events is equivalent to binge-drinking. This may be influenced by the relative isolation and control over such events, which might lower the chances for drinking at several locations in the same day, for example, pre-drinking before going to a bar. Identifying locations where heavy or binge-drinking are most common may help inform more effective prevention efforts.

Compared to other jurisdictions that have used the IAC Study design, high frequency drinking and high quantities in typical drinking occasions are relatively low in this pilot study. According to the WHO *Global Status Report on Alcohol and Health 2018,* Canada does have lower drinking rates than many of the comparators used.[30]

Despite employing several sampling strategies to try to increase the number of younger adult respondents, this pilot study had a disproportionately large number of adults aged over 45. This likely

TABLE 7
Comparison of risky drinking behaviours between those who had and had not bought alcohol at a grocery store in the past six months (Samples 1 + 2)

| Parameter | Number of respondents | | | | χ² test | p |
| | Did not buy at a grocery store | | Bought at a grocery store | | | |
	Count	%	Count	%		
Sex (n = 398)					0.592	.442
Female	193	48.6	40	53.2		
Male	205	51.5	35	46.8		
Age category (n = 398)					3.214	.523
18–24 years	49	12.2	7	9.9		
25–34 years	57	14.4	15	19.6		
35–44 years	55	13.8	13	16.9		
45–54 years	73	18.4	10	12.9		
55+ years	164	41.2	31	40.8		
Pre-drinking (n = 397)					5.364	.021
No	286	72.0	44	58.8		
Yes	111	28.0	31	41.2		
Over-drinking (n = 395)					4.242	.039
No	235	59.5	35	46.5		
Yes	160	40.5	40	53.5		
Planned drunk (n = 398)					0.364	.546
No	296	74.3	54	71.3		
Yes	102	25.7	22	28.8		
Binge-drinking (5+ drinks per occasion) (n = 399)					0.325	.569
No	151	37.9	31	41.3		
Yes	248	62.1	44	58.8		

resulted in underestimating heavy drinking as binge-drinking tends to be more common in younger age groups in Ontario.[50] Despite this possible bias, the relative drinking patterns of Ontarians this pilot study determined were proportional to the findings of other current sources of information on drinking behaviour patterns.[30] That the study data are in line with comparisons between Canada and other countries[30] also indicates the appropriateness of the IAC Study for use in Canada.

Only about 8% of respondents said they had personally experienced harm or other problems linked with their own drinking (Table 5). However, nearly 14% reported being injured as a result of others' drinking, and about 37% reported experiencing negative effects as a result of someone else's drinking. The latter is substantially higher than that reported in surveys of Ontario in 2006[6] although the 2006 survey included non-drinkers, who may be less likely to have experienced harm from others.[51]

Implementation of the IAC Study in Canada would expand the collection of important data on Canadians' attitudes towards alcohol policy. The findings on attitudes on five alcohol policies (Table 6) show some support for effective policies but rejection of others that are also known to be very effective, such as alcohol pricing.[2,52,53] The proportion ranged from 84% supporting police spot checks to detect drinking and driving, to only 8% supporting an increase in the price of alcohol. However, it is noteworthy that 37% supported restrictions on alcohol advertising and promotion. These findings are generally in line with previous research focusing on Ontario adults,[54] and at least partially support a claim by Room et al.[2]

that popular policies are largely ineffective, and effective policies are unpopular.

The pilot study was also able to capture information on a relatively recent policy change in Ontario, the sale of beer of and wine in grocery stores. Though grocery store purchasing showed no difference in sex and age, there was a significant difference in rate of over-drinking with grocery store purchasers drinking more than they had planned in a drinking session more often. Though the differences in pre-drinking, planned intoxication and binge-drinking were not significant, they were fairly large and would likely show significance in a sample with greater statistical power.

More frequent risky drinking practices among grocery store purchasers has important implications for policy decisions when considered through the lens of the total consumption model of alcohol-related harm. This model holds that an increase in the accessibility of alcohol is associated with an increase in the consumption, which in turn, is strongly predictive of the extent of alcohol-related harms.[55] The association of over-drinking with grocery store purchasing in particular suggests that the introduction of alcohol purchasing in grocery stores presents a risk to population health. It should be noted that the direction of this relationship is not discernible given the current cross-sectional design. In order to determine whether availability increases the risk of harmful drinking practices or whether those who engage in riskier drinking practices are likely to buy alcohol at any location (including grocery stores) more frequently, longitudinal analysis of drinking patterns is necessary. Implementation of the longitudinal component of the IAC Study would make such a determination possible.

Limitations

An important feature of the IAC Study is its longitudinal design, which allows the tracking of changing drinking behaviours across policy changes, but longitudinal data collection was outside the scope of the current pilot project. The results of this pilot suggest that implementing a longitudinal design would be a necessary next step in implementing the IAC Study in Canada. However, as is the trend in much survey research, low response rates continue to be a challenge. Future research

should consider methods for increasing participation rates, such as provision of incentives while reducing the potential for bias in participation.

Another important limitation of this current study was the limited representativeness of the sample. Quota sampling and inclusion of a cellphone sampling frame were implemented in order to bring the age distribution closer to the age profile of Ontario adults. However, the sample was not reflective of the age distribution of Ontario, with adults over the age of 45 overrepresented. Weighting procedures were used to help reduce the effect of this bias, but the limitations of the sample should still be kept in mind when interpreting the study results.

A small degree of clustering was present in our sample, with 500 participants drawn from 418 households. Our analyses did not account for the clustered nature of the sample, and variance may be underestimated due to this. This relatively small sample also means that the current analyses are likely to be underpowered.

The survey design also relied on self-reporting of drinking and purchasing behaviours, the experience of harm and attitudes on policy. As such, findings in this study may reflect recall or social desirability bias on part of survey respondents.

Conclusion

The results of this pilot study suggest that the IAC Study can be feasibly applied in the Canadian context. The IAC Study represents an important opportunity to improve the quality of information on drinking behaviours in Ontario and other Canadian jurisdictions at a time when recent, ongoing and suggested changes in alcohol policy may increase drinking and drinking-related harms. Improved methods for identifying harmful drinking patterns, attitudes towards alcohol policy and negative consequences of drinking alcohol plus the ability to compare these findings with those in other countries will likely improve prevention of these harms.

Despite the potential value of the IAC Study in Canada, the pilot also identified potential problems in the length of survey administration, difficulties in obtaining an appropriate sample and the limited insight of a cross-sectional pilot for a longitudinal study.

Conflict of interest

RG is the Editor-in-Chief of the HPCDP Journal, but recused himself from taking any editorial decisions on this manuscript.

Authors' contributions and statement

RG, NG and RM conceived the study. NG, RM, MvM and GS managed data collection. RG and HO provided study guidance and support. MvM analysed the data. NG, RM, MvM and HO interpreted the results. NG, MvM and HO wrote the manuscript. All authors reviewed and approved the final manuscript.

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