The effects of alcohol container labels on consumption behaviour, knowledge, and support for labelling: a systematic review

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Alcohol container labels might reduce population-level alcohol-related harms, but investigations of their effectiveness have varied in approach and quality. A systematic synthesis is needed to adjust for these differences and to yield evidence to inform policy. Our objectives were to establish the effects of alcohol container labels bearing one or more health warnings, standard drink information, or low-risk drinking guidance on alcohol consumption behaviour, knowledge of label message, and support for labels. We completed a systematic review according to Cochrane and synthesis without meta-analysis standards. We included all peer-reviewed studies and grey literature published from Jan 1, 1989, to March 6, 2024, in English, French, German, or Spanish that investigated the effects of alcohol container labels compared with no-label or existing label control groups in any population on alcohol consumption behaviour, knowledge of label message, or support for labels. Data were synthesised narratively as impact statements and assessed for risk of bias and certainty in the evidence. A protocol was preregistered (PROSPERO CRD42020168240). We identified 40 publications that studied 31 labels and generated 17 impact statements. 24 (60%) of 40 publications focused on consumption behaviour and we had low or very low certainty in 13 (59%) of 22 outcomes. Alcohol container labels bearing health warnings might slow the rate of alcohol consumption (low certainty), reduce alcoholic beverage selection (moderate certainty), reduce consumption during pregnancy (low certainty), and reduce consumption before driving (moderate certainty). Interventions with multiple types of rotating alcohol container labels likely substantially decrease alcohol use (moderate certainty) and reduce alcohol sales (high certainty). To the best of our knowledge, this is the first systematic review on multiple types of alcohol container labels assessing their effects for certainty in the evidence. Limitations included heterogeneity in label designs and outcome measurements. Alcohol container labels probably influence some alcohol consumption behaviour, with multiple rotating messages being particularly effective, although effects might vary depending on individual health literacy or drinking behaviour. Alcohol container labels might therefore be effective components of policies designed to address population-level alcohol-related harms.

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Introduction

In 2016, alcohol contributed to 2·8 million deaths and caused 5·1% of the global disease and injury burden.[1] This burden is disproportionately borne by those aged 20–39 years, for whom alcohol is the leading cause of disability-adjusted life-years.[2] In Canada, alcohol accounted for an estimated CA$19·7 billion or 40% of substance use costs in 2020, causing approximately 650 000 emergency department visits, 118 000 admissions to hospital, and 17 000 deaths.[3] Although the likelihood of health risks increases with increasing alcohol use, even small amounts can contribute to chronic health conditions—such as liver cirrhosis—and at least seven types of cancers, with new evidence continuing to emerge.[4–6] On the basis of this evidence, alcohol has been highlighted as a public health issue by WHO, which emphasises that no level of alcohol consumption is safe for health.[7,8]

One policy option recommended by WHO to reduce alcohol-related harms and costs is government-mandated alcohol container labelling, which aims to communicate alcohol-related health and safety information to consumers to increase alcohol health literacy and support safer consumption behaviour.[9,10] Alcohol container labels might include health warnings, standard drink information, low-risk drinking guidance, or several of these elements, either within a single label or across multiple labels affixed across different containers, which expose the consumer to a rotating selection of messages. Alcohol container labels are appealing to regulators because of their low cost and extensive reach among consumers at the points of purchase and pour, with those consuming high volumes exposed most often.[11] Although alcoholic beverages and cigarette smoke are both classified as human carcinogens by the International Agency for Research on Cancer, only 66 of 194 WHO member states have implemented mandatory alcohol container labels, compared with the 122 countries that require health warnings on cigarette packages.[12–15] Moreover, cigarette package warnings commonly cover a substantial proportion of the package and include causal language and graphic photographs of tobacco-associated diseases. By contrast, alcohol container label position, format (ie, text, icon, or both), and content vary considerably across jurisdictions. Health warnings, which are not always included, are often vague or feature harms relevant to only some population subgroups, such as harms related to pregnancy or driving.[16] In 2023, Ireland became the first country to mandate comprehensive alcohol container labels, including a cancer warning.[17] This legislation is being strongly opposed by the alcohol industry and some alcohol-producing countries.[18]

With calls by WHO and the EU to mandate alcohol container label implementation, related interest and

investigations have increased both internationally and in Canada, where alcohol is exempt from most product labelling requirements.[10,19,20] Health Canada's 2023 Canadian Drugs and Substances Strategy includes prevention and education as one of its four priority areas and the 2023 Guidance on Alcohol and Health, developed by the Canadian Centre on Substance Use and Addiction (CCSA), recommends alcohol container labels as an intervention to increase alcohol risk awareness.[6,21] However, existing primary research varies in methodology, outcomes, sampling approach, and analysis, which makes evidence interpretation for policy development challenging. Some attempts to review this complex evidence base have relied on an intentionally narrow scope to avoid introducing excess heterogeneity.[22] Others, striving to include all available evidence, chose not to assess studies in a formal framework, restricting their interpretability.[23–27] These attempts have resulted in a gap in the review literature for a comprehensive synthesis that also assesses results for certainty in the evidence and thereby provides a solid basis for further research and policy development. Therefore, the objective of this study is to provide a comprehensive evidence synthesis evaluating the effects of health warning labels, standard drink labels, low-risk drinking guideline labels, and a combination of these messages (labels with multiple or comprehensive messages) on three key policy-relevant outcomes: alcohol use and related behaviour, knowledge of label message, and support for labelling.

Methods

We did a systematic review that adhered to Cochrane methodology and is reported according to the PRISMA guidelines and the synthesis without meta-analysis guidelines.[28–30] A study protocol was pre-registered and is available online (PROSPERO CRD42020168240)

For the **study protocol** see https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020168240

Search strategy

The database search strategy covering five databases (MEDLINE, Embase, Cochrane Central, PsycINFO, and Scopus) was done on Sept 16, 2021, and was updated on Nov 15, 2022, and March 6, 2024. It was adapted in consultation with a health librarian from a previous systematic review done by Hobin and colleagues for the CCSA and peer-reviewed according to peer review of electronic search strategies (PRESS) guidelines.[31,32] The previous CCSA review search was done in May, 2020, and December, 2020, and restricted search dates to 2015 and later for health warning labels, 2018 and later for standard drink labels, and 1989 and later for low-risk drinking guideline labels. For this systematic review, the search was expanded to cover publications from Jan 1, 1989 for all three label types, the implementation date of mandatory alcohol container warning labels in the USA.[33] A manual search of reference lists and grey literature was conducted in September, 2021. Details are available in the appendix (pp 34–42).

See **Online** for appendix

Selection criteria

Screening and data extraction forms were developed and piloted a priori (appendix pp 2–17) and applied by use of DistillerSR. Studies in English, French, Spanish, or German (languages selected because of the team resources available) reporting primary data for interventions with or exposures to alcohol container labels bearing health messages, standard drink information, low-risk drinking guidelines, or labels with multiple or rotating (ie, labels applied to containers that vary between containers, over time, or both) messages, including at least one of these (labels with multiple or comprehensive messages) were eligible for initial inclusion, regardless of study design or population. Exposure studies were excluded if alcohol container labels were implemented voluntarily by the alcohol industry (rather than mandated or legislated; n=6) due to the associated risk of inconsistent application.

Three outcomes of interest were prioritised in consultation with subject matter and policy experts (EH and TS): alcohol consumption behaviour (eg, drinking and driving and alcohol sales), knowledge of the information conveyed on the alcohol container labels, and support for alcohol container labels. For behaviour and knowledge outcomes, only studies with a no-label or pre-existing label control group were included (n=19 studies excluded for the absence of an eligible control group). Knowledge outcomes were included if the assessment tool or measure did not prompt participants with the label in question (ie, label recall or recognition was excluded; n=17). For support outcomes, most available evidence was reported as uncontrolled prevalence data, which were synthesised separately to complement available controlled data and provide a more comprehensive understanding of the outcome. Two subgroups of interest based on drinking status or health literacy were identified, with education status accepted as a proxy measure for health literacy.[34]

Screening

References were prioritised for screening by continuous, automated re-ranking via machine learning on the basis of reviewer responses (DistillerSR AI Re-Rank). Relevance screening of titles and abstracts (completed by AMEZ, GL, KM, and NA) was overinclusive, such that references included by at least one reviewer moved to eligibility assessment. Each publication from the first database search was assessed for inclusion by two reviewers independently. Results from the search updates (less than 10% of total search results) were independently screened for relevance by one reviewer (AMEZ) and the DistillerSR Artificial Intelligence System (DAISY) in parallel. DAISY applied a classifier trained on the dataset from the initial database search and validated it by use of the in-platform analysis tool. Full text eligibility screening required consensus by two independent reviewers (completed by AMEZ, JP, KM,

and LB), who resolved conflicts by discussion or in consultation with a third reviewer.

Data extraction and analysis

All data extraction and analysis was completed by AMEZ, KM, and LB. Publications reporting prevalence (absolute or relative), risk ratio, risk difference, mean rating (eg, Likert scale), or adjusted odds ratio data for at least one of the three outcomes of interest were identified by one reviewer and verified by a second, with conflicts resolved as above. Data on study details (including funding sources), sample characteristics, intervention design, details of exposure, and label design characteristics were extracted in the same way. Odds ratios were converted into risk ratios (RRs) for effect size categorisation. Non-RR data were categorised for effect size according to thresholds defined a priori by consensus with subject matter experts (appendix p 18) and reported narratively. Publications reporting data only in other formats (eg, time trend analyses) were extracted narratively as presented by publication authors. When multiple timepoints were available, data for the longest follow-up were included in the synthesis. Uncontrolled prevalence data were only extracted if controlled data were not available and were summarised graphically by country, with subgroup data reported in tabular form. For two publications, attempts were made to contact study authors to provide additional details on label design, one of which was successful.

Risk of bias and GRADE

All work on the risk of bias and the GRADE approach was completed by AMEZ, KM, and LB. Outcomes were assessed for risk of bias with RoB 2, ROBINS-I, and ROBINS-E tools, and the Joanna Briggs Institute (JBI) critical appraisal tool for prevalence studies as appropriate.[35–38] One reviewer assessed each outcome for risk of bias, with their assessment verified by a second reviewer. Conflicts were resolved as above. Certainty in the evidence was assessed by use of the GRADE approach by two reviewers in the same manner as the risk of bias assessment.[39] This approach was done separately for each label type, but done across study and label designs because studies were often entirely unique in their approach and the overall number of studies was small (N=40), prohibiting a more granular synthesis. The detailed decision framework for this process is available in the appendix (pp 30–33). In line with available guidance, starting certainty was established by the risk of bias assessment tool used and synthesised separately: data assessed with ROB-2, ROBINS-I, or ROBINS-E started at high certainty in the evidence, whereas data assessed with the JBI prevalence tool started at low certainty in the evidence in line with GRADE guidance.[40] Due to heterogeneity in intervention design and outcome reporting, outcomes were synthesised narratively in the form of impact statements according to GRADE guidance.[41] Given the low number of publications per outcome, publication bias assessment was not feasible due to insufficient power for recommended testing approaches.[42] Given the heterogeneity of the literature, a sensitivity analysis was done in which only studies at low or moderate risk of bias were included. Due to limited data availability and insufficient homogeneity, uncontrolled data on prevalence of support for alcohol container labels and all subgroup data were narratively summarised and not assessed with GRADE. No funding was sought for this work.

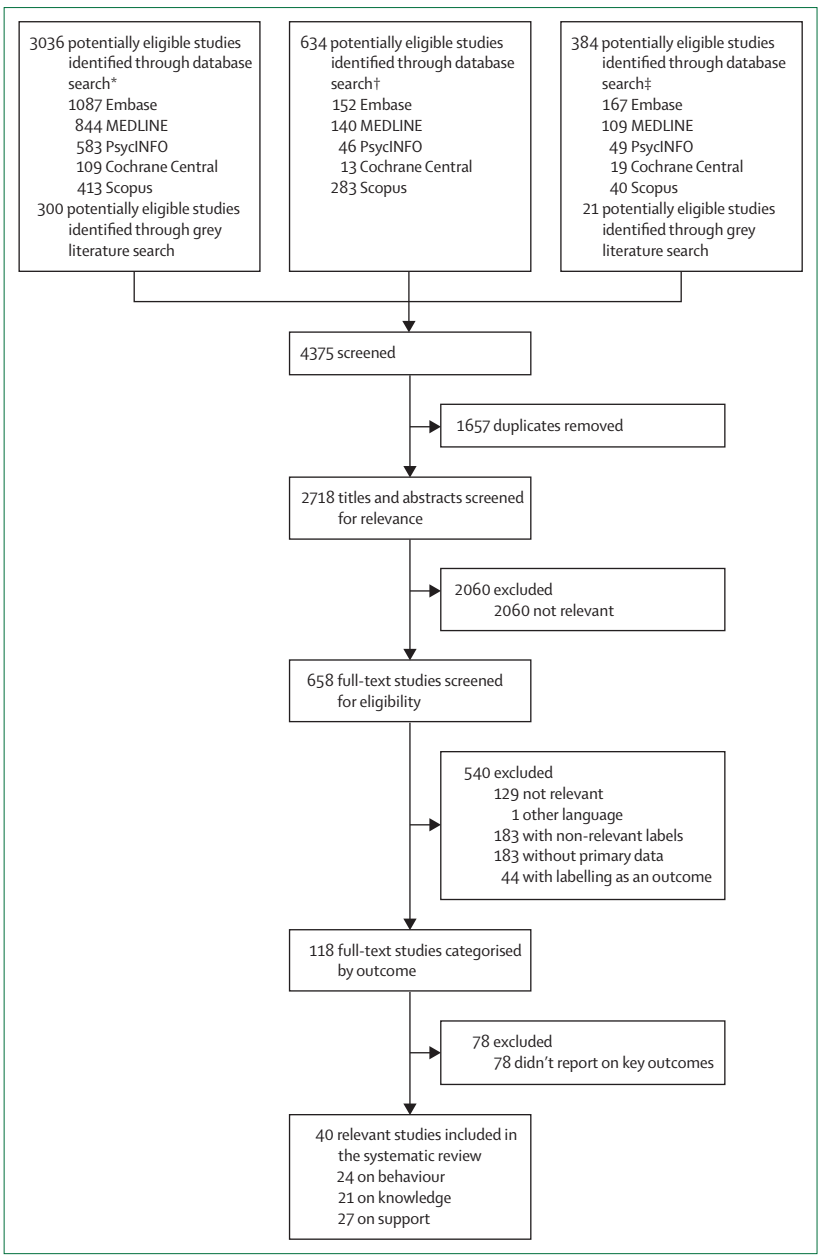

Figure: **Study selection**
PRISMA flow diagram depicting the selection process for publications included in this systematic review. *Search in September, 2021. †Updated search in November, 2022. ‡Updated search in March, 2024.

	Project type, study dates	Country	N (female: male)	Sample description	Alcohol container label type; ID*	Study design	Exposure to alcohol container labels	Control or comparison groups	Outcomes	Funding information
Blackwell et al (2018)[43]	NA, NR	UK	1884 (50:50)	Adults†, any drinking status	Health warning label, standard drink labels; 7 and 17	RCT	Once on virtual container	Pre-intervention alcohol by volume label	Alcoholic drink selection; support for health warning labels and standard drink labels	UK Centre for Tobacco and Alcohol Studies
Brennan et al (2022)[44]	NA, 2020	Australia	1755 (52:48)	Adults‡, ≥1 drink per week in past year	Health warning label; 24–26	RCT	Repeat (multiple days) on virtual container	No label	Alcohol consumption; knowledge of alcohol health risks	Australian National Health and Medical Research Council
Clarke et al (2021)[45]	NA, NR	UK	6087 (50:50)	Adults†, ≥1 drink per week (wine or beer)	Health warning labels; 8	RCT	Repeat (same day) on virtual container	No label	Alcoholic drink selection	The Wellcome Trust
Clarke et al (2023)[46]	NA, NR	UK	608 (55:45)	Adults†, ≥1 drink per week (wine or beer)	Health warning labels; 27 and 28	RCT	Once as separate virtual object (not on container)	No label	Standard drink units purchased	The Wellcome Trust
Coomber et al (2017)[47]	NA, NR	Australia	1061 (50:50)	Adults§, weighted to be representative of the population, any drinking status	Standard drink labels; 18	RCS	Continuous (mandated labelling) on real container	No label	Support for standard drink labels	NR
Dekker et al (2020)[48]	NA, NR	Canada, China, India, and USA	7545 (NR)	Adults†, any drinking status	Health warning labels; 1–4 and 6	CS	Continuous (mandated labelling) on real container	None	Support for health warning labels	NR
Dumas et al (2018)[49]	NA, 2012	France	3603 (100:0)	Pregnant women (age NR), quota sampled, any drinking status	Health warning labels; 19	CS	Continuous (mandated labelling) on real container	None	Knowledge of alcohol health risks	French Ministry of Health
Gill and O'May (2007)[50]	NA, NR	UK	180 (100:0)	University students¶, any drinking status	Standard drink labels; 20	CS	Once on virtual container	None	Support for standard drink labels	Queen Margaret University College
Glasgow et al (2022)[51]	HINTS, 2020	USA	3865 (51:49)	Adults†, weighted, any drinking status	Health warning labels; 6	CS	Continuous (mandated labelling) on real container	None	Support for health warning labels	National Institute of General Medical Sciences
Graves et al (1993)[52]	National household survey, 1990–91	USA	6096 (57:43)	Adults†, any drinking status	Health warning labels; 6	RCS	Continuous (mandated labelling) on real container	No label	Knowledge of alcohol health risks	National Institute on Alcohol Abuse and Alcoholism
Greenfield et al (1999)[53]	National household survey, 1990–94	Canada and USA	9187 (NR)	Adults†, excluding lifetime abstainers	Health warning labels; 6	QE	Continuous (mandated labelling) on real container	Pre-exposure	Alcohol consumption; alcohol-impaired driving; limiting alcohol consumption due to driving	National Institute on Alcohol Abuse and Alcoholism
Hankin et al (1998)[54]	Detroit Medical Centre, 1986–95	USA	21 117 (100:0)	African American pregnant women‖, any drinking status	Health warning labels; 6	QE (time series)	Continuous (mandated labelling) on real container	Pre-exposure	Alcohol consumption; alcohol consumption during pregnancy	National Institute on Alcohol Abuse and Alcoholism
Hankin et al (1993)[55]	Detroit Medical Centre, 1986–91	USA	12 026 (100:0)	African American pregnant women‖, any drinking status	Health warning labels; 6	QE (time series)	Continuous (mandated labelling) on real container	Pre-exposure	Alcohol consumption quantity	National Institute on Alcohol Abuse and Alcoholism
Hankin et al (1993)[56]	Detroit Medical Centre, 1989–91	USA	4379 (100:0)	African American pregnant women‖, any drinking status	Health warning labels; 6	QE (time series)	Continuous (mandated labelling) on real container	Pre-exposure	Alcohol consumption quantity	National Institute on Alcohol Abuse and Alcoholism
Nanos Research for Health Canada (2023)[57]	NA, 2023	Canada	9812 (49:51)	Adults**	Health warning labels, standard drink labels, low-risk drinking guidance labels; 29–31	CS	Once as separate virtual object (not on container)	None	Support for health warning labels; support for standard drink labels; support for low-risk drinking guidance labels	Health Canada

(Table 1 continues on next page)

	Project type, study dates	Country	N (female: male)	Sample description	Alcohol container label type; ID*	Study design	Exposure to alcohol container labels	Control or comparison groups	Outcomes	Funding information
(Continued from previous page)										
Hobin et al (2020)[58]	Whitehorse, YT, 2017–18	Canada	2049 (49:51)	Adults††, ≥1 drink in past 30 days	Labels with multiple or comprehensive messages; 9, 10, and 11	QE	Repeat (across months) on real container	Existing health warning labels	Alcohol consumption	Health Canada
Hobin et al (2020)[59]	Whitehorse, YT, 2017–18	Canada	1647 (49:51)	Adults††, ≥1 drink in past 30 days	Labels with multiple or comprehensive messages; 9, 10, and 11	QE	Repeat (across months) on real container	Existing health warning labels	Alcohol consumption	Health Canada
Hobin et al (2020)[60]	Whitehorse, YT, 2017–18	Canada	2049 (49:51)	Adults††, ≥1 drink in past 30 days	Labels with multiple or comprehensive messages; 9, 10, and 11	QE	Repeat (across months) on real container	Existing health warning labels	Knowledge of alcohol health risks; support for health warning labels	Health Canada
Hobin et al (2018)[61]	NA, 2014	Canada	2016 (52:48)	Adults††, ≥1 drink in past 12 months	Standard drink labels; 21	RCT	Repeat (across months) on real container	Alcohol by volume label	Support for standard drink labels	NR
Kaskutas (1993)[62]	National household survey, 1991	USA	2017 (NR)	Adults†, any drinking status	Health warning labels; 6	CS	Continuous (mandated labelling) on real container	No label	Alcohol consumption; support for health warning labels	National Institute on Alcohol Abuse and Alcoholism
Kaskutas and Greenfield (1992)[63]	National household survey, 1989–90	USA	2000 (59:41)	Adults†, any drinking status	Health warning labels; 6	RCS	Continuous (mandated labelling) on real container	No label	Knowledge of alcohol health risks	National Institute on Alcohol Abuse and Alcoholism
Lacoste-Badie et al (2022)[64]	NA, NR	France	101 (100:0)	Adults‡‡, excluding lifetime abstainers	Health warning labels; 12 and 13	RCT	Repeat (same day) on virtual container	Existing health warning labels	Alcoholic drink selection	French National Cancer Institute
MacKinnon et al (2000)[65]	Indiana high school students, 1989–95	USA	32 517 (50:50)	High school students (grades 10 and 12), any drinking status	Health warning labels; 6	RCS	Continuous (mandated labelling) on real container	Pre-exposure	Alcohol consumption frequency or quantity; alcohol-impaired driving; knowledge of alcohol health risks	US Public Health Service and Lilly Endowment
MacKinnon et al (1993)[66]	Indiana high school students, 1989–91	USA	3217 (48:52)	High school students§§, any drinking status	Health warning labels; 6	RCS	Continuous (mandated labelling) on real container	Pre-exposure	Knowledge of alcohol health risks	US Public Health Service and Lilly Endowment
Malouff et al (1993)[67]	NA, NR	USA	75 (52:48)	Adults (age NR), consuming ≥1 drinks before health warning label intervention	Health warning labels; 6	RCT	Repeat (same day) on real container	No label	Alcohol consumption quantity	NR
Mayer et al (1991)[68]	Utah household survey, 1989–90	USA	NR (NR)	Adults†, any drinking status	Health warning labels; 6	RCS	Continuous (mandated labelling) on real container	Pre-exposure	Alcohol consumption frequency	University of Utah and Utah State Department of Social Services
Morgenstern et al (2021)[69]	NA, 2017–18	Germany	9260 (49:51)	Youths¶¶, any drinking status	Health warning labels; 14	RCT	Once as separate virtual object (not on container)	No label	Knowledge of alcohol health risks	DAK-Gesundheit
Nohre et al (1999)[70]	Indiana high school students, 1989–92	USA	6391 (49:51)	High school students§§, any drinking status	Health warning labels; 6	RCS	Continuous (mandated labelling) on real container	Pre-exposure	Knowledge of alcohol health risks	NR
Osiowy et al (2015)[71]	NA, 2013	Canada	301 (61:39)	Adults††, ≥1 drink in past 30 days (wine, beer, or spirits)	Standard drink labels; 22	Non-RCT	Repeat (same day) on real container	None	Support for standard drink labels	NR

(Table 1 continues on next page)

	Project type, study dates	Country	N (female: male)	Sample description	Alcohol container label type; ID*	Study design	Exposure to alcohol container labels	Control or comparison groups	Outcomes	Funding information
(Continued from previous page)										
Parker et al (1994)[72]	NA, 1989–92	USA	2402 (56:44)	Adults†, any drinking status	Health warning labels; 6	Pre-post (repeated measures)	Continuous (mandated labelling) on real container	Pre-exposure	Alcohol-impaired driving; knowledge of alcohol health risks; support for health warning labels	National Institute on Alcohol Abuse and Alcoholism
Scammon et al (1991)[33]	Utah household survey, 1989–90	USA	2417 (57:43)	Adults†, any drinking status	Health warning labels; 6	RCS	Continuous (mandated labelling) on real container	Pre-exposure	Alcohol consumption frequency	University of Utah and Utah State Department of Social Services
Schoueri-Mychasiw et al (2020)[73]	Whitehorse, YT, 2017–18	Canada	2049 (49:51)	Adults††, ≥1 drink in past 30 days	Labels with multiple or comprehensive messages; 9, 10, and 11	QE	Repeat (across months) on real container	Existing health warning labels	Knowledge of drink limit recommendations; support for low-risk drinking guidance labels	Health Canada
Schoueri-Mychasiw et al (2021)[74]	Whitehorse, YT, 2017–18	Canada	2049 (49:51)	Adults††, ≥1 drink in past 30 days	Labels with multiple or comprehensive messages; 9, 10, and 11	QE	Repeat (across months) on real container	Existing health warning labels	Support for standard drink labels	Health Canada
Seidenberg et al (2022)[75]	HINTS, 2020	USA	3865 (50:50)	Adults†, any drinking status	Health warning labels; 6	CS	Continuous (mandated labelling) on real container	None	Support for health warning labels	NR
Smith et al (2022)[76]	NA, 2018	South Africa	404 (52:48)	Adults§, drinking status NR	Health warning labels; 5	CS	Continuous (mandated labelling) on real container	No label	Knowledge of alcohol health risks	National Institute on Minority Health and Health Disparities, University of Virginia, and Health Resources and Services Administration
Stafford and Salmon (2017)[77]	NA, NR	UK	45 (100:0)	University students‖‖, ≥1 drink per week (vodka)	Health warning labels; 15	RCT	Once on real container	No label	Alcohol consumption rate	University of Portsmouth
Thomson et al (2012)[78]	NA, 2009	Australia	1523 (NR)	Youth and adults**, drinking status NR	standard drink labels; 18	CS	Once on real container	None	Support for standard drink labels	NR
Webster-Harrison et al (2002)[79]	NA, NR	UK	196 (51:49)	Youth and adults**, excluding abstainers	Standard drink labels; 23	QE	Once on real container	None	Support for standard drink labels	NR
Wogalter et al (1994)[80]	NA, 1993–94	USA	80 (NR)	University students (undergraduate, age NR), drinking status NR	Health warning labels; 16	RCT	Once as separate virtual object	No label	Knowledge of alcohol health risks	North Carolina State University
Zhao et al (2020)[81]	Whitehorse, YT, 2015–18	Canada	NA	Alcohol sales data from youths and adults***	Labels with multiple or comprehensive messages; 9, 10, and 11	QE (interrupted time series)	Repeat (across months) on real container	Existing health warning labels	Alcohol sales	Health Canada

CS=cross-sectional study. NA=not applicable. NR=not reported. QE=quasi-experimental study. RCS=repeat cross-sectional study. RCT=randomised controlled trial. *Alcohol container label number (ID) can be found in the appendix (pp 19–28). †Aged 18 years and older. ‡Aged 18–69 years. §Aged 18–45 years. ¶First-year undergraduates, mean age of 18 years. ‖Mean age of 24 years. **Aged 16 years and older. ††Aged 19 years and older. ‡‡Aged 20–40 years. §§Grade 12, aged 17–18 years. ¶¶Aged 10–17 years. ‖‖Aged 18–25 years. ***Aged 15 years and older.

Table 1: **Characteristics of included studies**

Results

Database and grey literature searches yielded 2718 unique publications (figure). Of 118 studies of alcohol container label effects, 40 studies reporting one or more key outcomes were included in the final narrative synthesis (table 1). Alcohol container labels, most of which were investigated only by a single study, varied in design and implementation (appendix pp 19–28). 22 (54%) of 40 studies were at high risk of bias and 14 (34%) of 40 studies were at moderate risk of bias appendix pp 17–29). GRADE-eligible data were reported by 29 studies and 11 reported uncontrolled prevalence data

on support for alcohol container labels. 12 studies reported data from one or more subgroups of interest. A total of 17 outcomes were assessed with GRADE for certainty in the evidence (table 2). Most (n=11) were reported for interventions with or exposure to health warning labels, with fewer reported for standard drink labels (n=2), low-risk drinking guidance labels (n=2), and labels with multiple or comprehensive messages (n=2). Alcohol consumption (general or not further specified) was reported as an outcome for two label categories (health warning labels and mixed labels).

Most impact statements were assessed at low or very low certainty (n=13), with eight assessed at moderate certainty and one assessed at high certainty. Of the 11 outcomes reported for health warning labels, six suggested an effect of the intervention or exposure. We found moderate to large effects for consumption rate (low certainty and slowed consumption) and alcoholic drink selection (moderate certainty and decrease in selection), and small effects on consumption during pregnancy (low certainty and decrease in consumption), consumption quantity (low certainty and decrease in consumed quantity), and limiting alcohol consumption due to driving (moderate certainty and increase in limiting consumption). Effect sizes for consumption quantity (low or very low certainty) and knowledge of health risks (low or very low certainty) were mixed. Null effects were suggested for both standard drink label outcomes—drink selection for higher alcohol content (moderate certainty) and support for standard drink labels (low certainty)—and for one of the two low-risk drinking guidance label outcomes (knowledge of sex-specific drink limit recommendations, moderate certainty). For the other outcome—support for low-risk drinking guidance labels—the effect size was moderate (very low certainty and increase in support). Finally, for labels with multiple or comprehensive messages, we found large effect sizes for both consumption (moderate certainty and decrease in consumption) and mean standard drinks sold per capita (high certainty and decrease in sales). Sensitivity analysis including only low or moderate risk of bias data (table 3) slightly increased

	N (study type)	Impact statements	Certainty	Risk of bias	Inconsistency	Indirectness	Imprecision
Health warning labels							
Alcohol consumption (general)	10 942 (one RCT;[44] one RCS)[53]	Health warning labels likely result in little to no difference in general alcohol consumption	Moderate*	Some†	..	..	..
Alcohol consumption (general)	21 117 (one RCS)[54]	The evidence is very uncertain about the effect of health warning labels on general alcohol consumption	Very low‡	Serious§	None¶	Serious‖	..
Alcohol consumption frequency	36 878 (three RCSs)[33,65,68]	Health warning labels may have little to no effect on alcohol consumption frequency, but the evidence is very uncertain	Very low‡	Serious§	..	Serious‖	..
Alcohol consumption quantity	12 101 (one RCT;[55] two RCSs)[56,67]	Health warning labels may reduce alcohol consumption quantity or reduce it slightly	Low*	Serious§	..	Serious‖	..
Alcohol consumption quantity	32 517 (one RCS)[65]	Health warning labels may reduce or result in little to no difference in alcohol consumption quantity in youth, but the evidence is very uncertain	Very low‡	Serious§	None¶	Some**	..
Alcohol consumption rate	45 (one RCT)[77]	Health warning labels may result in a large decrease in alcohol consumption rate	Low*	Some†	None¶	Some**	Serious††
Alcohol consumption during pregnancy	21 117 (one TS)[54]	Health warning labels may slightly reduce alcohol consumption during pregnancy	Low*	Serious§	None¶	Serious‡‡	..
Alcohol-impaired driving	9187 (one RCS)[53]	Health warning labels likely result in little to no difference in outcome in alcohol-impaired driving	Moderate*	Some†	None¶	..	..
Alcohol-impaired driving	34 919 (two RCSs)[65,72]	The evidence is very uncertain about the effect of health warning labels on alcohol-impaired driving	Very low‡	Serious§	Some§§	Some**	Serious¶¶
Limiting alcohol consumption due to driving	9187 (one RCS)[53]	Health warning labels slightly increase the frequency of limiting alcohol consumption due to driving	Moderate*	Some†	None¶	..	..
Alcoholic drink selection	6188 (two RCTs)[45,64]	Health warning labels result in a moderate to large reduction in selecting the container bearing the label	Moderate*	Some†	..	..	..
Standard drinks purchased	608 (one RCT)[46]	Health warning labels may result in little to no difference in the number of standard drinks purchased	Low	..	None¶	Serious‡‡	Serious††
Knowledge of alcohol health risks	21 642 (one QE;[72] two RCSs;[44,59] three RCTs)[52,69,80]	Health warning labels may result in little to no difference, a slight increase, or a large increase in knowledge of alcohol health risks depending on label design	Low*	Serious§	..	Some‖‖	Serious¶¶
Knowledge of alcohol health risks	34 517 (four RCSs)[63,65,66,70]	The evidence is very uncertain about the effect of health warning labels on knowledge of alcohol health risks	Very low‡	Serious§	..	Serious‖	..
Support for alcohol container labels with health warnings	1884 (one RCT)[43]	Health warning labels likely result in little to no difference in support for such labels	Moderate*	Serious§	None¶	..	Some***
Support for alcohol container labels with health warnings	4451 (one QE;[72] one RCS)[60]	Health warning labels may result in little to no difference in support for such labels, but the evidence is very uncertain	Very low‡	Serious§	..	..	..

(Table 2 continues on next page)

	N (study type)	Impact statements	Certainty	Risk of bias	Inconsistency	Indirectness	Imprecision
(Continued from previous page)							
Standard drink labels							
Alcoholic drink selection for higher alcohol content	1884 (one RCT)[43]	Standard drink labels likely result in little to no difference in selection of beverages with higher alcohol content	Moderate*	Serious§	None¶	..	..
Support for labels with standard drink information	4583 (one QE;[47] one RCS;[43] one RCT)[74]	Standard drink labels may result in little to no difference to a small increase in support for such labels	Low*	Serious§	..	..	Serious¶¶
Low-risk drinking guidance labels							
Knowledge of sex-specific drink limit recommendations	2049 (one QE)[73]	Low-risk drinking guidance labels likely result in little to no difference in knowledge of sex-specific drink limit recommendations	Moderate*	Some†	None¶	..	..
Support for alcohol container labels with low-risk drinking guidance	2049 (one QE)[73]	Low-risk drinking guidance labels may increase support for such labels but the evidence is very uncertain	Very low‡	Serious§	None¶	..	..
Labels with multiple or comprehensive messages							
Alcohol consumption (general)	2049 (two QEs)[58,59]	Labels with multiple or comprehensive messages likely result in a large reduction in general alcohol consumption	Moderate*	Some†	None¶	..	..
Mean number of standard drinks sold per capita	NA (one QE)[81]	Labels with multiple or comprehensive messages result in a large reduction in total alcohol sales	High*	..	None¶	..	..

NA=not applicable. QE=quasi-experimental study. RCS=repeat cross-sectional study. RCT=randomised controlled trial. TS=time series study. *High starting certainty (due to risk of bias assessment with RoB 2, ROBINS-I, or ROBINS-E tools). †Some risk of bias (at least one study at moderate risk). ‡Low starting certainty (due to risk of bias assessment with the Joanna Briggs Institute prevalence tool[40]). §Serious risk of bias (at least one study at high risk). ¶No inconsistency due to single study. ||Serious indirectness due to indirectness in 31% or more of studies contributing to the outcome. **Some indirectness due to a single demographic limitation. ††Serious imprecision because optimal information criterion not met and outcome is based on a single study. ‡‡Serious indirectness due to two or more demographic limitations. §§Some inconsistency in direction of effect not explainable by population variation. ¶¶Serious imprecision because optimal information criterion was met but range of estimates crosses the threshold of no effect. ||||Some indirectness due to indirectness in 11–30% of studies contributing to the outcome. ***Some imprecision because optimal information criterion was met but no confidence interval was available.

Table 2: **Outcomes for the effects of alcohol container labels on consumption behaviour, knowledge of label message, and support for labelling**

the certainty rating of two health warning labels outcomes from very low to low: consumption frequency and knowledge of health risks. Support prevalence data were available for health warning labels,[48,51,57,75] health warning labels specifically with a warning relating to pregnancy risks,[48] standard drink labels,[47,50,57,71,78,79] and low-risk drinking guidance labels[57] (appendix p 29). Support for health warning labels ranged from 23·7% to 84·0%, with geographical differences indicating the least support in the UK[45] and the most support in India.[48] Support for pregnancy health warning labels covered a narrower range (from 72·0% in the USA[48] to 85·0% in China and India[48]), as did support for standard drink labels (from 66·2% in one Canadian estimate[61] to 95·0% in one Australian estimate[78]). Only one estimate of 60% support for low-risk drinking guidance labels (Canada) was available.[57]

Subgroup data were reported for eight outcomes; five for health warning labels[49,51,55,62,70,72,75,76] and one each for the other label types (table 4). Effects of health warning labels on consumption appeared to be smaller in participants who drank more[55,62] or reported higher literacy,[76] although the range for the latter group included null estimates. The former group appeared to also be less likely to support health warning labels,[51,62,75] with this difference more pronounced between participants who reported binge drinking compared with those who did not.[51,62,75] Participants who reported higher literacy appeared more likely to support health warning labels. Knowledge of alcohol driving risks appeared to increase more among drivers who also reported alcohol consumption.[72] For standard drink labels[50,57] and low-risk drinking guidance labels,[57] support might be slightly lower among participants who drink or have low health literacy, but substantially lower among those who report binge drinking (standard drink labels only).[47] Finally, data from one mixed label study suggested that participants with higher health literacy were substantially less likely to report reducing alcohol consumption due to label exposure.[59]

Discussion

In this systematic review, we identified 40 studies that investigated 31 unique alcohol container labels and reported on at least one key outcome: consumption and related behaviour, knowledge of the alcohol container label message, or support for alcohol container label implementation. Based on 29 studies reporting GRADE-eligible data, we generated 17 impact statements to assess for certainty in the evidence, ten of which were included in a sensitivity analysis of studies at moderate or low risk of bias. We also generated 15 summary statements for subgroup data based on drinking behaviour or health literacy (or proxy by education status).

Our results suggest that alcohol container labels with health warnings or comprehensive information might influence some alcohol consumption behaviour. We found, with moderate certainty, that health warning labels might decrease selection of alcoholic beverages[45,64] and alcohol consumption before driving.[53] We also found,

	N (study type)	Impact statement	Certainty	Risk of bias	Inconsistency	Indirectness	Imprecision
Health warning labels							
Alcohol consumption (general)	9187 (one RCS)[53]	Health warning labels likely result in little to no difference in general alcohol consumption	Moderate*	Some†	None‡	..	..
Alcohol consumption frequency	2417 (one RCS)[33]	Health warning labels might have little to no effect on alcohol consumption frequency	Low§	Some†	None‡	..	..
Alcohol consumption rate	45 (one RCT)[77]	Health warning labels might result in a large decrease in alcohol consumption rate	Low*	Some†	None‡	Some¶	Serious‖
Alcohol-impaired driving	9187 (one RCS)[53]	Health warning labels likely result in little to no difference in outcome in alcohol-impaired driving	Moderate*	Some†	None‡	..	..
Limiting alcohol consumption due to driving	9187 (one RCS)[53]	Health warning labels slightly increase the frequency of limiting alcohol consumption due to driving	Moderate*	Some†	None‡	..	..
Alcoholic drink selection	6188 (two RCTs)[45,64]	Health warning labels result in a moderate to large reduction in alcoholic drink choice	Moderate*	Some†	..	..	..
Knowledge of alcohol health risks	17 485 (one QE;[52] one RCS;[60] two RCTs)[69,80]	Health warning labels might result in little to no difference, a slight increase, or a large increase in knowledge of alcohol health risks depending on label design	Low*	Some†	..	Some**	Serious††
Knowledge of alcohol health risks	2000 (one RCS)[63]	Health warning labels might result in little to no difference in knowledge of alcohol health risks	Low§	..	None‡	..	..
Low-risk drinking guidance labels							
Knowledge of sex-specific drink limit recommendations	2049 (one QE)[73]	Low-risk drinking guidance labels likely result in little to no difference in knowledge of sex-specific drink limit recommendations	Moderate*	Some†	None‡	..	..
Labels with multiple or comprehensive messages							
Alcohol consumption (general)	2049 (two QE)[58,59]	Labels with multiple or comprehensive messages likely result in a large reduction in alcohol consumption	Moderate*	Some†	None‡	..	..
Mean number of standard drinks sold per capita	NA (one QE)[81]	Labels with multiple or comprehensive messages result in a large reduction in total alcohol sales	High*	..	None‡	..	..

NA=not applicable. QE=quasi-experimental study. RCS=repeat cross-sectional study. RCT=randomised controlled trial. *High starting certainty (due to risk of bias assessment with RoB 2, ROBINS-I, or ROBINS-E tools). †Some risk of bias (at least one study at moderate risk). ‡No inconsistency due to single study. §Low starting certainty (due to risk of bias assessment with the Joanna Briggs Institute prevalence tool[40]). ¶Some indirectness due to a single demographic limitation. ‖Serious imprecision because optimal information criterion not met and outcome is based on a single study. **Some indirectness due to indirectness in 11–30% of studies contributing to the outcome. ††Serious imprecision because optimal information criterion was met but range of estimates crosses the threshold of no effect.

***Table 3*: Sensitivity analysis outcomes from low or moderate risk of bias studies for the effect of alcohol container labels on consumption behaviour, knowledge of label message, and support for labelling**

with low certainty, that alcohol container labels might decrease consumption quantity per occasion,[55,56,67] reduce the speed of consumption,[77] and decrease consumption during pregnancy.[54] These findings align with results reported by six other evidence reviews (one scoping, two rapid, and three systematic) published since 2018 that vary widely in scope, approach, and quality.[22–27] One systematic review that investigated health warning labels across a variety of food and beverage products and included two alcohol container label randomised controlled trials (RCTs) reported that health warning labels might reduce the selection of alcoholic beverages.[22] The other five, none of which defined comparison or control groups, relied on a comprehensive search strategy or assessed for certainty in the evidence and generally found that the literature was either insufficient or too heterogeneous to determine whether health warning labels affected consumption behaviour.[24,25,27] Suggested reasons for heterogeneity included variations in alcohol container label format, intervention design (online, laboratory, or real-world), and sample demographics, which were issues we also encountered. Our subgroup analysis suggested that alcohol container label effects on consumption and support may be reduced in individuals who drink more, and that, while participants with higher health literacy might be more supportive of alcohol container labels, they might be less likely to change their consumption behaviour in response to exposure. Such variation probably hindered interpretation in previous syntheses, none of which evaluated subgroup differences. Furthermore, three reviews agreed that the effects of alcohol container labels were more favourable in real-world studies compared with online or laboratory-based experiments, probably due to repeated exposure to the label in a salient, everyday context.[23–25] We found that labels with comprehensive information (ie, health warnings, standard drinks, and low-risk drinking guidance) probably substantially reduce individual (moderate certainty) and population (high certainty) alcohol consumption, based on data from a real-world quasi-experimental study done in the Yukon and Northwest Territories (NWT) in Canada.[58,59,81] These results are not replicated in the health warning labels category, which could be partly influenced by the fact that most real-world studies included in this and previous reviews evaluated the 1989 US federal health warning

	Subgroup type	N (study type)	Summary	Effect size	Risk of bias (n)
Health warning labels					
Alcohol consumption	Consumption behaviour	14 043 (two RCSs)[55,62]	The effect of health warning labels on reducing alcohol consumption might be substantially smaller in participants drinking more compared with those drinking less	Moderate to very large	Moderate (1); high (1)
Alcohol consumption	Health literacy or educational attainment	1400 (one CS)[76]	The effect of health warning labels on reducing alcohol consumption might be similar or substantially smaller in participants with higher literacy or more education compared with those with lower literacy or less education, but all evidence is at high risk of bias	Null to very large	High (1)
Knowledge of alcohol driving risks	Consumption behaviour	1337 (one RCS)[72]	In drivers who consume alcohol, knowledge of alcohol driving risks might be substantially increased after health warning labels exposure compared with before exposure, or compared with knowledge of pregnancy risks, but all evidence is at high risk of bias	Moderate to very large	High (1)
Knowledge of alcohol health risks	Consumption behaviour	8243 (one CS;[49] one RCS)[70]	The effect of health warning labels on knowledge of alcohol health risks might be similar in participants who drink compared with those who do not	Null	Low (1); high (1)
Knowledge of pregnancy risks	Health literacy or educational attainment	404 (one CS)[76]	The effect of health warning labels on knowledge of alcohol pregnancy risks might be similar in participants with higher literacy or more education compared with those with lower literacy or less education, but all evidence is at high risk of bias	Null	High (1)
Support for health warning labels	Consumption behaviour	13 263 (three CSs)[51,62,75]	Support for health warning labels might be similar or lower in participants who consume alcohol compared with those who do not, but most evidence is at high risk of bias	Null to moderate	Moderate (1); high (2)
Support for health warning labels	Consumption behaviour	5468 (three CSs)[51,62,75]	Support for health warning labels might be lower in participants who engage in binge drinking compared with those who do not, but all evidence is at high risk of bias	Moderate	High (3)
Support for health warning labels	Health literacy or educational attainment	6609 (two CSs)[51,75]	Support for health warning labels might be higher in participants with higher literacy or more education compared with those with lower literacy or less education, but all evidence is at high risk of bias	Moderate to large	High (2)
Standard drink labels					
Support for standard drink labels	Consumption behaviour	9977 (two CSs)[50,57]	Support for standard drink labels might be slightly lower in participants who consume alcohol compared with those who do not, some evidence is at high risk of bias	Small	Moderate (1) high (1)
Support for standard drink labels	Consumption behaviour	650 (one CS)[47]	Support for standard drink labels might be substantially lower in participants who engage in high-risk drinking compared to those who engage in low-risk drinking, but all evidence is at high risk of bias	Large	High (1)
Support for standard drink labels	Health literacy or educational attainment	9812 (one CS)[57]	Support for standard drink labels might be slightly higher in participants with higher literacy or more education compared with those with lower literacy or less education	Small	Moderate (1)
Low-risk drinking guidance labels					
Support for low-risk drinking guidance labels	Consumption behaviour	9812 (one CS)[57]	Support for low-risk drinking guidance labels might be slightly lower in participants who consume alcohol compared with those who do not, some evidence is at high risk of bias	Small	Moderate (1)
Support for low-risk drinking guidance labels	Health literacy or educational attainment	9812 (one CS)[57]	Support for standard drink labels might be slightly higher in participants with higher literacy or more education compared with those with lower literacy or less education	Small	Moderate (1)
Labels with multiple or comprehensive messages					
Alcohol consumption	Consumption behaviour	290 (one QE)[59]	The effect of labels with multiple or comprehensive messages on reducing alcohol consumption might be similar in participants drinking more compared with those drinking less	Null	Moderate (1)
Alcohol consumption	Health literacy or educational attainment	682 (one QE)[59]	The effect of labels with multiple or comprehensive messages on reducing alcohol consumption might be substantially smaller in participants with higher literacy or more education compared with those with lower literacy or less education	Very large	Moderate (1)

If health literacy was not recorded, educational attainment was used as a proxy. Specific terms, such as drinking more, drinking less, binge drinking, high-risk drinking, and low-risk drinking cannot be defined because the data come from different studies with different definitions for each subgroup. CS=cross-sectional study. QE=quasi-experimental study. RCS=repeat cross-sectional study.

Table 4: **Narrative summary of findings from subgroups defined based on consumption behaviour or health literacy**

label, which is now considered poorly designed.[24,44,82] However, we found that even this label, or perhaps co-occurring policy changes, education drives, and media coverage, contributed to beneficial effects, such as the reduction in drinking before driving. Nevertheless, more real-world evidence from well controlled quasi-experimental studies is needed.

The evidence on health warning labels' effects on health risk knowledge was mixed, with effect sizes ranging from null to very large and an overall assessment of low certainty.[52,60,69,80] This evidence contrasts with three previous reviews that concluded there was sufficient evidence to suggest that alcohol container labels increased understanding of the risks associated with consumption.[23–25] However, two of these reviews did not assess studies for risk of bias[23,24] and all acknowledged that effect sizes appeared to vary based on label design. This latter consideration is likely to have played a substantial part in the result reported here; studies contributing to this outcome assessed labels from the black and white text-based US federal health warning label to the high-contrast cancer health warning label

designed for the Yukon and NWT study and to health warning labels with full colour photographs with messages ranging from a reminder to adhere to age restrictions to noting the risks of operating machinery while under the influence of alcohol. In addition to these differences, knowledge outcomes might be influenced by the incidental or intentional awareness raising that often accompanies health warning label introductions. Data from the Yukon and NWT investigation suggested that media coverage on alcohol industry interference, which caused the removal of the cancer health warning label partway through the study, might have increased knowledge in the NWT control site and therefore partly obscured the intervention effect.[60,83] Finally, some alcohol risks—such as those relating to pregnancy—are more widely known and so increases in knowledge due to experimental exposure to related health warning labels might not be substantial enough to reach significance thresholds.[23,49,69] Future studies should rely on effective label design and focus on lesser known risks that are salient to the target audience.

Consistent with previous reviews, we found limited evidence for the effects of standard drink labels and low-risk drinking guidance labels. This finding might partially be due to the key outcomes selected for this systematic review. For example, these labels might assist consumers in pouring a standard drink from a bottle or accurately assessing the risk of consumption behaviour.[43,61,71,84] As the immediate availability of standard drink content and low-risk drinking guidance on alcohol containers is intended to assist in consumption-related behaviour, such data are often measured as participants are being instructed to view or interact with a label. This guided engagement would not occur in day-to-day exposure and the resulting data were therefore not relevant to our systematic review. In addition, we found that individuals engaging in frequent or higher-risk drinking (which varies between studies) might be less likely to support standard drink label and low-risk drinking guidance label implementation, suggesting that such variations in label effectiveness might be present for other outcomes.[50,57] More research is needed to establish if standard drink and low-risk drinking guidance information is retained after or between exposures to alcohol container labels, how these labels influence alcohol consumption behaviour, and whether some population subgroups are differentially affected. High support for alcohol container labels was evident in most studies reporting this outcome,[47,48,50,51,57,71,75,78,79] although real-world studies are few with most reporting uncontrolled prevalence data that is more challenging to interpret. Furthermore, introduction of new alcohol policy is often accompanied by substantial political discussion and corresponding media coverage, so preintervention data might already include early changes in public interest and support. For example, a 2023 survey of almost 10 000 Canadians found that 62% supported standard drink labels, 60% supported low-risk drinking guidance labels, and 54% supported health warning labels on alcohol containers.[6,57] Finally, there was consistent evidence that support for different label types was lower among people who use alcohol, or use heavily,[50,51,57,62,75] indicating that increases in alcohol container label support among some population subgroups might be obscured by unchanging or decreasing support in others.

We acknowledge several limitations to our systematic review, many of which have been encountered in tobacco labelling research.[85] First, although we have adhered to Cochrane standards, the complexity of the topic increased the number of necessary judgement calls, all of which we have reported. Second, RCTs, usually the gold standard for methodological design, are not feasible at the population level or country level and must be adjusted in ways that reduce their relevance, such as exposing participants to alcohol container labels only once instead of repeatedly, as would be the real-world dose. Although we also included robust alternatives to RCTs, such as longitudinal studies and time series, alcohol container labels are rarely implemented in isolation and concurrent events are likely to confound measured effects. We also found substantial and wide-ranging heterogeneity in label design and outcome measurements and were required to simplify these to allow for narrative synthesis. This simplification probably obscured some nuances, which we highlighted in our discussion of the results. Despite these constraints, we have endeavoured to produce a high-quality, transparent systematic review to generate evidence for policy and provide a starting point for further research and evidence synthesis.

The evidence synthesised here has several important implications for public health policy. First, alcohol container labels with health warnings or multiple, rotating messages appear to affect several consumption-related behaviours, both in real-world and quasi-experimental contexts. In practice, the mandating of alcohol labelling is usually accompanied by other policy measures, media attention, and a corresponding increase in public awareness of alcohol-related health issues.[83,86] To allow for a successful and systematic evidence synthesis, we attempted to untangle the effects of labels from such co-occurring influences as much as possible. That some behaviour-modifying effects remained would not just suggest that labels are a viable component of alcohol policy, but that real-world implementation might reasonably generate more pronounced effects than those reported here,[87] in line with recommendations made by WHO,[16] the EU,[19] and the 2023 Guidance on Alcohol on Health[6] for the implementation of comprehensive alcohol container labels.

Second, alcohol container labels are first and foremost a vehicle for information, but we found that their effectiveness in increasing knowledge of alcohol risks

varied substantially. Given the wide variety of label designs under study, this result suggests that the real-world effects of alcohol container labels will—at least in part—depend on the choices made regarding design and implementation. In addition to future research endeavours specific to alcohol labelling, analogous evidence on tobacco labelling and package design might also contribute to informing a starting point for related policy processes.[12,85] Third, we found that support for alcohol container labels is generally high, particularly in locations where labelling is mandated.[75,88–91] Where complexities inherent in developing and implementing such policies hinder or slow progress, alcohol container labels might be able to function as a catalysing component by increasing public interest and support. Given the substantial health and societal burden associated with alcohol consumption, any facilitating effect that alcohol container labels have on the implementation of related policy might be beneficial to population health.[92]

There are several promising avenues for future research on alcohol labelling. We found that most of the existing evidence base focuses on outcomes proximate to labels themselves (eg, noticeability and perceived effectiveness), while a minority of studies examine alcohol container labels' effects on outcomes proximate to population health, such as consumption behaviour. Additional data on the causal pathway that links label design and implementation to long-term health outcomes would likely facilitate the development of related policy. Furthermore, we found evidence that labelling could have differential effects on population subgroups defined by consumption behaviour or health literacy. Unfortunately, few studies examined subgroup effects and we were therefore unable to systematically assess related evidence. As foreknowledge on intrapopulation differences might be helpful in guiding decision making around alcohol container labels implementation, future research should collect and report on related data where possible.

In conclusion, we have produced the first systematic review on multiple types of alcohol container labels that assessed their effects on outcomes in the domains of behaviour, knowledge, and support. We used GRADE to assess for certainty in the evidence to provide high-quality evidence for future research and policy development. Our results show, first, that alcohol container labels might influence some alcohol consumption behaviour and that well designed labels with multiple or rotating messages might be particularly effective. Second, alcohol container labels' effects might vary depending on individual health literacy or drinking behaviour. Finally, support for alcohol container labels is generally high and could increase after implementation. Alcohol container labels might therefore be an effective component of policy designed to address population alcohol harms.

Contributors

AMEZ, KM, AJG, FRD, TS, and EH conceptualised this systematic review. AMEZ, KM, and LB curated and validated the data. AMEZ did the formal analysis, programmed the software, and visualised the data. AMEZ, KM, LB, FRD, and EH did the investigation. AMEZ and AJG administered the project. AMEZ, AJG, FRD, and EH supervised the systematic review. AMEZ, TS, and EH wrote the original draft. All authors devised the methodology and wrote and edited the review.

Declaration of interests

EH is a member of the WHO Technical Advisory Group: Alcohol Labels and received support to travel to a conference and two meetings, one meeting in Copenhagen, Denmark in December, 2022, and one in Barcelona, Spain in September, 2023; and served as a member of the scientific advisory committee responsible for Canada's 2023 Guidance on Alcohol and Health and received travel support to attend one related meeting in Ottawa, ON. TS received payment for a presentation to Alko, the Finnish Government alcohol retail monopoly (Finnish Ministry for Health and Social Affairs), for presenting a webinar on alcohol and public health; served as an expert witness for the Ontario Public Service Employees Union during a case regarding liquor licence applications by the business 7/11; served as an expert witness for Elkin Injury Law for a case involving compensation for injury caused by an intoxicated person; received support by the International Order of Grand Templars, National Temperance Organisation, Sweden for attendance at annual working group meetings to produce reports on topics concerning alcohol and health; and served as a member of the scientific advisory committee responsible for Canada's 2023 Guidance on Alcohol and Health. All other authors declare no competing interests.

Data sharing

Data will be made available (upon request to the corresponding author) in accordance with all relevant policies and procedures of the Government of Canada.

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