Factors associated with adolescents' support for product information and health messaging on alcohol packaging: a cross-sectional study in the United Kingdom

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Abstract

Aims: Adolescents in the United Kingdom (UK) are among the heaviest drinkers in Europe. The World Health Organization recommends alcohol product labelling to inform consumers about product information and health risks associated with alcohol use. This study investigates support for product information and health messaging on alcohol packaging among UK adolescents.

Methods: The 2019 UK Youth Alcohol Policy Survey was an online cross-sectional survey among 3,388 adolescents aged 11-19. Participants indicated their support for seven forms of messaging on packaging (e.g., number of alcohol units, links to health conditions). Logistic regression models investigated associations between support for each of the seven forms and alcohol use, perceived risks of alcohol use, and previous exposure to messaging.

Results: Between 60% and 79% of adolescents were supportive of different aspects of product labelling. Compared to lower-risk drinkers, higher-risk drinkers (AUDIT-C 5+) had higher odds of supporting including the number of alcohol units (*OR*: 1.82, *95% CI:* 1.31 – 2.54), calories (*OR:* 1.52, *95% CI:* 1.04-1.68), and strength of the product (*OR:* 1.73, *95% CI*: 1.19-2.52) but lower odds of supporting including information on alcohol-related health conditions (*OR*: 0.68, *95% CI:* 0.53-0.87). Adolescents who perceived risks of alcohol use more strongly were more likely to support all forms of product information and messaging.

Conclusions: The majority of adolescents supported improved alcohol labelling. Higher-risk drinkers were supportive of improved product information but less supportive of health-related messaging. Adolescents who believe alcohol carries health risks were more likely to support messaging.

Short Summary

This cross-sectional study asked United Kingdom adolescents about seven types of alcohol product labelling, finding considerable support for including improved labelling overall. Higher-risk drinkers were more supportive of product information but less supportive of health messaging. Adolescents who believe alcohol carries health risks were more likely to support labelling.

INTRODUCTION

Compared to other world regions, Europe has the highest prevalence of adolescents aged 15-19 who are current drinkers (44%) (World Health Organization, 2019). Additionally, the 2019 European School Survey Project on Alcohol and Other Drugs found that 34% of adolescents aged 15-16 are heavy episodic drinkers (ESPAD Group, 2020). Although alcohol use among adolescents in the United Kingdom (UK) has been steadily declining over the past three decades, approximately four in 10 young adolescents in England report having ever drank alcohol and 21% of those who drank in the past week report consuming 15 or more units (NHS Digital, 2018; WHO European Regional Office, 2018). Similar estimates were reported in Scotland and Wales (WHO European Regional Office, 2018). Alcohol use during adolescence, a critical period of development, is associated with a number of negative physiological and psychosocial consequences and has also been causally linked to harms during adulthood, such as an increased likelihood of dependence and early death, with earlier age of initiation (i.e., before age 11) associated with increased chronicity (Guttmannova et al., 2011; McCambridge et al., 2011).

Alongside other strategies such as decreasing the availability and affordability of alcohol and regulating alcohol marketing, the World Health Organization (WHO) has recommended comprehensive and standardised alcohol product labelling as a cost-effective strategy to inform consumers about product and nutritional information, standard drink amounts, and health risks associated with alcohol consumption (World Health Organization, 2010; WHO European Regional Office, 2012). However, many

countries do not have mandatory requirements and countries that do have requirements for labelling do not have consistent labelling practices and face strong opposition from the alcohol industry (Jané-Llopis et al., 2020).

Currently in the UK, drinks producers are required by law to label alcohol containers with net quantity, alcoholic strength by volume, and other basic information such as country of origin (Alcohol Change UK, 2019). Social aspects/public relations organisations, such as the Scotch Whisky Association, and some individual companies voluntarily self-regulate other messaging, such as units of alcohol (one unit is equivalent to 10ml/8g of pure alcohol), UK Chief Medical Officers' (CMO) low-risk drinking guidelines (not more than 14 units per week), and health warnings (e.g., warnings against drinking during pregnancy) (Anheuser-Bush InBev, 2019; Scotch Whisky Association, 2020). In a 2020 review of 424 alcohol product labels, only 29% of products contained up-to-date information on CMO low-risk drinking guidelines, 15% had written information about risks to pregnancy, and only one label mentioned alcohol-related health risks other than pregnancy warnings (Alcohol Health Alliance UK, 2020). When products were labeled with CMO drinking guidelines and alcohol-related health information, the fonts and logos used were often too small and inconspicuous to adequately draw consumers' attention (Petticrew et al., 2016).

Among adults, awareness of what constitutes an alcohol 'unit' or standard drink is low, and more informative standard drink labelling could allow drinkers to more accurately understand how alcohol products relate to lower risk drinking guidelines (Blackwell et

al., 2018; Wettlaufer, 2018). Furthermore, both graphic and text-only health warnings about pregnancy, cancer, and liver damage have been shown to raise awareness of alcohol-related health conditions and reduce intentions to drink in lab and real-world experimental settings (Wigg and Stafford, 2016; Clarke et al., 2020, Hobin et al., 2020a; Hobin et al., 2020b; Winstock et al., 2020). In several studies exploring perceptions of product information and health messaging, adults have expressed strong support for including standard drink information and health warnings on alcohol labels, citing drinkers' right to know and the government's role in keeping its citizenry informed (Thomson et al., 2012; Rosenberg et al., 2018; Vallance et al., 2018). A qualitative study of young adult drinkers (aged 18-35) in Scotland found that drinkers did not find current labelling effective, and most supported including prominent text-and-graphic warnings on the front of alcohol packaging (Jones et al., 2021). Additionally, participants believed that more prominent labelling could increase awareness of alcohol-related harms among young people.

Despite several studies in adults, less is known about adolescents' perceptions of product information and health messaging on alcohol packaging, including those who are underage and those who have never tried alcohol. While some evidence shows that health messaging may not be a dominant driver of risk perceptions and alcohol consumption among adolescents (Dimova and Mitchell, 2021), investigations into the acceptability of product labelling and health messaging among adolescents are necessary to inform wider public health strategies regarding labelling (McCambridge et al., 2011; WHO European Regional Office, 2018). Further, although 44% of adolescents

in England have tried alcohol before the age of 15 (NHS Digital, 2019), adolescents' voices are largely excluded from alcohol policy debates, and policymakers must consider their perspectives when making decisions about labelling practices. The present study builds on previous work which identified low awareness of existing health messaging on alcohol packaging among UK adolescents (Critchlow et al., 2019a). This study assessed support for labelling and health messaging among UK adolescents and how this varied based on socio-demographics, alcohol use, perceived risks of drinking, and previous exposure to messaging.

METHODS

Design and sample

The Youth Alcohol Policy Survey (YAPS) is a repeat cross-sectional survey administered to UK adolescents aged 11-19. This study uses the 2019 wave of YAPS which took place from September to November 2019 (n = 3,388). The survey was hosted online by YouGov, a market research company that recruited a sample designed to be representative of all adolescents in the UK from their existing panel. Participants aged 16 years or over were approached directly to participate, while those aged under 16 years were approached through existing adult panel members known to have children. Each respondent was assigned a survey weight according to age, gender, ethnicity, region, and deprivation decile to enable descriptive results to be representative of the UK population aged 11-19. Previous literature further details the

recruitment process and methodology for YAPS (Critchlow et al., 2019b; Critchlow et al., 2019c).

Ethics

Ethical approval was obtained from the University of Stirling General Ethics Panel (GUEP670).

Measures

Demography. Demographic information on age, sex, ethnicity, and area deprivation were either collected through survey questions or obtained from existing information on panelists stored by YouGov. Age was dichotomised into UK legal purchasing age (18-19 years of age) and underage (11-17 years of age). Area deprivation was measured using the Index of Multiple Deprivation (IMD), with IMD deciles collapsed into quintiles for this study.

Drinking status. Similarly to national surveys of alcohol use among adolescents (NHS Digital, 2019), participants were asked 'Have you ever had a whole alcoholic drink? Not just a sip.' Those who answered 'Yes' were classified as ever drinkers, whereas those who answered 'No' were classified as never drinkers. Among ever-drinkers, alcohol use was classified using the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C) (Babor et al., 2001). The AUDIT-C is a three-item scale measuring the frequency of

alcohol consumption, number of drinks consumed during a typical drinking occasion, and heavy episodic drinking. Cronbach's alpha for the AUDIT-C was 0.76, reflecting acceptable internal consistency. Participants who answered anything other than 'Never' to the first item of the AUDIT-C completed items two and three and were classified as current drinkers. Current drinkers were categorised as either lower risk drinkers (score of 0-4 on AUDIT-C) or higher risk drinkers (score of 5+ on AUDIT-C), consistent with existing literature and national guidance (Critchlow et al., 2019a; Critchlow et al., 2019b; Critchlow et al., 2019c; Public Health England, 2017; Research in Practice, 2015). Based on responses to the ever-drinking question and the AUDIT-C, a three-level categorical variable for drinking status was created —1) never and non-drinkers, 2) lower risk drinkers (0-4 on AUDIT-C), and 3) higher risk drinkers (5+ on AUDIT-C).

Perceived risks. Adolescents' perceived risks of alcohol consumption were assessed using two questions. The first asked participants to indicate whether they thought alcohol was harmful to health on a Likert scale ranging from 1 (Agree) to 5 (Disagree). Those who selected 'Agree' or 'Somewhat agree' were categorised as believing that alcohol is harmful to health, and those who selected the neutral or disagree responses were categorised as not believing that alcohol is harmful.

The second question was to identify which health conditions they believed resulted from excessive alcohol consumption from a list of nine health conditions (cancer, chicken pox, flu, heart disease, migraines, stroke, type 1 diabetes, type 2 diabetes, liver damage). Chicken pox, flu and type 1 diabetes are not caused by alcohol consumption

and were included as an accuracy check. A small fraction of participants identified chickenpox (n=20) and flu (n=123) as alcohol-related conditions, and only six participants selected all choices, indicating that careless responding was minimal. Responses were dichotomised based on the number of alcohol-related health conditions identified out of the six correct conditions. Responses were planned to be dichotomized using a median split, but this was not possible due to the distribution of the data across the seven categories (identified zero to all six conditions correctly). Instead, responses were dichotomized as follows: those who identified zero to two conditions correctly were classified as having lower awareness of health risks (40% of participants), and those who identified three to six were classified as having higher awareness (60% of participants).

Previous exposure to messaging. This construct was assessed by asking participants 'How often, if at all, do you see product information, health messages or health warnings on alcohol packaging?'. Responses were measured on a five-item scale (Never, Some of the time, About half of the time, Most of the time, Almost always), and were collapsed into a three-level categorical variable as follows: 'Never', 'Some or about half of the time', and 'Most of the time or always'.

Support for product information and health messaging on packaging. Support for each of the following seven forms of product information and health messaging on alcohol packaging was assessed: 1) number of alcohol units in the product, 2) number of calories in the product, 3) strength of the product (e.g., alcohol by volume, (ABV%)), 4)

guidelines on how many units men and women should drink each week, 5) how many servings of the product are equal to the recommended weekly guidelines, 6) health warnings (e.g., not drinking while pregnant), and 7) information on health conditions which can result from drinking alcohol. Participants were asked, 'To what extent do you agree or disagree that alcohol packaging and advertising should display the following information' and were prompted to respond on a Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree) for each of the seven items. Cronbach's alpha for this seven-item scale was 0.95, reflecting very high internal consistency. We dichotomised responses for each form of messaging by classifying those who indicated they 'Strongly agree' or 'Somewhat agree' as explicitly supporting messaging and those who selected the neutral or disagree options as not explicitly supporting messaging. Cronbach's alpha for this dichotomised scale was 0.90.

Analysis

The analysis plan was preregistered on the Open Science Framework [https://osf.io/xe5vb/].

Descriptive data were weighted to be representative of the adolescent population in the UK using the survey weight from YouGov. Frequencies of age, sex, drinking status, perceptions of the 'Drink Responsibly' message, support for seven forms of health messaging, perceived risks and previous exposure to messaging were generated to characterise the sample. Weighted chi-squared tests were used to assess the

relationship between socio-demographics and drinking status and support for each of the seven forms of messaging. Analyses were weighted to be representative of the adolescent population in the UK.

Logistic regression models were run with support for messaging as the dependent variable and drinking status, perceived risks of alcohol consumption, and previous exposure to messaging as independent variables entered as separate blocks. Separate models were run for each of the seven forms of messaging to elucidate differences in support across types of product information and health messaging. Age, sex, and deprivation quintile were added to each model as possible confounders. For drinking status, lower risk drinkers were selected as the reference group because alcohol use is common, and this approach allowed for straightforward interpretation of whether higher risk drinking or never/non-drinking were associated with differential levels of support for messaging. For previous exposure to messaging, those who indicated they had never seen messaging were selected as the reference group, as they comprised the largest proportion of respondents. Models were run unweighted because variables used to construct the survey weights were included in the models as covariates. SPSS version 26 was used for all analyses.

RESULTS

Sample characteristics

The sample consisted of 3,388 total adolescents, 49% of whom were female and 76% under the age of 18 (Table 1). Of the entire sample, 56% of participants had never drunk alcohol or were currently non-drinkers, 24% were considered lower risk drinkers, and 17% were categorised as higher risk drinkers.

[PLEASE INSERT TABLE 1 ABOUT HERE]

Support for information on packaging, perceived risks, and previous exposure to messaging

Support for all forms of health messaging and product information on alcohol packaging ranged from 60% of all participants supporting including the number of calories in the product to 79% supporting including the strength of the product. Almost three-quarters (73%) agreed that alcohol is harmful to health, and 59% had higher prompted awareness of alcohol-related health conditions (identified 3-6 correct conditions). Almost half (46%) of participants indicated that they had never seen product information or health messaging on alcohol.

Factors associated with support for information on packaging

[PLEASE INSERT TABLE 2 ABOUT HERE]

The final model results of the seven regression models are shown in Table 2. Compared with lower risk drinkers, and after adjusting for covariates, higher risk drinkers had higher odds of supporting including the number of alcohol units (*OR*: 1.82, *95% CI:* 1.31 – 2.54), calories (*OR:* 1.52, *95% CI:* 1.04-1.68), and strength of the product (*OR:* 1.73, *95% CI*: 1.19-2.52) (Table 2). Conversely, higher risk drinkers had lower odds of supporting including information on alcohol-related health conditions (*OR*: 0.68, *95% CI:* 0.53-0.87). Never and non-drinkers had lower odds of supporting including alcohol units (*OR*: 0.61, *95% CI*: 0.49-0.75), calories (*OR*: 0.82, *95% CI*: 0.68-0.98), strength of the product (*OR*: 0.52, *95% CI*: 0.41-0.67), weekly drinking guidelines (*OR*: 0.75, *95% CI*: 0.61-0.92), servings of the product equal to the weekly guidelines (*OR*: 0.72, *95% CI*: 0.59-0.89), and health warnings (*OR*: 0.69, *95% CI*: 0.55-0.87) compared to lower risk drinkers.

Across all seven messaging types, adolescents who agreed that alcohol is harmful to health had approximately 1.5 to two times the odds of supporting messaging compared to those who did not believe alcohol was harmful (*ORs*: 1.45-1.95, p < 0.001 in each case) (Table 2). In this subgroup, health warnings (e.g., not drinking while pregnant) had the highest odds of support (*OR*: 1.95, *95% CI:* 1.61-2.37, p < 0.001). Similarly, those who had higher awareness of alcohol-related health conditions (i.e., were able to correctly identify three to six conditions) had approximately 1.5 to 2.5 times the odds of supporting all forms of messaging compared to those who had lower awareness of health conditions (*ORs*: 1.55-2.55, p < 0.001 in each case), with health warnings also

showing the highest odds of support in this subgroup (*OR*: 1.93, *95% CI:* 1.61-2.33, p < 0.001).

Those who had seen product information or health messaging on alcohol packaging most of the time or always had higher odds of supporting most forms of messaging (*ORs*: 1.33-1.77, p < 0.05) compared with those who indicated they had never seen this information. Support for weekly drinking guidelines and information on alcohol-related health conditions was not significantly different. Those who had seen messaging only some or about half of the time had 1.26 times the odds of supporting including weekly drinking guidelines (*OR*: 1.26, *95% CI:* 1.05-1.52, p = 0.015).

DISCUSSION

In this study, over 70% of UK adolescents explicitly supported including information about alcohol units, the strength of the product, weekly drinking guidelines, the number of units in the product equal to the weekly lower risk drinking guidelines, and health warnings (e.g., not drinking while pregnant). Support for information about alcohol-related health conditions and number of calories in the product was 70% and 60%, respectively.

Compared with lower risk drinkers, higher risk drinkers were more likely to support improved product information (the number of alcohol units, calories, strength of the product) but less likely to support including information about alcohol-related health

conditions. This finding suggests that higher risk drinkers may seek product information and messaging that informs their drinking choices but may not be receptive to information that would deter drinking. Further research would be needed to explore, but this finding reinforces WHO's recommendation that labelling should be used alongside other strategies that prevent drinking among youth, such as increased alcohol duties. Never and non-drinkers had lower explicit support for most forms of product information and health messaging than lower risk drinkers, which may plausibly be related to a perceived lack of relevance of this information to these individuals. Finally, adolescents who believed alcohol carries health risks, had higher awareness of alcohol-related health conditions, and had seen product information and health messaging most of the time or always were more likely to support most forms of messaging.

Our results are consistent with previous studies showing high levels of support for including more informative messaging on alcohol products in a number of adult populations (Jones et al., 2021; Thomson et al., 2012; Vallance et al., 2018). Previous work by some of the present study's authors has found increased awareness of messaging in adolescents of legal purchasing age and higher risk drinkers (Critchlow et al., 2019a). We posit that awareness of and support for messaging in these groups may be a result of increased exposure to these cues and relevance for those who drink alcohol and drink more heavily.

Additionally, experimental studies investigating the impacts of graphic health warnings found that they were associated with increased intentions to reduce or quit alcohol

consumption, mediated by an increase in the perceived risks of alcohol consumption (Clarke et al., 2020; Wigg and Stafford, 2016). A large, global cross-sectional study identified low awareness of the link between alcohol and cancer and that cancer warnings on alcohol packaging were most strongly associated with intentions to reduce drinking (Winstock et al., 2020). Another study evaluating text-and-graphic health warning labels on alcohol products found that graphic health warnings, despite having low levels of acceptability, were associated with a reduced desire to drink (Pechey et al., 2020). Tobacco control research has also provided strong evidence for the link between graphic health warnings on tobacco products and reduced smoking initiation and increased intentions to reduce or quit smoking among adolescents (Drovandi et al., 2019; Hammond, 2011).

Evidence for the effectiveness of health messaging in curbing alcohol consumption is mixed. A 2012 systematic review of studies investigating the impact of health warning labels on adolescents' attitudes and knowledge about alcohol harms found that labels are associated with increased awareness of risks but are not associated with reduced alcohol consumption itself (Scholes-Balog et al., 2012). However, seven of the 10 articles included in this review used the same analytic sample. A more recent rapid review of product information and health messaging on unhealthy commodities (including but not limited to alcohol) similarly found that improved labelling may increase consumers' knowledge and comprehension, and that well-designed health warnings or graphic health warnings may lead to reductions in alcohol consumption (Dimova and Mitchell, 2020). Notably, in a real-world setting in Whitehorse, Yukon, Zhao et al. (2020)

found that warning labels on alcohol containers were associated with a 6.3% reduction in total per capita alcohol sales. The present study does not explicitly measure intentions to initiate, quit, or reduce alcohol consumption or reactions to the design, tone, and placement of messaging among adolescents. However, our findings demonstrate 1) the acceptability of more informative product information and health messaging in this population and 2) the potential of intervening on perceived risks of drinking in building support for product information and messaging on alcohol.

Our study has numerous strengths. The sample is large and representative of the UK population aged 11-19. We collected detailed information on alcohol use and attitudes towards alcohol, meaning that the perceptions of risk around drinking could be investigated, building on other studies (Clarke et al., 2020; Wigg and Stafford, 2016). Support for multiple different and specific types of alcohol product information and health messaging was assessed. Limitations of this study include the cross-sectional design of the YAPS, which means the direction of causality cannot be established. The results are subject to self-report and recall biases regarding alcohol use (Brener et al., 2003), but we mitigated this by using clinically validated and widely used AUDIT-C scores. Additionally, we also addressed recall bias regarding previously seeing product information and health messaging by collapsing this measure into a three-level categorical variable. To aid interpretability, support for each of the seven aspects of labelling was dichotomised (i.e., explicitly supporting vs. not supporting messaging), meaning we did not differentiate between lack of support and neutral feelings towards messaging. Future studies may take a different analytical approach to investigate levels

of support in a more nuanced way. This study also did not assess support for novel graphic health warnings or for plain packaging, both of which have been found to be effective in tobacco control (Dimova and Mitchell, 2020; Drovandi et al., 2019; Hammond, 2011). Finally, we did not assess the relationship between support for messaging and drinking intentions among never drinkers.

Future studies should explore the longitudinal impacts of these forms of messaging on alcohol consumption. The relationships between perceptions of messaging and susceptibility to initiate drinking among non-drinkers, and to drink within guidelines or reduce drinking among current drinkers, also require further investigation. Further research is needed on how graphic health warnings are received and how they may impact perceived risks of alcohol use, as well as alcohol consumption, among adolescents. One concern about including the number of alcohol units in the product on packaging is that young people and higher risk drinkers will use this information to buy stronger alcohol products at a cheaper price (Thomson et al., 2012; Wettlaufer, 2018), and this should be investigated in parallel.

This study adds to a growing body of evidence demonstrating the support for including informative messages about alcohol and its health consequences on alcohol packaging. Additionally, evidence-based messaging such as labelling may counter the growing influence of the alcohol industry by shifting the public's perceptions of alcohol consumption and its related harms and building collective will for policy change (Madden and McCambridge, 2021). Taken together with the low awareness of standard

drink units, weekly guidelines, and alcohol-related health consequences reported elsewhere (Blackwell et al., 2018; Wettlaufer, 2018), the lack of exposure to messaging among adolescents reported in this study indicate a need for more visible and tailored messaging. This study also shows that higher-risk adolescent drinkers are more in favor of product information that facilitates drinking choices and less supportive of information that may put them off drinking, findings that must also be investigated among adult higher-risk drinkers. Implementing comprehensive and effective labelling practices has strong support and the potential to reduce alcohol harms among adolescents, as part of a wider strategy to reduce alcohol harm.

DATA AVAILABILITY

The data that support the findings of this study belong to Cancer Research UK and are available on reasonable request permission of the Cancer Policy Research Centre.

REFERENCES

Alcohol Change UK (2019) *Knowing what's in the bottle: why we need labelling laws*. London: Alcohol Change UK.

Alcohol Health Alliance UK (2020) *Drinking in the Dark: How alcohol labelling fails consumers*. London: Alcohol Health Alliance UK.

Anheuser-Bush InBev (2019) *AB InBev Responsible Marketing and Communications Code*. Leuven: AB InBev

Babor TF, Higgins-Biddle JC, Saunders JB and Monteiro MG (2001) *The Alcohol Use Disorders Identification Test: Guidelines for use in primary care*. Geneva: World Health Organization Department of Mental Health and Substance Dependence.

Blackwell AKM, Drax K, Attwood AS, Munafò MR and Maynard OM (2018) Informing drinkers: Can current UK alcohol labels be improved? *Drug and Alcohol Dependence* 192: 163–170.

Brener ND, Billy JOG and Grady WR (2003) Assessment of factors affecting the validity of self-reported health-risk behavior among adolescents: evidence from the scientific literature. *The Journal of Adolescent Health* 33: 436–457.

Clarke N, Pechey E, Mantzari E, Blackwell AKM, De-Loyde K, Morris RW, Munafò MR, Marteau TM and Hollands GJ (2020) Impact of health warning labels communicating the risk of cancer on alcohol selection: an online experimental study. *Addiction* 116: 41–52.

Critchlow N, Jones D, Moodie C, MacKintosh AM, Fitzgerald N, Hooper L, Thomas C and Vohra J (2019a) Awareness of product-related information, health messages and warnings on alcohol packaging among adolescents: a cross-sectional survey in the United Kingdom. *Journal of Public Health* 42: e223–e230.

Critchlow N, MacKintosh AM, Hooper L, Thomas C and Vohra J (2019b) Participation with alcohol marketing and user-created promotion on social media, and the association with higher-risk alcohol consumption and brand identification among adolescents in the UK. *Addiction research & theory* 27: 515–526.

Critchlow N, MacKintosh AM, Thomas C, Hooper L and Vohra J (2019c) Awareness of alcohol marketing, ownership of alcohol branded merchandise, and the association with alcohol consumption, higher-risk drinking, and drinking susceptibility in adolescents and young adults: a cross-sectional survey in the UK. *BMJ Open* 9: e025297.

Dimova ED and Mitchell D (2021) Rapid literature review on the impact of health messaging and product information on alcohol labelling. *Drugs: Education, Prevention and Policy* 1–13.

Drovandi A, Teague P-A, Glass B and Malau-Aduli B (2019) A systematic review of the perceptions of adolescents on graphic health warnings and plain packaging of cigarettes. *Systematic Reviews* 8: 25.

ESPAD Group (2020) *ESPAD Report 2019: Results from the European School Survey Project on Alcohol and Other Drugs*. Luxembourg: EMCDDA Joint Publications, Publications Office of the European Union.

Guttmannova K, Bailey JA, Hill KG, Lee JO, Hawkins JD, Woods ML and Catalano RF (2011) Sensitive periods for adolescent alcohol use initiation: predicting the lifetime occurrence and chronicity of alcohol problems in adulthood. *Journal of Studies on Alcohol and Drugs* 72: 221–231.

Hammond D (2011) Health warning messages on tobacco products: a review. *Tobacco*

Control 20: 327–337.

Hobin E, Schoueri-Mychasiw N, Weerasinghe A, Vallance K, Hammond D, Greenfield
   TK, McGavock J, Paradis C and Stockwell T (2020a) Effects of strengthening
   alcohol labels on attention, message processing, and perceived effectiveness: A
   quasi-experimental study in Yukon, Canada. *The International journal on drug
   policy* 77: 102666.

Hobin E, Weerasinghe A, Vallance K, Hammond D, McGavock J, Greenfield TK,
   Schoueri-Mychasiw N, Paradis C and Stockwell T (2020b) Testing Alcohol
   Labels as a Tool to Communicate Cancer Risk to Drinkers: A Real-World Quasi-
   Experimental Study. *Journal of Studies on Alcohol and Drugs* 81: 249–261.

Jané-Llopis E, Kokole D, Neufeld M, Hasan OSM and Rehm J (2020) *What is the
   current alcohol labelling practice in the WHO European Region and what are
   barriers and facilitators to development and implementation of alcohol labelling
   policy?* Copenhagen: WHO European Regional Office.

Jones D, Moodie C, Purves RI, Fitzgerald N and Crockett R (2021) Health information,
   messaging and warnings on alcohol packaging: a focus group study with young
   adult drinkers in Scotland. *Addiction research & theory* 1–10.

Madden M and McCambridge J (2021) Alcohol marketing versus public health: David
   and Goliath? *Globalization and Health* 17: 45.

McCambridge J, McAlaney J and Rowe R (2011) Adult consequences of late
   adolescent alcohol consumption: a systematic review of cohort studies. *PLoS
   Medicine* 8: e1000413.

NHS Digital (2018) *Part 5: Drinking behaviours among children*, viewed 16 July 2020,

<https://digital.nhs.uk/data-and-information/publications/statistical/statistics-on-alcohol/2018/part-5>.

NHS Digital (2019) *Part 5: Alcohol drinking prevalence and consumption*, viewed 16 July 2020, < https://digital.nhs.uk/data-and-information/publications/statistical/smoking-drinking-and-drug-use-among-young-people-in-england/2018/part-5-alcohol-drinking-prevalence-and-consumption>.

Pechey E, Clarke N, Mantzari E, Blackwell AKM, De-Loyde K, Morris RW, Marteau TM and Hollands GJ (2020) Image-and-text health warning labels on alcohol and food: potential effectiveness and acceptability. *BMC Public Health* 20: 376.

Petticrew M, Douglas N, Knai C, Durand MA, Eastmure E and Mays N (2016) Health information on alcoholic beverage containers: has the alcohol industry's pledge in England to improve labelling been met? *Addiction* 111: 51–55.

Public Health England (2017) *NHS Health Check: Best practice guidance*. London: Public Health England.

Research in Practice (2015) *Scoring standardised measures - All Guidance (2015)*. Sheffield: Research in Practice.

Rosenberg G, Bauld L, Hooper L, Buykx P, Holmes J and Vohra J (2018) New national alcohol guidelines in the UK: public awareness, understanding and behavioural intentions. *Journal of Public Health* 40: 549–556.

Scholes-Balog KE, Heerde JA and Hemphill SA (2012) Alcohol warning labels: unlikely to affect alcohol-related beliefs and behaviours in adolescents. *Australian and New Zealand Journal of Public Health* 36: 524–529.

Scotch Whisky Association (2020) *Code of Practice for the Responsible Marketing and*

Promotion of Scotch Whisky. Edinburgh: Scotch Whisky Association.

Thomson LM, Vandenberg B and Fitzgerald JL (2012) An exploratory study of drinkers views of health information and warning labels on alcohol containers. *Drug and Alcohol Review* 31: 240–247.

Vallance K, Romanovska I, Stockwell T, Hammond D, Rosella L and Hobin E (2018) "we have a right to know": exploring consumer opinions on content, design and acceptability of enhanced alcohol labels. *Alcohol and Alcoholism* 53: 20–25.

Wettlaufer A (2018) Can a label help me drink in moderation? A review of the evidence on standard drink labelling. *Substance Use & Misuse* 53: 585–595.

WHO European Regional Office (2012) *European action plan to reduce the harmful use of alcohol 2012–2020*. Geneva: World Health Organization.

WHO European Regional Office (2018) *Adolescent alcohol-related behaviours: trends and inequalities in the WHO European Region, 2002–2014*. Geneva: WHO European Regional Office.

Wigg S and Stafford LD (2016) Health Warnings on Alcoholic Beverages: Perceptions of the Health Risks and Intentions towards Alcohol Consumption. *Plos One* 11: e0153027.

Winstock AR, Holmes J, Ferris JA and Davies EL (2020) Perceptions of Alcohol Health Warning Labels in a Large International Cross-Sectional Survey of People Who Drink Alcohol. *Alcohol and Alcoholism* 55: 315–322.

World Health Organization (2010) *Global Strategy to Reduce the Harmful Use of Alcohol*. Geneva: World Health Organization.

World Health Organization (2019) *Global Status Report on Alcohol and Health 2018*.

Geneva: World Health Organization.

Zhao J, Stockwell T, Vallance K, Hobin E (2020) The Effects of Alcohol Warning Labels

on Population Alcohol Consumption: An Interrupted Time Series Analysis of

Alcohol Sales in Yukon, Canada. *Journal of Studies on Alcohol and Drugs* 81:

225-237.

Table 1. Sample characteristics of adolescents in the Youth Alcohol Policy Survey 2019[a,b], *n* = 3,388

Variable	*n* (%)
Age	
Legal purchasing age	813 (24)
Underage	2,575 (76)
Sex	
Male	1,728 (51)
Female	1,660 (49)
Drinking Status (n = 3,303)	
Never and current non-drinkers	1,888 (56)
Lower risk drinkers	825 (24)
Higher risk drinkers	590 (17)
Perceptions of 'Drink Responsibly' Message	
Agree that it is clear	2,103 (62)
Agree that it would deter drinking	419 (12)
Support for Product Information and Health Messaging[c]	
Number of alcohol units in the product	2,486 (73)
Number of calories in the product	2,021 (60)
Strength of the product (% alcohol by volume)	2,679 (79)
Weekly drinking guidelines	2,413 (71)
Number of servings equal to weekly guidelines	2,384 (70)
Health warnings (e.g., not drinking while pregnant)	2,674 (79)
Alcohol-related health conditions	2,360 (70)
Perceived Risks	
Belief that alcohol is harmful to health	2,469 (73)
Higher awareness of alcohol-related health conditions[d]	2,004 (59)
Previous Exposure to Messaging	
Never	1,544 (46)
Some or about half of the time	1,092 (32)
Most of the time or always	634 (19)

[a]Sample weighted to be representative of all UK adolescents.
[b]Deprivation quintile is not shown, as each deprivation quintile had 678 (20%) participants.
[c]Represents the number and proportion of participants who supported each form of messaging ('somewhat agree' or 'strongly agree'

on a 5-point Likert scale).
[d]Participants correctly identified three to six alcohol-related health conditions.

Table 2. Associations between drinking status, perceived risks, and exposure to messaging and support for seven forms of product information and health messaging[a,b], $n = 3,154$

	Number of alcohol units		Number of calories		Strength of the product		Weekly drinking guidelines		Servings of the product equal to weekly guidelines		Health warnings		Alcohol-related health conditions	
	AOR (95% CI)	p	AOR (95% CI)	p	AOR (95% CI)	p	AOR (95% CI)	p	AOR (95% CI)	p	AOR (95% CI)	p	AOR (95% CI)	p
Age														
Underage							Ref							
Legal purchasing age	1.21 (0.95-1.55)	0.230	1.16 (0.95-1.41)	0.144	0.98 (0.75-1.28)	0.879	1.12 (0.90-1.41)	0.302	0.95 (0.77-1.18)	0.655	0.92 (0.72-1.19)	0.521	0.89 (0.72-1.09)	0.266
Sex														
Male							Ref							
Female	1.16 (0.91-1.49)	0.189	**1.26 (1.09-1.46)**	**0.002**	1.08 (0.90-1.3)	0.391	1.15 (0.98-1.35)	0.085	**1.24 (1.06-1.45)**	**0.009**	1.14 (0.95-1.37)	0.148	**1.26 (1.08-1.48)**	**0.003**
Deprivation Quintile														
1 (most deprived)							Ref							
2	1.29 (0.97-1.72)	0.080	1.07 (0.83-1.37)	0.597	1.27 (0.93-1.72)	0.129	1.19 (0.91-1.55)	0.211	**1.35 (1.03-1.76)**	**0.031**	1.35 (1.00-1.82)	0.054	1.02 (0.78-1.33)	0.901
3	1.02 (0.77-1.34)	0.880	1.05 (0.82-1.34)	0.718	1.08 (0.80-1.44)	0.630	1.21 (0.93-1.57)	0.162	1.20 (0.92-1.56)	0.173	1.17 (0.87-1.56)	0.303	0.93 (0.72-1.21)	0.589
4	1.31 (1.00-1.73)	0.052	**1.29 (1.01-1.64)**	**0.040**	**1.40 (1.04-1.89)**	**0.027**	1.22 (0.94-1.58)	0.128	1.19 (0.92-1.54)	0.175	1.28 (0.96-1.71)	0.096	1.05 (0.81-1.36)	0.697
5 (least deprived)	**1.34 (1.03-1.74)**	**0.031**	**1.29 (1.02-1.62)**	**0.031**	**1.37 (1.03-1.82)**	**0.030**	**1.46 (1.14-1.87)**	**0.003**	1.23 (0.97-1.58)	p = 0.092	**1.39 (1.05-1.84)**	**0.020**	1.16 (0.90-1.48)	0.248
Drinking Status ($n = 3,303$)														
Never and current non-drinkers	**0.61 (0.49-0.75)**	**<0.001**	**0.82 (0.68-0.98)**	**0.030**	**0.52 (0.41-0.67)**	**<0.001**	**0.75 (0.61-0.92)**	**0.006**	**0.72 (0.59-0.89)**	**0.002**	**0.69 (0.55-0.87)**	**p = 0.002**	0.94 (0.77-1.15)	p = 0.560
Lower risk drinkers							Ref							
Higher risk drinkers	**1.82 (1.31-2.54)**	**<0.001**	**1.32 (1.04-1.68)**	**0.025**	**1.73 (1.19-2.52)**	**0.004**	0.95 (0.72-1.24)	0.688	0.90 (0.69-1.17)	0.433	1.15 (0.84-1.58)	0.395	**0.68 (0.53-0.87)**	**0.002**
Perceived Risks														
Belief that alcohol is harmful to	**1.74 (1.44-2.09)**	**<0.001**	**1.45 (1.23-1.71)**	**<0.001**	**1.68 (1.37-2.05)**	**<0.001**	**1.81 (1.52-2.16)**	**<0.001**	**1.86 (1.57-2.22)**	**<0.001**	**1.95 (1.61-2.37)**	**<0.001**	**1.88 (1.58-2.23)**	**<0.001**

	AOR (95% CI)	p	AOR (95% CI)	p	AOR (95% CI)	p	AOR (95% CI)	p	AOR (95% CI)	p	AOR (95% CI)	p	AOR (95% CI)	p
health (vs. not)														
Higher awareness of alcohol-related health conditions (vs. lower awareness)	**2.55 (2.14-3.03)**	**<0.001**	**1.59 (1.36-1.85)**	**<0.001**	**2.33 (1.93-2.82)**	**<0.001**	**1.86 (1.57-2.19)**	**<0.001**	**1.71 (1.45-2.01)**	**<0.001**	**1.93 (1.61-2.33)**	**<0.001**	**1.55 (1.32-1.83)**	**<0.001**
Previous Exposure to Messaging														
Never							Ref							
Some or about half of the time	1.07 (0.88-1.30)	0.486	1.14 (0.97-1.35)	0.118	1.02 (0.83-1.26)	0.822	**1.26 (1.05-1.52)**	**0.015**	1.15 (0.96-1.38)	0.130	0.97 (0.80-1.19)	0.798	0.98 (0.82-1.18)	0.853
Most of the time or always	**1.77 (1.34-2.30)**	**<0.001**	**1.52 (1.24-1.85)**	**<0.001**	**1.47 (1.10-1.95)**	**0.008**	1.18 (0.95-1.47)	0.145	**1.33 (1.07-1.66)**	**0.010**	**1.68 (1.23-2.21)**	**<0.001**	1.12 (0.91-1.38)	0.291

AOR = adjusted odds ratio; CI: confidence interval.
Bolding indicates statistical significance.
[a]Final model results from seven logistic regression models (binary outcome of support for each type of product information/health messaging, mutually adjusted for other variables in the table).
[b]Represents the number and proportion of participants who supported each form of messaging ('somewhat agree' or 'strongly agree' on a 5-point Likert scale).