FOOD STANDARDS
Australia New Zealand
Te Mana Kounga Kai – Ahitereiria me Aotearoa

P1059 Consumer Research Report

Energy labelling on alcoholic beverages: The effects of various labelling formats on consumer perceptions and behavioural intentions

November 2023

Executive summary

In January 2023, FSANZ released a Call for Submissions proposing to amend the Australia New Zealand Food Standards Code to require the declaration of energy content information, in a prescribed format, on the label of packaged alcoholic beverages. Most submissions supported mandatory energy labelling on alcoholic beverages. However, there were mixed views as to the most appropriate format of the energy label, with some raising concerns about potential negative unintended consequences. These key concerns were that: 1) 'energy per serving' information could imply a recommended amount for consumption and reduce consumer understanding of standard drinks, 2) 'servings per package' information could reduce consumer understanding of standard drinks, and 3) 'energy per 100 mL' information could imply that 100 mL of spirits is an acceptable amount to consume.

Based on this feedback, FSANZ undertook consumer research to compare the effects of five different energy labelling formats on consumer perceptions and behavioural intentions. The objective of the research was to determine the format of the energy label on alcoholic beverages that is best understood by consumers and best mitigates these potential unintended consequences that were raised by submitters.

Methods

The research design was a randomised controlled trial. 2,362 Australian and New Zealand consumers of alcoholic beverages were randomly allocated to view one of five types of energy labels on one of three types of alcoholic beverages (750 mL bottle of wine, 330 mL bottle of beer, or 700 mL bottle of spirits). The five different energy labelling formats were as follows:

Label A (control label):

ENERGY INFORMATION Servings per package: (x) Serving size: mL		
	Quantity per serving	Quantity per 100 mL
Energy	kJ (Cal)	kJ (Cal)

Label B ('servings per package' information removed):

ENERGY INFORMATION		
	Quantity per x mL serving	Quantity per 100 mL
Energy	kJ (Cal)	kJ (Cal)

Label C ('energy per serving' information removed):

ENERGY INFORMATION	
	Quantity per 100 mL
Energy	kJ (Cal)

Label D ('energy per 100 mL' information removed):

ENERGY INFORMATION Servings per package: (x) Serving size: mL	
Quantity per serving	
Energy	kJ (Cal)

Label E (standard drinks information added):

ENERGY INFORMATION Servings per package: (x) Serving size: mL (x standard drinks)		
	Quantity per serving	Quantity per 100 mL
Energy	kJ (Cal)	kJ (Cal)

Label A served as the control label in order to isolate the effects of including versus excluding particular labelling elements. That is, all other labels were identical to Label A with the exception of one particular element either removed (energy content per serving, number of servings per package, or energy content per 100 mL) or added (standard drinks information). In addition to the randomly allocated energy label, all beverages contained the following information that is currently mandated on the label of alcoholic beverages: alcohol content, number of standard drinks per package, volume.

While viewing their allocated label, participants were asked to report the energy content per serving, the energy content per 100 mL, the number of servings per package, the number of standard drinks per package, and the volume of the bottle.

Participants were then asked:

- how much of the beverage they would choose to consume within one week,
- whether they thought the label implies there is a certain amount of the beverage that they should consume,
- their perceived understanding of the energy content information,
- their perceived understanding of what a standard drink is, and
- their understanding of how a serving size relates to a standard drink (whether a serving is more than, less than, or equal to, a standard drink).

Next, participants were shown their allocated energy label on all types of alcoholic beverages, and were asked to rank the different beverages from lowest to highest in energy (based on one typical drink).

Finally, participants were shown all five energy labels, and were asked to select which energy label they thought would best enable them to compare the energy content information between: a) different categories of alcoholic beverages (e.g. wine versus beer); b) different alcoholic beverages within the same category (e.g. between different types of beer); and c) alcoholic beverages and non-alcoholic beverages/foods.

Key findings

The key findings relating to each type of energy label are discussed below, in order of best label (Label E) to worst label (Label C) according to their impacts on consumer understanding.

Label E (standard drinks information added) best enabled consumer understanding of the energy content information, and did not result in any negative unintended consequences. Consumers most commonly selected Label E as best enabling them to compare the energy content between products. Furthermore, Label E was the only label that enabled consumer understanding of how a serving size relates to a standard drink. This was the case for all types of alcoholic beverages, except for beer, where consumer understanding of how a standard drink relates to a serving size was generally high regardless of the type of energy label. It is unsurprising that consumers generally understood how a serving size relates to a standard drink for a single serve beverage (beer) but had low levels of understanding for multi-serve beverages (wine and spirits). Nevertheless, incorporation of standard drinks information in the energy label still significantly improved consumer understanding of this information for beer (75% versus 68% of consumers with accurate responses).

In addition to standard drinks information, Label E contains the following information (consistent with information requirements on other foods and non-alcoholic beverages): energy content per serving; number of servings per package; energy content per 100 mL. None of these labelling elements had negative unintended consequences when presented in unison, regardless of the type of alcoholic beverage (wine, beer or spirits). Specifically, consumers did not think that any label implied there is a certain amount of the beverage that they should consume. Consistent with this finding, none of these labelling elements affected the amount of the beverage that consumers intended to consume. Additionally, none of these labelling elements (when presented in unison) made consumers feel any more or less confused about what a standard drink is.

Label A (control) performed just as well as Label E in every respect, except that consumer understanding of how a serving size relates to a standard drink was poor for Label A (as for Labels B, C and D). In contrast to Labels B, C and D, Label A contains all other labelling elements that best enabled consumer understanding of the energy content information, and best mitigated any other negative unintended consequences.

When energy per 100 mL information was removed (Label D), most consumers were unable to correctly estimate this information, which may limit consumers' ability to compare the energy content between different products (FSANZ, 2021). Consumers most commonly selected Label E as best enabling them to compare the energy content between products (which included both 'energy per serving' information and 'energy per 100 mL' information).

Label B ('servings per package' information removed) increased consumer confusion about the number of servings per package versus the number of standard drinks per package. Provision of 'servings per package' information was

necessary to enable consumers to distinguish between these two pieces of information.

Label C (energy per serving information removed) resulted in a lower perceived understanding of the energy content, a decreased ability to correctly rank the energy content of different alcoholic beverages (based on one typical drink), and a lower perceived understanding of what a standard drink is and how this relates to a serving size. Consumers who viewed Label C tended to assume that a serving size was the same as a standard drink, and interpreted the 'energy per 100 mL' information as 'energy per serving' information. The majority of consumers were able to correctly rank the energy content of different alcoholic beverages (based on one typical drink) when viewing all other labels.

Contents

Introduction

Background

Under the Australia New Zealand Food Standards Code (the Code), most packaged foods are required to be labelled with a nutrition information panel (NIP), which contains average energy content[1] information expressed in kilojoules (or both in kilojoules and in kilocalories) as well as the average quantity of 6 nutrients. Conversely, manufacturers are not required to provide a NIP on packaged alcoholic beverages. However, if a nutrition content claim about energy or carbohydrate content is made on the label of an alcoholic beverage, a NIP is then required.

In January 2023, FSANZ released a Call for Submissions proposing to amend the Code to require the declaration of energy content information, in a prescribed format, on the label of packaged alcoholic beverages (Proposal P1059 – Energy Labelling on Alcoholic Beverages; FSANZ, 2023). FSANZ's proposed prescribed format is shown below, which includes energy per serving information, energy per 100 mL information, and the number of servings per package (Label A). Label A was chosen in order to maintain consistency with the presentation of energy content information on other foods and non-alcoholic beverages.

Label A

ENERGY INFORMATION Servings per package: (x) Serving size: mL		
	Quantity per serving	Quantity per 100 mL
Energy	kJ (Cal)	kJ (Cal)

A systematic review and meta-analysis undertaken by FSANZ (FSANZ, 2021) indicates that consumers are unaware of the energy content of alcoholic beverages based on serving sizes. Consumers also report that they prefer energy content information that helps them to understand the implications of drinking a serving of an alcoholic beverage (e.g. glass of wine, bottle of beer).

Furthermore, consumers are unaware of the energy content of different alcoholic beverages for the same volume (e.g. 100 mL). For example, consumers are generally unaware that 100 mL of spirits is higher in energy than 100 mL of wine or beer, which is likely related to additional evidence that consumers are unaware that alcohol is the main source of energy in these beverages (FSANZ, 2021). Provision of energy content per 100 mL, in addition to energy content per serving, should therefore best enable comparison between different alcoholic beverages, and also between alcoholic beverages and other foods and non-alcoholic beverages.

[1] **Average energy content** means the average energy content calculated in accordance with section S11—2.

FSANZ received 64 submissions with the majority of submitters generally supporting the mandatory provision of standardised energy information on alcoholic beverages. However, submitters were mixed in their views as to the most appropriate format and application of energy labelling, with some also raising concerns about potential negative unintended consequences. These unintended consequences were that the label could: reduce consumer understanding of standard drinks[2], imply a recommendation or that there is a particular amount of the beverage that should be consumed, and increase the amount of the beverage that consumers intend to consume.

Based on the feedback received, FSANZ has undertaken consumer research to test the effects of five different energy labelling formats on consumer perceptions and behavioural intentions. The objective of the research was to determine the format of energy label on alcoholic beverages that:

a) is best understood by consumers; and
b) best minimises the risk of any negative unintended consequences.

Research questions to be addressed

More specifically, the study sought to address the following research questions:

1. What is the effect of including 'energy per serving' information in the energy label?

   Reason for inclusion: investigates concerns that the inclusion of 'energy per serving' information could:
   a) imply that there is a certain amount of alcohol that should be consumed;
   b) increase consumers' intended consumption of alcoholic beverages compared to forms of energy labelling without this information; and/or
   c) reduce consumer understanding of standard drinks.

2. What is the effect of including 'number of servings per package' information in the energy label?

   Reason for inclusion: investigates whether the presence of 'servings per package' information may exacerbate consumer confusion about standard drinks, or whether the presence of this information helps consumers to further distinguish between the number of standard drinks per package versus the number of servings per package.

[2] The standard drink measure is used in relation to recommendations about alcohol consumption and assists consumers to monitor their alcohol intake. A standard drink in Australia and New Zealand contains 10 grams of pure alcohol, regardless of the type of alcoholic beverage or how it is served. Therefore a typical serving may be more or less than a standard drink, depending on the alcohol content. We did not examine the effect of including 'energy per standard drink' information in the energy label because a standard drink does not reflect typical amounts consumed. Additionally, 'energy per standard drink' information would be similar across different types of alcoholic beverages and would therefore be of limited use to consumers.

3. What is the effect of including ‘energy per 100 mL’ information in the energy label?

   Reason for inclusion: investigates concerns that the inclusion of ‘energy per 100 mL’ information could, compared to ‘energy per serving’ information only,
   a) imply that 100 mL of spirits is an acceptable amount to consume and/or
   b) increase consumers’ intended consumption of spirits (or affect consumption of other alcoholic beverages)

4. What is the effect of including standard drinks information in the energy label (i.e. ‘Serving size: x mL (x standard drinks)’)?

   Reason for inclusion: tests whether this label can address any potential confusion consumers may have about how a serving size relates to a standard drink.

5. Which energy label do consumers perceive as best enabling them to compare energy content information between different products?

   Reason for inclusion: addresses evidence gaps regarding which format is better for consumer understanding of the energy content of alcoholic beverages. No research to date has directly compared these particular types of energy labels.

Methods

Design

This study consisted of an online, randomised controlled trial. Participants were pseudo-randomly allocated to view one type of alcoholic beverage (a bottle of wine, a bottle of beer, or a bottle of spirits) with the prerequisite that they had consumed that type of beverage in the past year. Quotas were used to ensure approximate equal allocation to each type of beverage. Participants were then randomly allocated to view one of five energy labels (Label A, B, C, D or E). This means that each participant viewed one type of energy label on one type of alcoholic beverage. This resulted in a total of 15 different groups (5 types of energy labels multiplied by 3 types of alcoholic beverages).

Piloting

The survey was firstly piloted on 219 Australian/New Zealand consumers of alcoholic beverages, in order to identify any possible comprehension issues. Pilot participants were recruited from an online market research panel (PureProfile). An open-ended question was included at the end of the pilot survey asking participants for any feedback or suggestions for survey improvement. No comprehension issues were identified, although free-response questions were improved by prompting participants to provide more detail (e.g. if participants only provided numbers, then they were

prompted to also specify units). Due to minor revisions made to the survey following piloting, piloting participants were excluded from the final sample.

Participants and sampling approach

Australian and New Zealand participants were recruited from PureProfile's online market research panel and completed the study between 29th June and 19th July 2023. Participants were eligible to complete the study if they were at least 18 years of age, had consumed wine, beer or spirits within the past 12 months, and were not currently employed in the alcohol industry.

The sample was nationally representative of each country based on interlocking quotas of age, gender and level of education. Soft quotas were also used for Māori in New Zealand (approximately 15.6%) and for Aboriginal/Torres Strait Islander in Australia (approximately 3.2%), reflecting census data.

A total of 2,362 participants completed the study. A priori power analysis indicated that a sample size of at least 2,340 would be required to detect small to medium effects (power = 0.80, alpha = 0.01). The power analysis was calculated using G*Power software.

Stimuli

As previously described, participants were randomly allocated to view one of 15 different images (5 types of energy labels multiplied by 3 types of alcoholic beverages = 15 different images/groups).

The five different energy label formats (Labels A, B, C, D and E) were chosen in order to isolate the effects of including versus excluding particular elements of FSANZ's originally proposed format (Label A). That is, all other labels were identical to Label A with the exception of one particular element either removed (energy content per serving, number of servings per package, energy content per 100 mL) or added (standard drinks information).

The five different types of energy label formats (Labels A, B, C, D and E) were as follows:

Label A (control label – FSANZ's originally proposed format):

ENERGY INFORMATION Servings per package: (x) Serving size: mL		
	Quantity per serving	Quantity per 100 mL
Energy	kJ (Cal)	kJ (Cal)

Reason for inclusion: given the purpose of this study was to isolate the effects of including versus excluding particular elements of FSANZ's originally proposed energy label format (Label A), Label A served as the control label.

Label B ('servings per package' information removed):

ENERGY INFORMATION		
	Quantity per x mL serving	Quantity per 100 mL
Energy	kJ (Cal)	kJ (Cal)

Reason for inclusion: comparing consumer perceptions and behavioural intentions between Label B and Label A will isolate the effects of including or excluding servings per package information. Addresses Research Question 2. Accordingly, serving size information was incorporated into the 'quantity per serving' heading.

Label C ('energy per serving' information removed):

ENERGY INFORMATION	
	Quantity per 100 mL
Energy	kJ (Cal)

Reason for inclusion: comparing consumer perceptions and behavioural intentions between Label C and Label A will isolate the effects of including or excluding energy per serving information. Addresses Research Question 1. Accordingly, all references to serving information was removed from this label (including the number of servings per package, and the serving size).

Label D ('energy per 100 mL' information removed):

ENERGY INFORMATION Servings per package: (x) Serving size: mL	
	Quantity per serving
Energy	kJ (Cal)

Reason for inclusion: comparing consumer perceptions and behavioural intentions between Label D and Label A will isolate the effects of including or excluding energy per 100 mL information. Addresses Research Question 3.

Label E (standard drinks information added):

ENERGY INFORMATION Servings per package: (x) Serving size: mL (x standard drinks)		
	Quantity per serving	Quantity per 100 mL
Energy	kJ (Cal)	kJ (Cal)

Reason for inclusion: comparing consumer perceptions and behavioural intentions between Label E and Label A will isolate the effects of including or excluding standard drink information in the energy label. Addresses Research Question 4.

In addition to the randomly allocated energy label, all beverages contained the following information that is currently mandated on the label of alcoholic beverages: alcohol content, number of standard drinks per package and volume of the package.

The images for each beverage type were identical in all respects, except for the format of the energy label. That is, the alcohol content, number of standard drinks per package and volume were the same for that specific type of beverage (regardless of the type of energy label). The on-label information that was specific to each type of beverage is provided in Table 1 below.

Images of the beverages did not include branding information to ensure that this would not bias the findings. Rather, beverages were generically referred to as ‘wine’, ‘beer’, or ‘spirits’.

To ensure that the information on the label of each alcoholic beverage was legible, a zoomed image of the label was provided next to the smaller image of the beverage. Example images that participants viewed for wine, beer and spirits are in Appendix 1.

Table 1: Information on the label for each type of beverage

	Wine	Beer	Spirits
Volume	750 mL	330 mL	700 mL
Alcohol content (% ALC/VOL)	13.5%	5%	37%
Number of standard drinks per package[#]	8.3	1.3	20.4
Energy content*	488 kJ (117 Cal) per serving 325 kJ (78 Cal) per 100 mL	385 kJ (92 Cal) per serving 117 kJ (28 Cal) per 100 mL	254 kJ (61 Cal) per serving 845 kJ (202 Cal) per 100 mL
Serving size*	150 mL	330 mL	30 mL
Number of servings per package*	5	1	23.3
Number of standard drinks per serving size*	1.7	1.3	0.9

[#]The number of standard drinks per package was shown using icons that are commonly used on the label of wine, beer and spirits (see Appendix 1).

*****Note that not all participants were provided with this information, depending on the energy labelling format that they were randomly allocated to (i.e. Label B did not contain servings per package information, Label C did not contain energy per serving information, Label D did not contain energy per 100 mL information, and only Label E contained standard drinks per serving size information).

Measures

Participants were asked the following questions (in the same order as they are presented here). The full survey instrument is provided in Appendix 2.

Demographic/baseline questions

Prior to being randomly allocated to view one type of energy label on one type of alcoholic beverage, participants were asked the following series of demographic/baseline questions:

- Age
- Gender
- Geographic location
- Whether they have consumed an alcoholic beverage in the past 12 months
- Whether they are currently employed in the alcohol industry
- Whether they have consumed wine, beer or spirits within the past 12 months
- Level of alcohol consumption: assessed using the AUDIT-C, a screening tool shown to have good reliability and validity (Bush et al., 1998)
- Highest level of education completed
- Cultural background
- Household income
- Use and understanding of nutrition labels on food
- The importance of health and weight in food and beverage choices: assessed using an adapted version of the weight subscale from the Steptoe et al. (1995) Food Choice Questionnaire.

Questions after random allocation to one energy label on one type of beverage

Attention questions

After being randomly allocated to view an image of one type of energy label on one type of alcoholic beverage, participants were asked to provide information about the image (to ensure that they paid attention to the image). This information included:

- The energy content per serving (in kilojoules and/or calories)
- The energy content per 100 mL (in kilojoules and/or calories)
- The number of servings in the bottle
- The number of standard drinks in the bottle
- The volume of the bottle

Participants were asked to provide all information regardless of the type of energy label that they were randomly allocated to (note that some energy labels did not provide energy per serving information, energy per 100 mL information, and number of servings per package information). Therefore, a second purpose of these questions was to determine whether participants were able to correctly estimate this information when it was not provided to them.

Consumption intentions

"If you had seen this label on [beer/spirits/wine] bottles, how much [beer/spirits/wine] would you choose to consume within one typical week?" Participants were only asked about the beverage that they had been randomly assigned to (beer, wine or spirits).

Participants responded by providing the number of drinks (free response), and the approximate size of each drink in mL (response options: 10 mL, 30 mL, 100 mL, 125 mL, 150 mL, 200 mL, 330 mL, or "other" [enter amount]). Participants were provided with images of each mL option so that they could see what each volume would look like. That is, participants who were randomly allocated to the wine group viewed images of a glass of wine filled to each volume, whereas participants in the spirits group viewed images of a spirits glass filled to each volume. Participants in the beer group viewed images of the bottle of beer filled to each volume, to demonstrate that they were being asked how much of the bottle they would consume as a single drink.

Participants were told that there is no right or wrong answer, and to please answer how much they would personally choose to consume.

Perception of whether the label implies that there is a certain amount that they should consume

"Do you think this label implies that there is a certain amount of [beer/spirits/wine] that you should consume"? The response format was on a scale from 1 (not at all) to 7 (completely). For participants who responded above 1 to this question, they were asked the follow-up question: "What is this amount?" (free response).

Perceived understanding of the energy content information

"Do you think the energy content information on this beverage is easy or hard to understand?" The response format was on a scale from 1 (don't understand at all) to 7 (understand completely).

Perceived understanding of standard drinks

"Do you think you understand what is meant by a 'standard drink'?" The response format was on a scale from 1 (don't understand at all) to 7 (understand completely).

Understanding of how a serving size relates to a standard drink

"Based on the information on this label, is one serving of [beer/spirits/wine]:"

- More than a standard drink
- Less than a standard drink
- Equal to a standard drink
- Don't know

Participants were required to select one of the four response options.

Question after viewing one energy label on all three types of beverages

Ability to rank different types of alcoholic beverages based on their energy content

Participants were shown their randomly allocated energy label on all three types of alcoholic beverages, and were asked to rank the different beverages from lowest to highest in energy, based on one typical drink.

Questions after viewing all types of energy labels

Participants were shown all five types of energy labels. These labels were not shown on a particular type of beverage, rather, participants just viewed the energy labels themselves. However, the numerical information on the energy labels corresponded to their previously allocated beverage.

Label that best enables comparison of energy content information between different products

Participants were asked the following three questions:

1. "Which of the following energy labels do you think would **best** enable you to compare energy content information **between different categories of alcoholic beverages** (e.g. compare wine vs. beer vs. spirits):"

2. "Which of the following energy labels do you think would **best** enable you to compare energy content information **between the same category of alcoholic beverages** (e.g. compare between different types of wine, or compare between different types of beer, etc.):"

3. "Which of the following energy labels do you think would **best** enable you to compare energy content information **between alcoholic beverages and non-alcoholic beverages/foods** (e.g. compare wine to orange juice, or compare beer to a chocolate bar, etc.):"

For each of the three questions, participants were required to select one of five response options:

- Label A
- Label B
- Label C
- Label D
- Label E

Data analysis

Analyses were conducted using IBM SPSS Statistics software, Version 28.

Data manipulations

We computed an overall measure of the importance of health and weight in food and beverage choices for each participant by averaging responses across the four items (these items are detailed under Question 16 in Appendix 2). Factor analysis showed that the four items measured one construct, indicating that it was appropriate to take an average.

We computed a total AUDIT-C score for each participant by summing responses to the three AUDIT-C questions (Bush et al., 1998).

The total amount of the beverage intended for consumption within one week was calculated for each participant by multiplying the number of drinks by the size of each drink.

Finally, categorical data (attention questions, understanding of how a serving relates to a standard drink, ability to rank different types of alcoholic beverages based on their energy content) were dichotomised by coding responses as either correct or incorrect. We also coded whether participants provided particular types of incorrect responses (e.g. whether participants incorrectly reported the energy content per 100 mL when asked to report the energy content per serving, or whether participants incorrectly reported the number of standard drinks per package when asked to report the number of servings per package).

Data exclusions based on implausible consumption intentions

There was evidence that a small subset of participants may not have understood the consumption questions. This was evident where participants stated implausible drink sizes in mL and/or implausible numbers of drinks that they would consume within one week.

For participants that stated implausible drink sizes, it was evident that they likely entered mL values that they had already multiplied by the number of drinks they said that they would consume. For example, one participant stated that they would consume 10 drinks within one week, and that each drink would be 3,300 mL. This participant was asked about beer, and 3,300/10 = 330, indicating that they likely meant that they would consume 10 beers (each 330 mL in size) within one week. However, given that we could not be certain about participants' intended answers, participants with these implausible values were excluded from analysis regarding consumption intentions (rather than recoded).

For participants that wrote implausible drink sizes, it was evident that they may have entered the volume of the bottle, rather than the number of drinks. For example, one participant stated that they would consume 750 drinks within one week. This participant was asked about wine (which had a 750 mL volume), and also stated that each drink would be 125 mL in size. There was also a small subset of participants who stated a number of drinks per week that seemed implausibly high that could not

be explained by the volume of the bottle. We therefore excluded participants who stated that they would consume 150 or more drinks per week (as this would mean that they would consume at least 21 drinks per day).

Applying both exclusion criteria (for implausible mL values and number of drinks) resulted in a total of 37 participants' data being excluded for this analysis[3].

It is challenging to fully justify cut-off levels, as the number of drinks that would result in a blood alcohol level associated with alcohol poisoning or death is highly variable across different individuals. We therefore conducted sensitivity analysis using a more conservative approach for excluding people based on the number of drinks. Here, participants who stated that they consumed at least 300 drinks per week (at least 42 drinks per day) were excluded from analysis (total n excluded = 33). Results are also reported where no data were excluded, and results did not substantively change regardless of the approach regarding data exclusions (see Results section).

Appendix 3 shows a breakdown of participant responses regarding the number of drinks they would consume per week. The two different cut-off values used for exclusion criteria are in red text.

Descriptive statistics

Descriptive statistics (percentages, means, standard deviations, medians, interquartile ranges) are reported where appropriate.

Descriptive statistics are provided for all 15 groups where measures significantly differed across different types of alcoholic beverages (attention questions and understanding of how a serving relates to a standard drink). Where measures did not significantly differ across different types of beverages (all other measures), descriptive statistics are only provided for each of the five energy label groups.

Significance testing

For continuous measures (perceived understanding of energy content information, perceived understanding of standard drinks, perception that the label implies that there is a certain amount of the beverage that should be consumed, consumption intentions), two-way factorial ANOVAs (type of energy label x type of alcoholic beverage) were used to determine whether there is a significant main effect of type of energy label and a significant interaction between type of energy label and type of beverage (i.e. whether any energy labelling effects differ depending on the type of beverage examined). Follow-up t-tests were used to compare Label A (control) with the other types of energy labels to isolate the effects of including/excluding different types of information. Alpha levels were corrected using a sequential Bonferroni correction.

[3] Although a priori power analysis indicated that a sample size of at least 2,340 would be required to detect small to medium effects, this calculation was based on the follow-up t-tests. The total sample included for the consumption intentions measure (n = 2,325) therefore still had sufficient power in order to detect small significant main effects and interactions based on a two-way factorial ANOVA (required sample size = 1,511).

For categorical measures (attention questions, understanding of how a serving relates to a standard drink, ability to rank different types of alcoholic beverages based on their energy content), binomial logistic regression was used to determine whether there is a significant main effect of type of energy label and, where relevant, a significant interaction between type of energy label and type of alcoholic beverage. For all logistic regression models, Label A (control) was used as the reference category for type of energy label. Wine was used as the reference category for type of alcoholic beverage because comparison with beer enabled comparison with a single serve beverage, whereas comparison with spirits enabled comparison with a beverage that has a higher alcohol content. These comparisons were most relevant given that, theoretically, beer and spirits could produce different results (compared to wine) for these reasons.

Sensitivity analyses

All significance testing was repeated while controlling for baseline measures (age, gender, level of alcohol consumption [total AUDIT-C scores], use and understanding of nutrition information on food labels, importance of health and weight in food and drink choices). Given that three participants had to be excluded from all analyses that controlled for baseline measures (as these participants did not identify as either male or female, and the sample size was too small to include 'other gender' in the models), results are reported both with and without controlling for baseline measures. Results were highly consistent regardless of the analytical approach.

For continuous measures, we used two-way factorial ANCOVAs to control for baseline measures. For some ANCOVA tests, it was not possible to enter all baseline measures as covariates in the model. This was where some covariates violated statistical assumptions of the ANCOVA (homogeneity of regression slopes)[4].

For categorical measures, we used hierarchical binomial logistic regression to control for baseline measures. Type of energy label, type of alcoholic beverage and the interaction were entered at stage 1, whereas baseline measures were entered at stage 2.

For all statistical tests, all relevant statistical assumptions were tested and met (e.g. homogeneity of variance, no multicollinearity, linearity of the logit, etc.; see Field, 2018). The central limit theorem states that normality testing is not required when sample sizes are large (Field, 2018). However, Wilcox (2010) suggests that sample sizes may need to be as large as 160 per group when data are very skewed (as was the case for some dependent variables). Bootstrapped versions of all ANOVAs (which do not assume normality) were therefore conducted for comprehensiveness, which produced consistent results and increased confidence in the findings (see

[4] Homogeneity of regression slopes refers to the statistical assumption that the covariate (i.e. the variable to be controlled for) has the same relationship with the outcome measure across the different levels of the independent variables. For example, the ANCOVA test assumes that the relationship between perceived understanding of nutrition labels on food (the covariate) and consumption intentions (the outcome measure) is the same across the different energy labelling and beverage groups. Failure to meet this assumption questions the validity of the ANCOVA test. Multi-level linear modelling using an unstructured covariance structure (which does not assume homogeneity of regression slopes) was not possible as the models failed to converge, which can happen when the model is too complex (Field, 2018).

Results section). Bootstrapping is also robust in the presence of outliers (as there was evidence of outliers for the consumption intentions measure)[5].

As previously described, all significance testing comparing consumption intentions among the different energy labelling groups is reported for the whole sample, as well as when excluding participants based on the two different exclusion criteria (see previous section on data exclusions).

Peer review

The draft research report was externally reviewed by an independent academic with expertise in the behavioural sciences and statistical analysis. Peer review comments were considered and incorporated into the final version of the report.

Results

Demographic/baseline measures

The sample consisted of 2,362 consumers of alcoholic beverages aged 18-92 years of age. The sample was nationally representative by interlocking demographics of age, gender and level of education for each country. We slightly oversampled Māori (18.9%) and Aboriginal/Torres Strait Islanders (4.4%) within their respective countries. Table 2 below provides a summary of the key participant characteristics across each energy labelling group. A more detailed description further broken down by the type of alcoholic beverage that participants were allocated to is provided in Appendix 4.

[5] A bootstrapping procedure estimates the shape of the sampling distribution by taking 2,000 samples of the data.

Table 2. Key participant characteristics across each type of energy labelling group (Label A, B, C, D and E)

	Label A (n = 467)	**Label B (n = 476)**	**Label C (n = 474)**	**Label D (n = 473)**	**Label E (n = 472)**
Country (%):					
Australia	50.5	49.2	49.8	50.5	49.8
New Zealand	49.5	50.8	50.2	49.5	50.2
Age, mean (SD)	45.59 (17.32)	47.07 (16.54)	48.71 (17.00)	48.10 (16.79)	47.79 (17.11)
Gender (%):					
Male	50.5	49.4	44.3	47.1	45.3
Female	49.5	50.4	55.3	52.9	54.7
Non-binary	0.0	0.0	0.2	0.0	0.0
Prefer not to say	0.0	0.2	0.2	0.0	0.0
Highest education level (%):					
No tertiary degree	73.2	70.2	70.9	71.5	68.4
Tertiary degree	26.8	29.8	29.1	28.5	31.6
Annual Household income (%):					
< $25,000	5.1	3.8	3.8	6.6	6.8
$25,000-$45,000	14.3	16.0	16.2	14.4	15.3
$45,001-$65,000	12.0	13.7	14.6	13.3	12.5
$65,001-$85,000	11.3	12.8	13.9	13.1	12.5
$85,001-105,000	10.3	9.9	8.9	11.2	10.4
>$105,000	40.5	36.1	36.5	37.4	34.7
Prefer not to say	6.4	7.8	6.1	4.0	7.8
Use of nutrition labels on food, mean (SD) (0 = never; 1 = rarely; 2 = occasionally; 3 = often; 4 = always)	2.25 (1.03)	2.25 (1.07)	2.26 (1.06)	2.25 (1.00)	2.28 (0.99)
Understanding of nutrition labels on food, mean (SD) (1 = very hard to understand; 7 = very easy to understand)	4.42 (1.49)	4.39 (1.49)	4.27 (1.47)	4.17 (1.46)	4.32 (1.44)
Importance of health and weight in drink choice, mean (SD) (1 = not at all important; 7 = very important)	4.72 (1.34)	4.49 (1.42)	4.52 (1.45)	4.44 (1.47)	4.60 (1.43)
Total AUDIT-C, mean (SD)	4.42 (2.36)	4.55 (2.49)	4.30 (2.35)	4.50 (2.55)	4.35 (2.46)

Attention questions

After being randomly allocated to view an image of one type of energy label on one type of alcoholic beverage, participants were asked to provide information about the image. This was to ensure that participants paid attention to the image (for groups that were provided with that information). A second purpose of these questions was to determine whether participants were able to correctly estimate this information when it was not provided to them. The results are summarised below.

Information that was provided to all participants (volume and number of standard drinks per package)

Participants generally reported accurate volume information and number of standard drinks per package information (accurately reported by at least 91% of participants across the different labelling groups).

Number of servings per package

Most participants accurately reported the number of servings per package, except for those who viewed Label B (where number of servings per package information was removed) and Label C (where only energy per 100 mL information was provided and all serving information was removed). For participants who viewed Labels B and C, incorrectly entering the number of standard drinks per package was either the most prominent response, or was similarly prominent to correctly responding with the number of servings per package. Very few participants selected “don’t know” when servings per packaging information was absent (Labels B and C). This indicates that the absence of this information may lead to confusion about the number of servings per package versus the number of standard drinks per package. Table 3 below shows the percentage of participants in each group who provided correct responses, who incorrectly reported the number of standard drinks per package (rather than the number of servings per package), and who selected “don’t know”.

Table 3. Percentage of participants in each group who correctly reported the number of servings per package, incorrectly reported the number of standard drinks per package, and selected "don't know".

Type of beverage	Type of energy label	Percentage of participants who correctly reported the number of servings per package	Percentage of participants who incorrectly reported the number of standard drinks per package	Percentage of participants who selected "don't know"
Wine	Label A	86.0	11.50	1.3
	Label B	40.6*	40.0*	6.9
	Label C	3.8*	52.9*	16.6
	Label D	85.9	7.7	1.3
	Label E	82.3	8.2	2.5
Beer	Label A	83.2	9.0	1.9
	Label B	35.5*	36.1*	9.0
	Label C	19.5*	52.8*	7.5
	Label D	77.4	15.1	3.1
	Label E	67.1	24.7	2.5
Spirits	Label A	76.8	11.6	3.2
	Label B	3.1*	54.0*	8.7
	Label C	0.0*	53.8*	4.4
	Label D	63.9	20.3	1.9
	Label E	72.4	14.7	3.8

* Significantly different from Label A (based on binomial logistic regression results)
Note: Percentages summed across each row do not total to 100, given that a small percentage of participants entered other incorrect values.

We performed a binomial logistic regression to determine whether the different labels significantly predicted accurate responses. The model was statistically significant ($\chi 2(14) = 1125.10$, $p < 0.001$). The model explained 51% of the variance in correct responses (Nagelkerke $R^2 = 0.51$) and correctly classified 79.5% of cases. Type of energy label was a significant predictor of correct responses ($p < 0.001$), such that

participants who viewed Label A were significantly more likely to correctly report the number of servings per package (82%) compared to participants who viewed Label B (26.3%) and Label C (7.8%) (both $p < 0.001$). There were no other significant differences in the percentage of accurate responses between Label A and the other labels (all $p > 0.05$). There was also a significant interaction between type of energy label and type of alcoholic beverage ($p < 0.001$), such that correct responses from participants who viewed Label B was more likely for wine (40.6%) than for spirits (3.1%) ($p < 0.001$). Additionally, correct responses from participants who viewed Label C was more likely for beer (19.5%) than for wine (3.8%) ($p < 0.001$). Nevertheless, the percentage of accurate responses was generally low across all beverage types for Labels B and C. Results did not change when baseline measures (age, gender, level of alcohol consumption, use and understanding of nutrition information on food labels, importance of health and weight in food and drink choices) were controlled for in the model using hierarchical binomial logistic regression.

We also performed a binomial logistic regression to determine whether the different labels significantly predicted whether participants would inaccurately report the number of standard drinks per package (rather than the number of servings per package). The model was statistically significant ($\chi 2(14) = 394.73$, $p < 0.001$). The model explained 22% of the variance in these incorrect responses (Nagelkerke $R^2 = 0.22$) and correctly classified 74.2% of cases. Type of energy label was a significant predictor of these incorrect responses ($p < 0.001$), such that participants who viewed Label B and Label C were significantly more likely to incorrectly report the number of standard drinks per package (43.50% and 53.20%, respectively) compared to participants who viewed Label A (10.70%) (both $p < 0.001$). There were no other significant differences in the percentage of these inaccurate responses between Label A and the other labels (all $p > 0.05$). There was also a significant interaction between type of energy label and type of alcoholic beverage ($p < 0.001$), such that these incorrect responses from participants who viewed Label E was less likely for wine (8.2%) than for beer (24.7%) ($p = 0.002$). Additionally, these incorrect responses from participants who viewed Label D was less likely for wine (7.7%) than for spirits (20.3%) ($p = 0.029$). Nevertheless, the percentage of inaccurate responses was generally low across all beverage types for Labels E and D. Results did not change when baseline measures were controlled for in the model using hierarchical binomial logistic regression.

The full results of both hierarchical binomial logistic regression models are available in Appendix 5.

Energy content per serving

Most participants accurately reported the energy content per serving, except for those who viewed Label C (where only energy per 100 mL information was provided). Participants who viewed Label C tended to inaccurately report the energy content per 100 mL as the energy content per serving. Very few participants who viewed Label C selected “don’t know.” Table 4 below shows the percentage of participants in each group who provided accurate responses, who inaccurately reported the energy content per 100 mL, and who selected “don’t know”.

Table 4. Percentage of participants in each group who correctly reported the energy content per serving, incorrectly reported the energy content per 100 mL, and selected "don't know".

Type of beverage	Type of energy label	Percentage of participants who correctly reported the energy content per serving	Percentage of participants who incorrectly reported the energy content per 100 mL	Percentage of participants who selected "don't know"
Wine	Label A	87.3	10.8	3.2
	Label B	83.8	11.9	4.4
	Label C	1.9*	82.2*	9.6
	Label D	94.2*	0.0	2.6
	Label E	88.6	8.9	4.4
Beer	Label A	88.4	10.3	3.9
	Label B	80.0	18.1	3.9
	Label C	2.5*	82.4*	3.8
	Label D	96.9*	0.0	1.9
	Label E	90.5	8.9	2.5
Spirits	Label A	91.0	9.0	2.6
	Label B	86.3	12.4	5.0
	Label C	0.0*	86.1*	3.2
	Label D	93.0*	0.0	3.8
	Label E	85.3	12.2	5.1

* Significantly different from Label A (based on binomial logistic regression results)
Note: Percentages summed across each row do not always total to 100, where a small percentage of participants entered other incorrect values. Some rows total to over 100 due to rounding.

We performed a binomial logistic regression to determine whether the different labels significantly predicted accurate responses. The model was statistically significant ($\chi 2(14) = 1481.25$, $p < 0.001$). The model explained 67% of the variance in correct responses (Nagelkerke $R^2 = 0.67$) and correctly classified 90.7% of cases. Type of energy label was a significant predictor of correct responses ($p < 0.001$), such that participants who viewed Label A were significantly more likely to correctly report the energy content per serving (82%) compared to participants who viewed Label C (7.8%) ($p < 0.001$). Furthermore, participants who viewed Label D (where only energy content per serving information was provided) were significantly more likely to provide correct responses (95%) than Label A (82%) ($p = 0.038$), although the prevalence of correct responses were generally high across both Labels A and D. There were no other significant differences in the percentage of accurate responses between Label A and the other labels (all $p > 0.05$). There was no significant interaction between type of energy label and type of alcoholic beverage ($p = 0.442$), and results did not change when baseline measures were controlled for in the model using hierarchical binomial logistic regression.

We also performed a binomial logistic regression to determine whether the different labels significantly predicted whether participants would inaccurately report the energy content per 100 mL (rather than the energy content per serving). The model was statistically significant ($\chi 2(14) = 1164.25$, $p < 0.001$). The model explained 59% of the variance in these incorrect responses (Nagelkerke $R^2 = 0.59$) and correctly classified 89.9% of cases. Type of energy label was a significant predictor of these incorrect responses ($p < 0.001$), such that participants who viewed Label C were significantly more likely to incorrectly report the energy content per 100 mL (83.5%) compared to participants who viewed Label A (10.1%) ($p < 0.001$). There were no other significant differences in the percentage of these inaccurate responses between Label A and the other labels (all $p > 0.05$). There was no significant interaction between type of energy label and type of alcoholic beverage ($p = 0.777$), and results did not change when baseline measures were controlled for in the model using hierarchical binomial logistic regression.

The full results of both hierarchical binomial logistic regression models are available in Appendix 5.

Energy content per 100 mL

Most participants accurately reported the energy content per 100 mL, except for those who viewed Label D (where only energy content per serving information was provided). Table 5 below shows the percentage of participants in each group who provided accurate responses, who inaccurately reported the energy content per serving (rather than the energy content per 100 mL), and who selected “don’t know”.

***Table 5. Percentage** of participants in each group who correctly reported the energy content per 100 mL, incorrectly reported the energy content per serving, and selected "don't know".*

Type of beverage	Type of energy label	Percentage of participants who correctly reported the energy content per 100 mL	Percentage of participants who incorrectly reported the energy content per serving	Percentage of participants who selected "don't know"
Wine	Label A	84.7	11.5	4.5
	Label B	86.3	10.6	4.4
	Label C	91.1	0.0	7.0
	Label D	28.2*	21.2	32.7
	Label E	86.7	9.5	4.4
Beer	Label A	85.8	8.4	5.2
	Label B	77.4	12.9	6.5
	Label C	92.5	0.0	5.7
	Label D	8.2*	26.4	29.6
	Label E	82.3	14.6	3.8
Spirits	Label A	87.7	9.0	5.2
	Label B	88.8	5.6	6.2
	Label C	92.0	0.0	4.4
	Label D	0.60*	24.7	30.4
	Label E	83.3	9.0	7.7

* Significantly different from Label A (based on binomial logistic regression results)
Note: Percentages summed across each row do not always total to 100, where a small percentage of participants entered other incorrect values. Some rows total to over 100 due to rounding.

We performed a binomial logistic regression to determine whether the different labels significantly predicted accurate responses. The model was statistically significant ($\chi 2(14) = 1063.60$, $p < 0.001$). The model explained 52% of the variance in correct responses (Nagelkerke $R^2 = 0.52$) and correctly classified 86.8% of cases. Type of energy label was a significant predictor of correct responses ($p < 0.001$), such that participants who viewed Label A were significantly more likely to correctly report the

energy content per serving (86%) compared to participants who viewed Label D (12%) ($p < 0.001$). There were no other significant differences in the percentage of accurate responses between Label A and the other labels (all $p > 0.05$). There was a significant interaction between type of energy label and type of alcoholic beverage ($p < 0.001$), such that correct responses from participants who viewed Label D was more likely for wine (28.2%) than for beer (8.20%; $p < 0.001$) or for spirits (0.60%; $p < 0.001$). Nevertheless, the percentage of correct responses was generally low across all beverage types for Labels D. Results did not change when baseline measures were controlled for in the model using hierarchical binomial logistic regression.

The full results of the hierarchical binomial logistic regression is available in Appendix 5.

Some participants who saw Label D reported values that were approximately correct (i.e. within 10% of the correct value; not shown in Table 5). Adding these participants to the total percentage of correct responses still produced overall low levels of accuracy for Label D across all beverage types. However, correct responses from participants who viewed Label D became more prevalent for beer (42.2%) than for wine (34%) or spirits (27.8%).

Perception that the label implies there is a certain amount of the beverage that should be consumed

A two-way factorial ANOVA (type of energy label x type of alcoholic beverage) showed no significant main effect of type of energy label (F (4, 2347) = 0.27, $p = 0.898$) and no significant interaction between type of energy label and type of alcoholic beverage (F (8, 2347) = 0.61, $p = 0.768$). This indicates no significant differences between any of the energy labelling groups, and this was the case regardless of the type of alcoholic beverage.

Therefore, labels with energy per serving information did not cause participants to think there is a certain amount that they should consume (compared to labels without energy per serving information). Additionally, labels with energy per 100 mL information did not cause participants to think there is a certain amount that they should consume (compared to labels without energy per 100 mL information).

Table 6 shows the mean and median ratings for each of the five different energy labelling groups (as well as the standard deviations and interquartile ranges). Participants generally did not think that any label implied there is a certain amount of the beverage that should be consumed, as the mean/median ratings for each group were below the midpoint of the scale (on a scale from 1 [not at all] to 7 [completely]). The percentage of participants that selected each response option is also available in Appendix 6 (supplementary figures for continuous measures).

Table 6. Perception that the label implies there is a certain amount of the beverage to be consumed: Descriptive statistics for each energy label group.

Type of energy label	Mean	Standard deviation	Median	Interquartile range
Label A (control)	2.76	2.08	2.00	4
Label B (servings per package removed)	2.74	2.04	2.00	3
Label C (energy per 100 mL)	2.75	2.10	2.00	3
Label D (energy per serving)	2.80	2.09	2.00	4
Label E (standard drinks information added)	2.86	2.09	2.00	4

Note: Standard deviations are high because the data were highly skewed towards the “not at all” end of the rating scale (see sensitivity analysis below where a bootstrapping procedure was used to deal with skewed data).

Participants who had a score above 1, indicating they did not fully disagree the label implied there was a certain amount of the beverage that should be consumed (51.7% of participants), were prompted to specify what this amount would be. Three participants answered “100 mL” in the group that saw Label A, while three answered “100 mL” in the group that saw Label D (where energy per 100 mL information was removed). Therefore, the results provide no evidence that the presence of energy per 100 mL information (in addition to energy per serving information) made participants more likely to perceive 100 mL as an amount that they should consume. Results were consistent when only participants who viewed spirits was considered (in both the Label A and Label D groups, only one participant stated that the amount was 100 mL for spirits).

Participants generally stated that the amount would be the serving size, rather than 100 mL (stated by 45.3% of participants who were asked this question). This response was similarly prevalent to other responses that had nothing to do with the energy label (43.1% of participants who were asked this question). These other responses included other random mL amounts, the volume of the bottle, the number of standard drinks per package, other random numbers of standard drinks, and “don’t know”/“there is no amount”.

Regardless, participants generally did not think that any label implied there is a certain amount of the beverage that should be consumed, and no label made participants significantly more likely to have this perception.

Sensitivity analysis

A two-way factorial ANCOVA controlling for baseline measures (age, gender, level of alcohol consumption, use and understanding of nutrition information on food labels, importance of health and weight in food and drink choices) produced results consistent with the initial ANOVA test. That is, there was no significant main effect of energy label (F (4, 2344) = 0.42, p = 0.795) and no significant interaction between type of energy label and type of alcoholic beverage (F (8, 2344) = 0.76, p = 0.638).

Both the ANOVA and ANCOVA were also rerun using a bootstrapping procedure, and results remained unchanged.

Consumption intentions

Participants were asked to state the number of drinks of their allocated beverage type that they would consume within one typical week (free response), and the approximate size of each drink in mL (response options: 10 mL, 30 mL, 100 mL, 125 mL, 150 mL, 200 mL, 330 mL, or “other” [enter amount]). We multiplied the number of drinks by the size of each drink to compute a total amount of the beverage that would be consumed for each participant. A total of 37 participants’ data were excluded from this analysis, based on evidence that these participants may have misinterpreted the questions and therefore entered implausible responses (see Data Analysis section for further information on data exclusions).

A two-way factorial ANOVA (type of energy label x type of alcoholic beverage) showed no significant main effect of energy label (F (4, 2304) = 1.57, p = 0.181) and no significant interaction between type of energy label and type of alcoholic beverage (F (8, 2304) = 1.64, p = 0.108). This indicates no significant differences in consumption amounts between any of the energy labelling groups, and this was the case regardless of the type of alcoholic beverage.

Table 7 below shows the mean and median ratings for each of the five different energy labelling groups (as well as the standard deviations and interquartile ranges). The percentage of participants with each total mL value is also available in Appendix 6 (supplementary figures for continuous measures).

Table 7. Intended weekly consumption amounts in mL (number of drinks multiplied by size of each drink): Descriptive statistics for each energy label group.

Type of energy label	Mean	Standard deviation	Median	Interquartile range
Label A (control)	953.26	1531.01	500.00	850.00
Label B (servings per package removed)	987.94	1925.96	400.00	1075.00
Label C (energy per 100 mL)	888.85	1462.40	500.00	750.00
Label D (energy per serving)	1049.35	2022.39	450.00	880.00
Label E (standard drinks information added)	794.42	1155.46	400.00	680.00

Note: Standard deviations are high because of high variability in the data and the presence of outliers (see sensitivity analysis below where a bootstrapping procedure was used to deal with non-normally distributed data and outliers).

Sensitivity analysis

A two-way factorial ANCOVA controlling for baseline measures (importance of health and weight in food and drink choices) produced results consistent with the initial ANOVA test. That is, there was no significant main effect of type of energy label (F (4, 2301) = 1.51, p = 0.195) and no significant interaction between type of energy label and type of alcoholic beverage (F (8, 2301) = 1.64, p = 0.109). It was not possible to enter other baseline measures as covariates in the ANCOVA because they violated statistical assumptions (see data analysis section). Nevertheless, it is important to note that baseline levels of alcohol consumption (total AUDIT-C scores) did not significantly differ among the different groups (a two-way factorial ANOVA showed no significant main effect of type of energy label, and no significant interaction between type of energy label and type of beverage; all $p > 0.05$). Baseline levels of consumption were therefore not a confound within the data.

When the more conservative exclusion criteria was applied (i.e. excluding participants who stated that they consumed 300+ drinks per week, as opposed to those who stated that they consumed 150+ drinks per week), the two-way factorial ANOVA and ANCOVA produced consistent results (all $p > 0.05$).

All possible analyses run with a bootstrapping procedure were also consistent (all $p > 0.05$).

Understanding of the energy content information

Perceived understanding of the energy content information

Participants were asked whether they think the energy content information on the beverage is easy or hard to understand (on a scale from 1 (don't understand at all) to 7 (completely understand)).

A two-way factorial ANOVA (type of energy label x type of alcoholic beverage) showed a significant main effect of type of energy label (F (4, 2347) = 3.89, $p = 0.004$) and no significant interaction between type of energy label and type of alcoholic beverage (F (8, 2347) = 0.28, $p = 0.972$). Follow-up t-tests showed that participants that saw Label C (energy content information per 100 mL) had significantly *lower* levels of perceived understanding of the energy content ($M = 4.87$, $SD = 1.74$) compared to those that saw Label A ($M = 5.21$, $SD = 1.68$; $p = 0.002$). There were no other significant differences between Label A and the other labels (all $p > 0.05$).

Table 8 shows the mean and median ratings for each of the five different energy labelling groups (as well as the standard deviations and interquartile ranges).

Table 8. Perceived understanding of the energy content information: Descriptive statistics for each energy label group.

Type of energy label	Mean	Standard deviation	Median	Interquartile range
Label A (control)	5.21	1.68	6.00	3.00
Label B (servings per package removed)	5.13	1.62	5.00	3.00
Label C (energy per 100 mL)	4.87*	1.74	5.00	2.00
Label D (energy per serving)	5.00	1.76	5.00	3.00
Label E (standard drinks information added)	5.24	1.70	6.00	3.00

*Significantly different compared to Label A (based on ANOVA with follow-up t-tests)

Sensitivity analysis

A two-way factorial ANCOVA controlling for baseline measures (age, level of alcohol consumption, use and understanding of nutrition information on food labels, importance of health and weight in food and drink choices) produced results consistent with the initial ANOVA test. That is, there was a significant main effect of

type of energy label (F (4, 2343) = 3.77, p = 0.005) and no significant interaction between type of energy label and type of alcoholic beverage (F (8, 2343) = 0.32, p = 0.958). Follow-up t-tests showed that participants that saw Label C had significantly lower levels of perceived understanding of the energy content (adjusted mean = 4.88) compared to those that saw Label A (adjusted mean = 5.21; p = 0.002). There were no other significant pairwise differences between Label A and the other labels (all p > 0.05).

The ANOVA and ANCOVA were also rerun using a bootstrapping procedure, and results remained unchanged.

Ability to rank different types of alcoholic beverages based on their energy content

Participants were shown their randomly allocated energy label on all three types of alcoholic beverages, and were asked to rank the different beverages from lowest to highest in energy, based on one typical drink.

The majority of participants correctly ranked the beverages based on energy per serving information ('spirits-beer-wine' ranking order), except for those who viewed Label C (where only energy per 100 mL information was provided). Participants who viewed Label C tended to incorrectly rank the beverages based on energy per 100 mL information ('beer-wine-spirits' ranking order).

It is possible that some participants may have interpreted a "typical drink" (as phrased in the survey question) to mean a standard drink, rather than a typical serving size. This would have resulted in a 'spirits-wine-beer' ranking. However, very few participants ranked the beverages in this way (5.7% - 9.5% across the different energy label groups). Further, it is not possible to definitely conclude that this was why participants ranked the beverages in a 'spirits-wine-beer' order.

Table 9 below shows the percentage of participants in each group who correctly ranked the beverages, who incorrectly ranked the beverages based on energy content per 100 mL information, and who incorrectly ranked the beverages in a way that was consistent with energy per standard drink information.

***Table 9. Percentage** of participants in each group who correctly ranked the beverages, who incorrectly ranked the beverages based on energy per 100 mL information, and who incorrectly ranked the beverages based on energy per standard drink information.*

Type of energy label	Percentage of participants who correctly ranked the beverages	Percentage of participants who incorrectly ranked the beverages based on energy per 100 mL	Percentage of participants who incorrectly ranked the beverages based on energy per standard drink
Label A (control)	56.3	25.3	6.4
Label B (servings per package removed)	51.1	30.3	7.4
Label C (energy per 100 mL)	4.9*	72.6*	9.5
Label D (energy per serving)	61.5	14.6*	9.3
Label E (standard drinks information added)	58.3	24.4	5.7

* Significantly different compared to Label A (based on binomial logistic regression results)

We performed a binomial logistic regression to determine whether the different labels significantly predicted accurate responses. The model was statistically significant ($\chi 2(4) = 506.50$, $p < 0.001$). The model explained 26% of the variance in correct responses (Nagelkerke $R^2 = 0.26$) and correctly classified 64.5% of cases. Type of energy label was a significant predictor of correct responses ($p < 0.001$), such that participants who viewed Label A were significantly more likely to correctly rank the beverages (56%) compared to participants who viewed Label C (where only energy content per 100 mL information was provided) (5%; $p < 0.001$). There were no other significant differences in the percentage of accurate responses between Label A and the other labels (all $p > 0.05$). Results did not change when baseline measures were controlled for in the model using hierarchical binomial logistic regression.

We also performed a binomial logistic regression to determine whether the different labels significantly predicted whether participants would inaccurately rank the beverages based on energy per 100 mL information (rather than energy per serving information). The model was statistically significant ($\chi 2(4) = 424.96$, $p < 0.001$). The model explained 23% of the variance in these incorrect responses (Nagelkerke $R^2 = 0.23$) and correctly classified 75.6% of cases. Type of energy label was a significant predictor of these incorrect responses ($p < 0.001$), such that participants who viewed

Label C were significantly more likely to rank the beverages based on energy per 100 mL information (73%) compared to those who viewed Label A (25%; $p < 0.001$). Additionally, participants who viewed Label D (where only energy per serving information was provided) were significantly *less* likely to rank the beverages based on energy per 100 mL information (15%) compared to Label A (25%; $p < 0.001$). Nevertheless, this difference between Label A and Label D was small, and there was no significant difference in the prevalence of *correct* responses between these two labels (as previously described). There were no other significant differences in the percentage of these inaccurate responses between Label A and the other labels (all $p > 0.05$). Results did not change when baseline measures were controlled for in the model using hierarchical binomial logistic regression.

The full results of the hierarchical binomial logistic regression is available in Appendix 5.

The label perceived as best enabling comparisons between different types of products

Participants were shown all five energy labels independent of a beverage, and were asked to select which energy label they thought would best enable them to compare the energy content information between: 1) different categories of alcoholic beverages, 2) different alcoholic beverages within the same category, and 3) alcoholic beverages and non-alcoholic beverages/foods.

Across all three questions, Label E (the energy label with standard drinks information added) was consistently the most prevalent response (rated as the best by 41-48% of participants). The percentage of participants that selected each type of energy label for each question/type of comparison is shown in Table 10 below.

Table 10. Percentage of participants that selected each label as best enabling comparisons between different types of products.

	Type of comparison		
Type of energy label	**Different categories of alcoholic beverages (e.g. wine vs. beer vs. spirits)**	**The same categories of alcoholic beverages (e.g. different types of beer)**	**Alcoholic beverages vs. non-alcoholic beverages/foods**
Label A (control)	14.8	17.1	19.5
Label B (servings per package removed)	10.7	10.2	13.0
Label C (energy per 100 mL)	11.5	11.9	13.8
Label D (energy per serving)	15.6	13.3	12.4
Label E (standard drinks information added)	47.4	47.6	41.3

Understanding of standard drinks

Perceived understanding of standard drinks

Participants were asked whether they think they understand what is meant by a standard drink (on a scale from 1 (don't understand at all) to 7 (understand completely)).

A two-way factorial ANOVA (type of energy label x type of alcoholic beverage) showed a significant main effect of type of energy label (F (4, 2347) = 3.81, p = 0.004) and no significant interaction between type of energy label and type of alcoholic beverage (F (8, 2347) = 0.66, p = 0.731). Follow-up t-tests showed that participants that saw Label C (energy content information per 100 mL) had significantly *lower* levels of perceived understanding of what a standard drink is (M = 5.01, SD = 1.70) compared to those that saw Label A (M = 5.34, SD = 1.67;

p = 0.002). There were no other significant differences between Label A and the other labels (all p > 0.05).

Table 11 shows the mean and median ratings for each of the five different energy labelling groups (as well as the standard deviations and interquartile ranges).

Table 11. Perceived understanding of the energy content information: Descriptive statistics for each energy label group.

Type of energy label	Mean	Standard deviation	Median	Interquartile range
Label A (control)	5.34	1.67	6.00	3.00
Label B (servings per package removed)	5.20	1.68	5.00	3.00
Label C (energy per 100 mL)	5.01*	1.70	5.00	2.00
Label D (energy per serving)	5.37	1.63	6.00	3.00
Label E (standard drinks information added)	5.33	1.57	6.00	3.00

*Significantly different compared to Label A (based on ANOVA with follow-up t-tests)

Sensitivity analysis

A two-way factorial ANCOVA controlling for baseline measures (age, gender, use and understanding of nutrition information on food labels, importance of health and weight in food and drink choices) produced results consistent with the initial ANOVA test. That is, there was a significant main effect of type of energy label (F (4, 2339) = 4.50, p = 0.001) and no significant interaction between type of energy label and type of alcoholic beverage (F (8, 2339) = 0.69, p = 0.702). Follow-up t-tests showed that participants that saw Label C had significantly lower levels of perceived understanding of what a standard drink is (adjusted mean = 5.02) compared to those that saw Label A (adjusted mean = 5.31; p = 0.004). There were no other significant differences between Label A and the other labels (all p > 0.05).

The ANOVA and ANCOVA were also rerun using a bootstrapping procedure, and results remained unchanged.

Understanding of how a serving size relates to a standard drink

Participants were asked whether they thought that one serving of the beverage is "more than", "less than", or "equal to" a standard drink. Participants could also respond "don't know".

Most participants provided incorrect responses, except for those who viewed Label E (the energy label with standard drinks information added), and for those who viewed beer (regardless of the type of energy label). It is unsurprising that consumers generally understood how a serving size relates to a standard drink for a single serve beverage (beer), but had low levels of understanding for multi-serve beverages (wine and spirits) when this information was not provided to them. Nevertheless, incorporation of standard drinks information in the energy label still improved consumer understanding of this information for beer (75% versus 68% of consumers with accurate responses).

Table 12 shows the percentage of participants in each group who provided correct responses, who provided incorrect responses, and who selected "don't know".

Table 12. Percentage of participants in each group who correctly reported how a serving size relates to a standard drink, who provided incorrect responses, and who selected "don't know".

Type of beverage	Type of energy label	Percentage of participants who correctly reported how a serving size relates to a standard drink	Percentage of participants who provided incorrect responses	Percentage of participants who selected "don't know"
Wine	Label A	46.5	44.6	8.9
	Label B	43.1	45.6	11.3
	Label C	26.1*	58.6	15.3
	Label D	49.4	41.0	9.6
	Label E	63.9*	32.9	3.2
Beer	Label A	68.4	27.7	3.9
	Label B	66.5	25.2	8.4
	Label C	67.9	24.5	7.5
	Label D	66.7	28.3	5.0
	Label E	74.7*	22.2	3.2

Type of beverage	Type of energy label	Percentage of participants who correctly reported how a serving size relates to a standard drink	Percentage of participants who provided incorrect responses	Percentage of participants who selected "don't know"
Spirits	Label A	34.2	53.5	12.3
	Label B	21.1	69.6	9.3
	Label C	11.4*	76.6	12.0
	Label D	25.9	63.3	10.8
	Label E	53.8*	38.5	7.7

* Significantly different from Label A (based on binomial logistic regression results)

We performed a binomial logistic regression to determine whether the different labels significantly predicted correct responses. The model was statistically significant ($\chi 2(14) = 386.19$, $p < 0.001$). The model explained 20% of the variance in correct responses (Nagelkerke $R^2 = 0.20$) and correctly classified 67.0% of cases. Type of energy label was a significant predictor of correct responses ($p < 0.001$), such that participants who viewed Label E were significantly *more* likely to provide correct answers (64.2%) compared to participants who viewed Label A (49.7%) ($p = 0.002$). Additionally, participants who viewed Label C (where only energy per 100 mL information was provided) were significantly *less* likely to report correct responses (35.2%) than those who viewed Label A. There were no other significant differences in the percentage of accurate responses between Label A and the other labels (all $p > 0.05$). There was a significant interaction between type of energy label and type of alcoholic beverage ($p < 0.001$), such that correct responses from participants who viewed Label C was more likely for beer (67.9%) than for wine (26.1%) ($p = 0.010$). Indeed, the percentage of correct responses was similarly high between Label A and Label C for beer. Results did not change when baseline measures were controlled for in the model using hierarchical binomial logistic regression.

The full results of the hierarchical binomial logistic regression is available in Appendix 5.

Further inspection of the data from participants who viewed Label C on wine and spirits revealed that the most prevalent response was that a serving is "equal to" a standard drink (42% of participants who viewed label C on wine; 41% of participants who viewed label C on spirits). Few participants who viewed Label C selected "don't know" (wine: 15%; spirits: 12%). The percentage of participants who selected each response option ("more than a standard drink", "less than a standard drink", "equal to a standard drink", or "don't know") for each group is in Appendix 7.

Discussion

The current research consisted of a randomised controlled trial that compared the effects of five different energy labelling formats on consumer perceptions and behavioural intentions in relation to alcoholic beverages. The objective of the research was to determine the format of the energy label on alcoholic beverages that is best understood by consumers and best mitigates any potential negative unintended consequences. These unintended consequences include: reducing consumer understanding of standard drinks, implying that there is a certain amount of the beverage that should be consumed, and increasing the amount of the beverage that consumers intend to consume.

More specifically, the research sought to address the following research questions:

1. What is the effect of including 'energy per serving' information in the energy label?
2. What is the effect of including 'energy per 100 mL' information in the energy label?
3. What is the effect of including 'number of servings per package' information in the energy label?
4. What is the effect of including standard drinks information in the energy label?
5. Which energy label do consumers perceive to be the easiest to understand, and which one best enables comparison of energy content information between different products?

The key findings are presented below, grouped by the research questions. This is followed by a discussion of the strengths and limitations of the research, and a conclusion regarding the energy label that best enables consumer understanding of the energy content information while best mitigating any negative unintended consequences.

What is the effect of including 'energy per serving' information in the energy label? (Label A vs. Label C)

Label A

ENERGY INFORMATION Servings per package: (x) Serving size: mL		
	Quantity per serving	Quantity per 100 mL
Energy	kJ (Cal)	kJ (Cal)

vs.

Label C

ENERGY INFORMATION	
Quantity per 100 mL	
Energy	kJ (Cal)

Labels with 'energy per serving' information **did not cause consumers to think that there is a certain amount that they should consume** (compared to labels with 'energy per 100 mL' information only). Participants generally did not think that any label implied there is a certain amount of the beverage that should be consumed. Consistent with this finding, provision of 'energy per serving' information **did not affect the amount of the beverage that consumers intended to consume**.

Rather, provision of 'energy per serving' information caused participants to have a **higher perceived understanding of the energy content** (compared to labels with 'energy per 100 mL' information only). Furthermore, **when energy per serving information was absent (i.e. when consumers saw 'energy content per 100 mL' information only), consumers were unable to correctly estimate this information**. Rather, the 'energy per 100 mL' information was interpreted as the 'energy per serving' information. Consumers' ability to rank different types of alcoholic beverages from lowest to highest in energy (based on a typical drink) was also extremely poor when this information was not available to them.

Provision of 'energy per serving' information also caused consumers to have a **significantly higher perceived understanding of what a standard drink is.** There are two possible explanations for this finding: 1) consumers incorrectly perceived serving sizes as standard drinks (and therefore provision of serving size information made them feel that they had a better understanding of what a standard drink is), or 2) provision of serving information helped consumers to further distinguish between a serving versus a standard drink. Consistent with the latter explanation, provision of 'energy per serving' information also **significantly improved consumer understanding of how a serving relates to a standard drink** (i.e. whether a serving is lower than, equal to, or higher than a standard drink). Although it is not surprising that consumers would not know this information when serving information is absent (i.e. when only 'energy per 100 mL' information is provided), consumers tended to incorrectly assume that a serving size is equal to a standard drink in this instance, rather than state that they did not know how the two are related.

Summary

Provision of 'energy per serving' information had no negative unintended consequences. However, this information made consumers feel that they had a better understanding of the energy content information, a better understanding of standard drinks, and best enabled them to correctly rank different beverages from lowest to highest in energy (based on one typical drink). This is important because consumers report that they want to understand the implications of drinking a serving of alcoholic beverages (e.g. glass of wine; FSANZ, 2021). Consumers were unable to accurately estimate this information when they were only provided with 'energy per 100 mL' information. When asked what the energy content per serving was when this is information was absent, consumers incorrectly perceived the energy content per 100 mL as the energy content per serving.

What is the effect of including 'number of servings per package' information in the energy label? (Label A vs. Label B)

Label A

ENERGY INFORMATION Servings per package: (x) Serving size: mL		
	Quantity per serving	Quantity per 100 mL
Energy	kJ (Cal)	kJ (Cal)

vs.

Label B

ENERGY INFORMATION		
	Quantity per x mL serving	Quantity per 100 mL
Energy	kJ (Cal)	kJ (Cal)

When labels did not contain the number of servings per package, consumers tended to incorrectly assume that this was the same as the number of standard drinks per package (rather than state that they don't know what this value is). This indicates that **provision of 'number of servings per package' information was necessary to enable consumers to distinguish between the number of servings versus the number of standard drinks per package.**

Conversely, provision of 'number of servings per package' information had no significant effect on consumers' *perceived* understanding of what a standard drink is. It also had no effect on consumers' understanding of how one serving relates to a standard drink (i.e. whether a serving is lower than, equal to, or higher than a standard drink). Rather, consumers' understanding of how one serving relates to a standard drink was poor regardless of the type of energy label, except for Label E (where this information was more directly provided).

Provision of the number of servings per package information had no significant effects on any other measures (consumer understanding of energy content information, amounts of the beverage intended for consumption, or perceptions around whether the label implies that there is an amount that should be consumed).

Summary

Provision of 'number of servings per package' information had no negative unintended consequences. Rather, provision of this information was necessary to enable consumers to distinguish between the number of servings per package versus the number of standard drinks per package. However, consumers still required further information in order to have a good understanding of how one serving relates to one standard drink (Label E, where this information was directly provided).

What is the effect of including 'energy per 100 mL' information in the energy label? (Label A vs. Label D)

Label A

ENERGY INFORMATION Servings per package: (x) Serving size: mL		
	Quantity per serving	Quantity per 100 mL
Energy	kJ (Cal)	kJ (Cal)

vs.

Label D

ENERGY INFORMATION Servings per package: (x) Serving size: mL	
	Quantity per serving
Energy	kJ (Cal)

Labels with energy per 100 mL information **did not cause consumers to think that there is a certain amount that they should consume** (compared to labels with 'energy per serving' information only). Consumers generally did not think that any label implied that there is a certain amount of the beverage that should be consumed. Furthermore, when pressed to state what this amount could be, consumers tended to state that this would be the serving size, not the 100 mL. Consistent with this finding, provision of energy per 100 mL information **did not affect the amount of the beverage that consumers intended to consume**. These results were consistent across all types of alcoholic beverages, including spirits where 100 mL is much higher than a typical 30 mL serving.

When 'energy per 100 mL' information was absent (i.e. when consumers saw 'energy content per serving' only), most participants were unable to correctly estimate this information, which may limit consumers' ability to compare the energy content between different products (FSANZ, 2021). Consumers most commonly selected Label E as best enabling them to compare the energy content between products (which included both 'energy per serving' information and 'energy per 100 mL' information).

Provision of 'energy per 100 mL' information had no effect on consumers' perceived understanding of the energy content (compared to labels with 'energy per serving' information only), or on their ability to correctly rank different types of alcoholic beverages based on a typical drink. Although provision of 'energy per 100 mL' information caused participants to be more likely to incorrectly rank beverages based on energy per 100 mL (as opposed to incorrectly ranking in other ways), there was no significant effect on the prevalence of correct responses. Thus, the *way* in which participants were inaccurate depended on whether energy per 100 mL information was present (but this did not affect overall levels of accuracy).

Provision of 'energy per 100 mL' information had no significant effects on consumers' perceived understanding of standard drinks, or understanding of how a standard drink relates to a serving size.

Summary

Provision of 'energy per 100 mL' information (when provided in addition to 'energy per serving' information) had no negative unintended consequences. When this information was not provided, most consumers were unable to correctly estimate this information, which may limit consumers' ability to compare the energy content between different products.

What is the effect of including standard drinks information in the energy label? (Label A vs. Label E)

Label A

ENERGY INFORMATION Servings per package: (x) Serving size: mL		
	Quantity per serving	Quantity per 100 mL
Energy	kJ (Cal)	kJ (Cal)

vs.

Label E

ENERGY INFORMATION Servings per package: (x) Serving size: mL (x standard drinks)		
	Quantity per serving	Quantity per 100 mL
Energy	kJ (Cal)	kJ (Cal)

Energy labels with standard drink information incorporated **did not cause consumers to think that there is a certain amount that they should consum**e (compared to labels without standard drink information incorporated). Consistent with this finding, incorporating standard drinks information **did not affect the amount of the beverage that consumers intended to consume**.

Provision of standard drinks information had no effect on consumers' perceived understanding of the energy content, or on their ability to correctly rank different types of alcoholic beverages based on their energy content.

Provision of standard drinks information had no statistically significant effects on consumers' *perceived* understanding of standard drinks. However, **provision of this**

information significantly improved consumers' understanding of how a serving relates to a standard drink (i.e. whether a serving is lower than, equal to, or higher than a standard drink). Importantly, consumer understanding of how a serving and a standard drink are related was poor for all types of energy labels, except for this energy label that directly incorporated this information. This was the case for all types of alcoholic beverages, except for beer, where consumer understanding of how a standard drink relates to a serving size was generally high regardless of the type of energy label. It is unsurprising that consumers generally understood how a serving size relates to a standard drink for a single serve beverage (beer), but had low levels of understanding for multi-serve beverages (wine and spirits). Nevertheless, incorporation of standard drinks information in the energy label still significantly improved consumer understanding of this information for beer (75% versus 68% of consumers with accurate responses).

Summary

The addition of standard drinks information to the energy label had no negative unintended consequences. Rather, provision of this information was necessary to enable consumer understanding of how a serving relates to a standard drink.

Which energy label do consumers perceive as best enabling them to compare energy content information between different products?

Consumers most commonly selected Label E as best enabling them to compare the energy content between products. Label E contains 'energy per serving' information, 'energy per 100 mL' information, 'number of servings per package' information, as well as standard drinks information incorporated into the energy label. This finding was highly consistent regardless of the types of products being compared (i.e. the same types of alcoholic beverage, different types of alcoholic beverages, and alcoholic beverages versus non-alcoholic beverages/foods).

Strengths and limitations

The purpose of the current study was to isolate the effects of including versus excluding particular information (energy content per serving, number of servings per package, energy content per 100 mL, standard drinks information) in an energy label on alcoholic beverages. Use of a randomised controlled trial was the most appropriate design in order to establish cause and effect of each type of labelling information.

Nevertheless, the current research is not without limitations. The study has the usual limitations associated with an online survey. The non-response rate of potential survey respondents is unknown. Although the final sample was nationally representative of the Australian/New Zealand population by three factors (age, gender, level of education), it is possible that non-respondents of the survey had common factors that made them less likely to participate. Additionally, members of an online panel may have certain characteristics that differ from the broader population.

Secondly, consumers' consumption intentions were measured through self-report, which is limited by social desirability bias. However, this is an inherent limitation of any self-report questionnaire, and therefore some level of these biases is unavoidable. Secondly, consumers' behavioural *intentions* were examined, which may not necessarily lead to actual behaviour change (Sheeran & Webb, 2016). Acknowledging this limitation, intended alcohol consumption is still correlated with actual alcohol consumption (Cooke et al., 2016), and thus is still a useful proxy measure. Due to practicality reasons, use of self-report measures are highly common within social science research.

There was also evidence that a subset of participants may not have understood the consumption intentions questions, which was not apparent during piloting. It is also possible that some responses indicating excessive alcohol consumption were fanciful or playful. However, this was only for a small subset of participants, and results were highly consistent regardless of whether these participants were included or excluded. We also conducted sensitivity analysis using two different exclusion criteria, and results remained highly consistent. Furthermore, the finding that participants did not think that any label implied that there is a certain amount of the beverage that they should consume, is consistent with the finding that the labels had no significant effect on consumers' consumption intentions. This further increases confidence in the findings.

Conclusion

Label E (standard drinks information added) best enabled consumer understanding of the energy content information, and did not result in any negative unintended consequences. Consumers most commonly selected Label E as best enabling them to compare the energy content between products. Furthermore, Label E was the only label that enabled consumer understanding of how a serving size relates to a standard drink across all types of alcoholic beverages.

In addition to standard drinks information, Label E contains the following information (consistent with information requirements on other foods and non-alcoholic beverages): energy content per serving; number of servings per package; energy content per 100 mL. None of these labelling elements had any negative unintended consequences when presented in unison, and this was the case regardless of the type of alcoholic beverage (wine, beer or spirits). That is, consumers did not think that any label implied that there is a certain amount of the beverage that they should consume. Consistent with this finding, none of these labelling elements affected the amount of the beverage that consumers intended to consume. Additionally, none of these labelling elements (when presented in unison) made consumers feel any more or less confused about what a standard drink is.

Rather, provision of 'energy per serving' information made consumers feel that they had a better understanding of the energy content information, a better understanding of standard drinks, and best enabled them to correctly rank different beverages from lowest to highest in energy (based on one typical drink). Provision of 'energy per 100 mL' information is also important in addition to 'energy per serving' information, because most consumers were unable to correctly estimate this information when it was not provided, which may limit consumers' ability to compare the energy content between different food/beverage products. Finally, provision of 'number of servings

per package' information was necessary to enable consumers to distinguish between the number of servings per package versus the number of standard drinks per package.

Label A (control) performed just as well as Label E in every respect, except that consumer understanding of how a serving size relates to a standard drink was poor for Label A (as for Labels B, C and D). In contrast to Labels B, C and D, Label A contains all other labelling elements that best enabled consumer understanding of the energy content information, and best mitigated any other negative unintended consequences.

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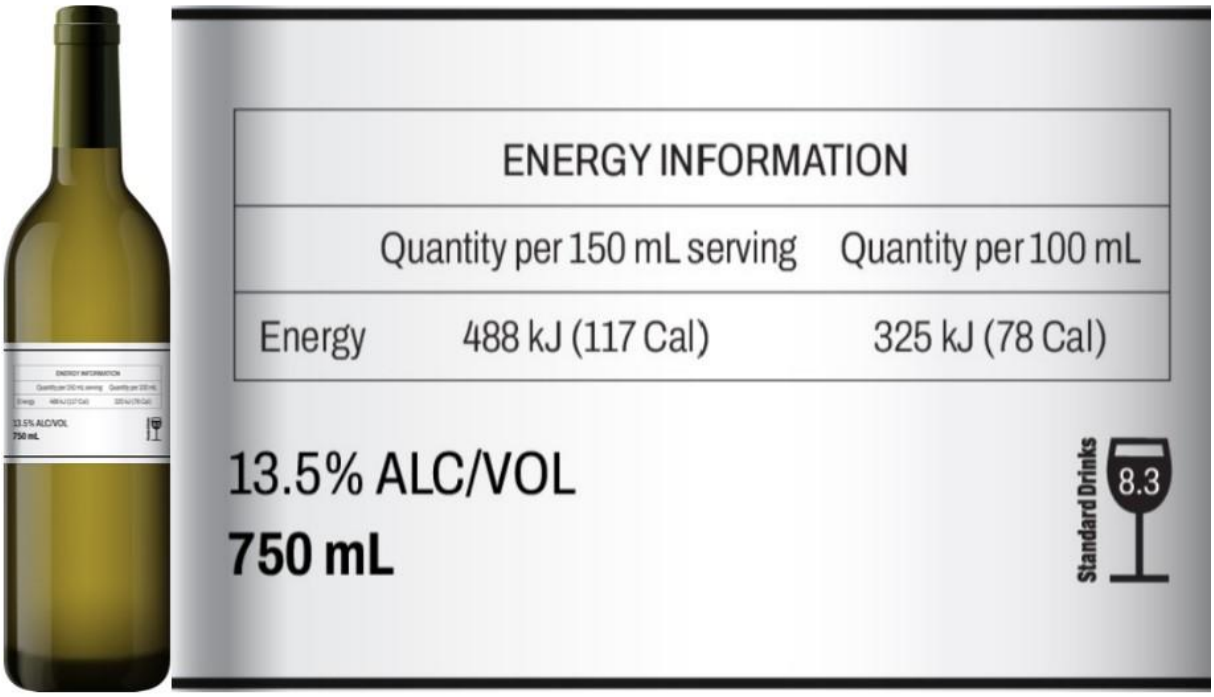
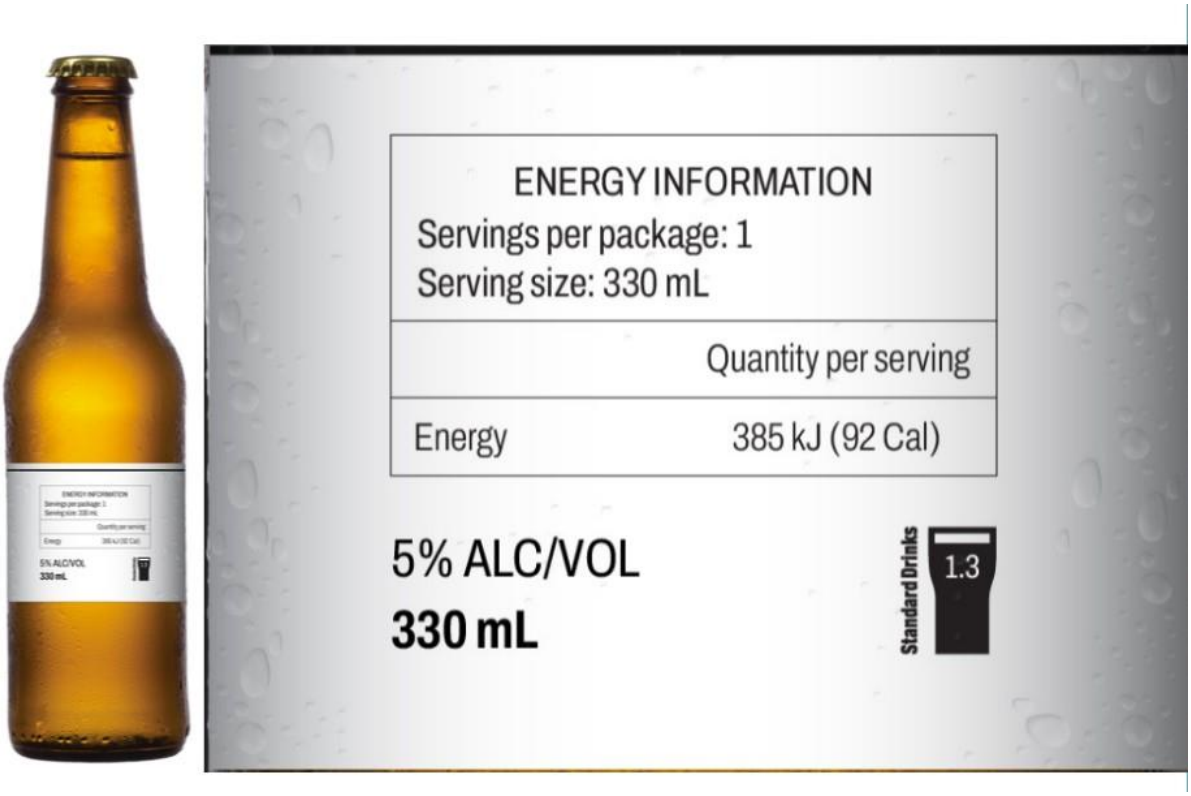
Appendices

Appendix 1: Example images for wine, beer and spirits





ENERGY INFORMATION

Servings per package: 23.3

Serving size: 30 mL (0.9 standard drinks)

	Quantity per serving	Quantity per 100 mL
Energy	254 kJ (61 Cal)	845 kJ (202 Cal)

37% ALC/VOL

700 mL

STANDARD DRINKS 20.4 APPROX.

Appendix 2: Survey instrument

Overview

[show after Question # 6 to prevent participation bias]

This survey will ask about how you use food labels, your consumption of alcoholic beverages, and how you perceive labels on alcoholic beverages.

The survey will take around 10 minutes to complete. Thank you for your participation.

Section 1: Demographics/baseline measures

#	**Purpose**	**Variable**	**Question, Response Options [Code]**
1	Screening/demographics/ quota	Age	What is your age? [Numeric input] [Terminate if < 18 years old]
2	Demographics/quota	Gender	How do you identify? • Male • Female • Nonbinary • Another term (Please specify) [Free text field] • Prefer not to say [Single response option]
3	Demographics	Location	What is your postcode? [Autocode to states/region]

4	Screening	Consumption of alcohol in the past 12 months	Have you done these things in the past 12 months? Rows: [randomize the order] • Consumed an alcoholic beverage • Renovated your house • Bought a new car • Went for a holiday overseas • Started to learn a new language Column: Yes/No [Terminate if Not consumed an alcoholic beverage]
5	Screening	Work in the alcohol industry	Are you currently employed in the alcohol industry? • Yes • No [Terminate if respond Yes]
6	Screening/Quota/Use for stratified randomisation in Section 2	Type of alcoholic beverage consumed in the past 12 months	Which of the following alcoholic beverages have you consumed within the past 12 months? Please select all that apply: ▪ Wine ▪ Beer ▪ Spirits ▪ None of the above [Randomise order of responses, except 'None of the above'] [Terminate if respond 'None of the above']. [For those who select more than one option, randomly allocate participants to one of those beverages for Section 2 questions, using quotas for approximate equal allocation to each type of beverage].
7	Demographics	Level of alcohol consumption Q1	How often do you have a drink containing alcohol? • Monthly or less [1] • 2-4 times a month [2]

			• 2-3 times a week [3] • 4 or more times a week [4] [single response]
8	Demographics	Level of alcohol consumption Q2	How many drinks containing alcohol do you have on a typical day when you are drinking? • 1 or 2 [0] • 3 or 4 [1] • 5 or 6 [2] • 7 to 9 [3] • 10 or more [4] [single response]
9	Demographics	Level of alcohol consumption Q3	How often do you have six or more drinks on one occasion? • Never [0] • Less than monthly [1] • Monthly [2] • Weekly [3] • Daily or almost daily [4] [single response]
10	Demographics/quota	Education	What is the highest level of formal education you have **completed**? • High school or below • Vocational/trade qualification • Undergraduate degree • Postgraduate degree [Single response option]

11	Demographics/soft quota	Cultural Background AU	[Show only to people residing in Australia] How would you describe your **cultural background**? (Please select all that apply) ▪ Aboriginal and/or Torres Strait Islander ▪ English ▪ Irish ▪ Scottish ▪ Chinese ▪ Italian ▪ German ▪ Indian ▪ Greek ▪ Dutch ▪ Australian ▪ Other (please specify): [FREE TEXT] ▪ Prefer not to say [EXCLUSIVE] Examples of 'Other (please specify)' are: Spanish, Vietnamese, Hmong, Welsh, Kurdish, Lebanese. [Multiple responses possible]
12	Demographics/soft quota	Cultural Background NZ	[Show only to people residing in New Zealand] How would you describe your **cultural background**? (Please select all that apply) ▪ New Zealand European ▪ Māori ▪ Pacific Islander ▪ Chinese ▪ Indian ▪ Other (please specify): [FREE TEXT]

			▪ Prefer not to say [EXCLUSIVE] Examples of 'Other (please specify)' are: Filipino, Korean, Dutch, Australian, and Middle Eastern. [Multiple responses possible]
13	Demographics	Household Income	Which one of the following categories best describes your household's total annual income (before tax)? Please include the income of everyone in your household. If you don't know the exact amount, then please take your best guess. • Under $25,000 • $25,000 - $35,000 • $35,001 - $45,000 • $45,001 - $55,000 • $55,001 - $65,000 • $65,001 - $75,000 • $75,001 - $85,000 • $85,001 - $105,000 • $105,001 - $115,000 • $115,001 - $125,000 • $125,001 - $145,000 • $145,001 - $165,000 • $165,001 - $185,000 • $185,001 - $205,000 • $205,001 - $225,000 • $225,001 - $245,000 • $245,001 - $265,000 • $265,001 - $285,000 • Above $285,000

			• Prefer not to say [Single response option]
14	Demographics	Use of nutrition information on food labels	How often do you read nutrition information on food labels? [Matrix: Never, rarely, occasionally, often, always]
15	Demographics	Understanding of nutrition information on food labels	Do you think nutrition information on food labels is easy or hard to understand? [Matrix: 1-7 scale, where 1 = very hard to understand; 7 = very easy to understand]
16	Demographics	Importance of health and weight in food and drink choice	It is important to me that the food and beverages I consume on a typical day: • Are low in calories • Help me control my weight • Are low in fat • Keep me healthy [Matrix for each: 1-7 scale, where 1 = not at all important; 7 = very important]

Section 2: Random allocation to energy labels on one type of alcoholic beverage

[Participants will be pseudo-randomly allocated to view one type of alcoholic beverage (wine, beer or spirits), using quotas for approximate equal allocation with the prerequisite that they had consumed that type of beverage in the past year (Question 6). Each beverage group will then be randomly allocated to view one of five energy labels (Label A, B, C, D or E) on their allocated beverage. This will result in a total of 15 different groups (5 types of energy labels multiplied by 3 types of beverages). All beverages will also contain the following on-label information: alcohol content, number of standard drinks per package, volume. All participants will answer the following survey questions while viewing their allocated label.

Randomly allocated if quota is open. Make sure we have same number of completes for each label in each alcoholic beverage.

All number input questions: Range from 0 to 999999999. Allow participants to enter either whole numbers or decimal numbers for Questions 17-21.]

Please take a look at this image of a bottle of [wine/beer/spirits] (left image). The information on the label has been enlarged so that it is readable (right image). The following questions relate to these images.

#	Purpose	Variable	Question, Response Options [Code]
17	Attention check/ key measure	Energy per serving	What is the **energy** content (kilojoules (kJ) **and/or** calories (Cal)) **per serving** for this drink? Please enter energy content in kilojoules (kJ) **and/or** calories (Cal), **or** select don't know • Kilojoules (kJ): ____ • Calories (Cal): ____ • Don't know
18	Attention check/ key measure	Energy per 100 mL	What is the **energy** content (kilojoules (kJ) **and/or** calories (Cal)) **per 100 mL** for this drink? Please enter energy content in kilojoules (kJ) **and/or** calories (Cal), **or** select don't know • Kilojoules (kJ): ____ • Calories (Cal): ____ • Don't know
19	Attention check/ key measure	Servings per package	How many **servings** are in this bottle of [beer/spirits/wine]? Please enter number, or select don't know. • ____ servings • Don't know
20	Attention check/ key measure	Standard drinks per package	How many **standard drinks** are in this bottle of [beer/spirts/wine]? Please enter number, or select don't know. • ____ standard drinks • Don't know
21	Attention check/ key measure	Volume	What is the **volume of this bottle of [beer/spirits/wine]**?

			Please enter number, or select don't know. • ____ mL • Don't know
22	Key measure	Consumption intentions	If you had seen this label on [beer/spirits/wine] bottles, how much [beer/spirits/wine] would you choose to consume **within one typical week**? Please imagine that this label was on any kind of [beer/spirits/wine] that you would choose to consume. There is no right or wrong answer, please answer how much you would personally choose to consume. Number of drinks within one week:____ Please type in the box provided Approximate size of each drink: Please select from the mL options. Note that the amount of liquid shown in the [glass/bottle] represents the amount you would consume as one drink. [For spirits group only: These are images of a spirits glass, rather than of a shot glass]. [response options with images for each: 10 mL, 30 mL, 100 mL, 125 mL, 150 mL, 200 mL, 330 mL, or "other" (enter amount in mL)] [show the two sub-questions on screen at the same time, allow participants to change responses to both until ready to submit as one answer. Do not allow participants to select a size if they have entered zero for number of drinks]
23	Key measure	Perception of whether there is an amount that should be consumed	Do you think this label implies that there is a certain amount of [beer/spirits/wine] that you should consume? [Martrix: 1-7 scale, where 1 = not at all; 7 = completely]

24	Key measure	The amount that should be consumed	[Follow up question to those who responded above '1' to the previous question. Keep the previous question on screen for context]: What is this amount? [free response] [if participants only enter a number, prompt them to include units: "please provide the unit of the amount entered"]
25	Key measure	Perceived understanding of energy content information	Do you think the energy content information on this beverage is easy or hard to understand? [Matrix: 1-7 scale, where 1 = very hard to understand; 7 = very easy to understand]
26	Key measure	Perceived understanding of standard drinks	Do you think you understand what is meant by a 'standard drink'? [matrix: 1-7 scale, where 1 = don't understand at all; 7 = understand completely]
27	Key measure	Understanding of how a serving size relates to a standard drink	Based on the information on this label, is one serving of [beer/spirits/wine]: • More than a standard drink • Less than a standard drink • Equal to a standard drink • Don't know [Randomise order of responses, except 'Don't know'] [single response]

Section 3: Show allocated energy label on all types of alcoholic beverages

[Show each participant their allocated energy label on all types of alcoholic beverages. Each image should be labelled as 'beer', 'wine' or 'spirits' to ensure that participants are able to differentiate between them. This will mean that each participant will view 3 different images – this will result in 5 different groups/pathways given that each participant will still only view one type of energy label on each type of beverage)]

#	Purpose	Variable	Question, Response Options [Code]
28	Key measure	Ability to rank different beverages based on their energy content	Imagine that someone was going to have **one drink** and wanted to choose the alcoholic beverage that had the **least amount of energy**. Please rank the following types of alcoholic beverages from least to most amount of energy based on **one typical drink**: Please drag and drop OR click in order to rank (1 = least amount of energy; 3 = most amount of energy) Beer Wine Spirits [Randomise the order of the images]

Section 4: Show all types of energy labels (not on a particular beverage, just the energy labels themselves)

[Show each participant all five energy labels. Participants will not view the energy labels on a particular type of beverage, rather, they will just view the energy labels themselves. However, the numerical information on the energy labels will correspond to participants' previously allocated beverage. This will therefore result in 3 different types of groups/pathways)]

#	Purpose	Variable	Question, Response Options [Code]
29	Key measure	Label that best enables comparison between different categories of alcohol	Which of the following energy labels do you think would **best** enable you to compare energy content information **between different categories of alcoholic beverages** (e.g. compare wine vs. beer vs. spirits):

			Label A Label B Label C Label D Label E [Randomise the order of the images] [Single response]
30	Key measure	Label that best enables comparison between the same category of alcohol	Which of the following energy labels do you think would **best** enable you to compare energy content information **between the same category of alcoholic beverages** (e.g. compare between different types of wine, or compare between different types of beer, etc.). Label A Label B Label C Label D Label E [Randomise the order of the images] [Single response]
31	Key measure	Label that best enables comparison between alcohol and other foods	Which of the following energy labels do you think would **best** enable you to compare energy content information **between alcoholic beverages and non-alcoholic beverages/foods** (e.g. compare wine to orange juice, or compare beer to a chocolate bar, etc.): Label A Label B Label C

			Label D Label E [Randomise the order of the images] [Single response]

Closing:

Food Standards Australia New Zealand would like to thank you for your participation in this survey. Should you be interested in the results, please keep an eye on our website later in the year, or sign up to receive Food Standards News to be notified when the results are released.

Appendix 3: Summary of participant responses regarding number of drinks they would consume per week (n = 2,362)

Response (number of drinks per week)	Number of participants	Percentage (based on total sample)	Converted to number of drinks per day	Size and type of each drink for each participant*
0	80	3.39	0.00	-
1	386	16.34	0.14	-
2	426	18.04	0.29	-
3	287	12.15	0.43	-
4	233	9.86	0.57	-
5	261	11.05	0.71	-
6	172	7.28	0.86	-
7	81	3.43	1.00	-
8	75	3.18	1.14	-
9	6	0.25	1.29	-
10	110	4.66	1.43	-
11	3	0.13	1.57	-

12	48	2.03	1.71	-
13	1	0.04	1.86	-
14	22	0.93	2.00	-
15	25	1.06	2.14	-
16	7	0.30	2.29	-
18	6	0.25	2.57	-
20	25	1.06	2.86	-
21	11	0.47	3.00	-
23	8	0.34	3.29	-
24	14	0.59	3.43	-
25	6	0.25	3.57	-
28	4	0.17	4.00	-
30	13	0.55	4.29	-
32	1	0.04	4.57	-
33	1	0.04	4.71	-
35	5	0.21	5.00	-
36	1	0.04	5.14	-

40	5	0.21	5.71	-
42	1	0.04	6.00	-
45	1	0.04	6.43	-
48	1	0.04	6.86	-
50	7	0.30	7.14	-
60	1	0.04	8.57	-
63	1	0.04	9.00	-
70	1	0.04	10.00	-
90	1	0.04	12.86	-
100	5	0.21	14.29	-
150	1	0.04	21.43	150 mL wine.
200	3	0.13	28.57	90 mL wine, 200 mL wine, 200 mL spirits.
300	3	0.13	42.86	100 mL spirits, 200 mL wine, 330 mL spirits.
330	1	0.04	47.14	200 mL beer.
350	1	0.04	50.00	10 mL spirits.
420	1	0.04	60.00	30 mL spirits.

450	1	0.04	64.29	150 mL wine.
600	1	0.04	85.71	150 mL wine.
660	1	0.04	94.29	330 mL beer.
700	1	0.04	100.00	30 mL spirits.
750	1	0.04	107.14	125 mL wine.
900	2	0.08	128.57	150 mL wine, 200 mL spirits.
950	1	0.04	135.71	125 mL wine.
1500	2	0.08	214.29	150 mL wine, 150 mL wine.

* The size and type of each drink is only reported for responses that were used as cut-off values (red text), to further demonstrate that the total amounts were likely implausible

Appendix 4: Participant characteristics across each of the 15 groups (type of energy label by type of alcoholic beverage)

	Wine					Beer					Spirits				
	Label A (n=157)	**Label B (n=160)**	**Label C (n=157)**	**Label D (n=156)**	**Label E (n=158)**	**Label A (n=155)**	**Label B (n=155)**	**Label C (n=159)**	**Label D (n=159)**	**Label E (n=158)**	**Label A (n=155)**	**Label B (n=161)**	**Label C (n=158)**	**Label D (n=158)**	**Label E (n=156)**
Country (%):															
Australia	50.3	48.1	50.3	51.3	50.6	49.7	49.7	49.7	49.7	50.0	51.6	49.7	49.4	50.6	48.7
New Zealand	49.7	51.9	49.7	48.7	49.4	50.3	50.3	50.3	50.3	50.0	48.4	50.3	50.6	49.4	51.3
Age, mean (SD)	50.38 (17.86)	50.62 (17.29)	52.75 (17.16)	51.46 (16.64)	52.51 (16.81)	42.21 (16.00)	44.68 (16.51)	49.11 (16.66	47.19 (16.89)	45.33 (17.51)	44.12 (17.06)	45.86 (15.27)	44.30 (16.19)	45.70 (16.42)	45.51 (16.09)
Gender (%):															
Male	42.0	43.8	35.0	39.7	36.7	64.5	63.2	56.0	62.3	60.8	45.2	41.6	41.8	39.2	38.5
Female	58.0	56.3	65.0	60.3	63.3	35.5	36.1	44.0	37.7	39.2	54.8	58.4	57.0	60.8	61.5
Non-binary	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
Prefer not to say	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
Highest education level (%):															
No tertiary degree	75.2	71.3	70.7	65.4	61.4	71.6	71.0	70.4	72.3	74.1	72.9	68.3	71.5	76.6	69.9
Tertiary degree	24.8	28.8	29.3	34.6	38.6	28.4	29.0	29.6	27.7	25.9	27.1	31.7	28.5	23.4	30.1
Annual Household income (%):															
< $25,000	4.5	3.1	5.7	6.4	7.6	5.2	5.2	2.5	5.7	6.3	5.8	3.1	3.2	7.6	6.4
$25,000-$45,000	19.1	19.4	16.6	14.7	13.3	9.0	13.5	11.9	10.1	18.4	14.8	14.9	20.3	18.4	14.1
$45,001-$65,000	12.1	13.1	11.5	11.5	17.1	14.8	11.6	18.2	15.1	8.9	9.0	16.1	13.9	13.3	11.5
$65,001-$85,000	12.1	10.0	18.5	10.9	12.0	11.6	16.8	11.9	17.0	12.7	10.3	11.8	11.4	11.4	12.8
$85,001-105,000	10.8	6.9	9.6	9.0	5.7	9.7	9.7	10.1	13.2	15.2	10.3	13.0	7.0	11.4	10.3
>$105,000	33.1	41.3	32.5	40.4	34.2	44.5	34.8	36.5	36.5	34.2	43.9	32.3	40.5	35.4	35.9
Prefer not to say	8.3	6.3	5.7	7.1	10.1	5.2	8.4	8.8	2.5	4.4	5.8	8.7	3.8	2.5	9.0
Use of nutrition labels on food, mean (SD) (0 = never; 1 = rarely; 2 =	2.36 (1.01)	2.49 (1.06)	2.25 (1.01)	2.24 (0.99)	2.35 (0.98)	2.14 (1.09)	2.17 (1.03)	2.18 (1.06)	2.14 (1.01)	2.22 (1.04)	2.25 (1.00)	2.09 (1.08)	2.34 (1.11)	2.35 (1.01)	2.27 (0.95)

occasionally; 3 = often; 4 = always)															
Understanding of nutrition labels on food, mean (SD) (1 = very hard to understand; 7 = very easy to understand)	4.51 (1.48)	4.58 (1.42)	4.15 (1.41)	4.17 (1.36)	4.33 (1.47)	4.54 (1.47)	4.40 (1.48)	4.28 (1.49)	4.19 (1.58)	4.33 (1.38)	4.23 (1.50)	4.20 (1.54)	4.39 (1.51)	4.15 (1.44)	4.29 (1.47)
Importance of health and weight in drink choice, mean (SD) (1 = not at all important; 7 = very important)	4.83 (1.28)	4.47 (1.43)	4.40 (1.51)	4.38 (1.50)	4.57 (1.54)	4.76 (1.43)	4.61 (1.36)	4.61 (1.42)	4.36 (1.47)	4.61 (1.36)	4.57 (1.30)	4.39 (1.47)	4.56 (1.43)	4.57 (1.45)	4.61 (1.38)
Total AUDIT-C, mean (SD)	4.12 (2.44)	4.28 (2.50)	3.73 (2.18)	4.17 (2.39)	3.84 (2.30)	4.79 (2.34)	4.77 (2.48)	4.53 (2.50)	5.07 (2.69)	4.49 (2.34)	4.35 (2.24)	4.60 (2.48)	4.64 (2.26)	4.26 (2.48)	4.71 (2.66)

Appendix 5: Full hierarchical binary logistic regression results

Appendix 5 presents the full hierarchical binary logistic regression results for each dichotomous measure. Three participants were excluded from these analyses (total N = 2,359) given that they did not identify as male or female, and it was not possible to include a third gender category due to the low sample size.

Type of energy label, type of alcoholic beverage and the interaction were entered at stage 1 (model 1), whereas baseline measures were entered at stage 2 (model 2). Main effects of type of alcoholic beverage are not reported in the tables given that only the interaction between type of alcoholic beverage and type of energy label is of interest. Non-significant label/beverage combinations ($p > 0.05$) are not reported in the tables.

Attention questions: number of servings per package

Predictors of correct responses

	β	Exp(B)	*p*	Nagelkerke R^2
Model 1			**<0.001***	**0.51**
Main effect of label			<0.001	
Label A vs. Label B	-2.19	0.11	<0.001	
Label A vs. Label C	-5.04	0.01	<0.001	
Label A vs. Label D	-0.01	0.99	0.982	
Label A vs. Label E	-0.28	0.76	0.369	
Label by beverage interaction			<0.001	
Label B by spirits (vs. wine)	-2.44	0.09	<0.001	
Label C by beer (vs. wine)	2.02	7.54	<0.001	
Model 2			**<0.001***	**0.52**
Main effect of label			<0.001	
Label A vs. Label B	-2.28	0.10	<0.001	
Label A vs. Label C	-5.08	0.01	<0.001	
Label A vs. Label D	0.03	1.03	0.925	
Label A vs. Label E	-0.25	0.78	0.421	
Label by beverage interaction			<0.001	
Label B by spirits (vs. wine)	-2.37	0.09	<0.001	
Label C by beer (vs. wine)	2.09	8.08	<0.001	
Gender (male vs. female)[#]	-0.36	0.70	0.002	

Age	-0.01	0.99	<0.001	
Total AUDIT-C	-0.05	0.96	0.044	
Use of nutrition labels on food	0.14	1.15	0.022	
Understanding of nutrition labels on food	0.06	1.06	0.164	
Importance of health and weight in drink choice	-0.05	0.95	0.212	

***** These p values tested whether the model was significantly better than the previous model (Model 0 = when no predictors were entered). Note: All models were significant overall ($p < 0.001$)

[#] Gender was coded as: male = 1; female = 2, with male as the reference category

Predictors of incorrectly reporting the number of standard drinks per package (rather than the number of servings per package)

	β	Exp(B)	*p*	Nagelkerke R^2
Model 1			**<0.001***	**0.22**
Main effect of label			<0.001	
Label A vs. Label B	1.64	5.15	<0.001	
Label A vs. Label C	2.16	8.66	<0.001	
Label A vs. Label D	-0.44	0.64	0.260	
Label A vs. Label E	-0.37	0.69	0.337	
Label by beverage interaction			<0.001	
Label D by spirits (vs. wine)	1.10	3.00	0.029	
Label E by beer (vs. wine)	1.56	4.77	0.002	
Model 2			**<0.001***	**0.25**
Main effect of label			<0.001	
Label A vs. Label B	1.70	5.46	<0.001	
Label A vs. Label C	2.12	8.34	<0.001	
Label A vs. Label D	-0.51	0.61	0.200	
Label A vs. Label E	-0.43	0.65	0.265	
Label by beverage interaction			<0.001	
Label D by spirits (vs. wine)	1.15	3.15	0.024	
Label E by beer (vs. wine)	1.59	4.90	0.002	
Gender (male vs. female)[#]	0.22	1.24	0.046	
Age	0.02	1.02	<0.001	
Total AUDIT-C	-0.01	0.99	0.726	
Use of nutrition labels on food	-0.14	0.87	0.016	
Understanding of nutrition labels on food	-0.06	0.94	0.152	

Importance of health and weight in drink choice	0.003	1.00	0.935	

* These p values tested whether the model was significantly better than the previous model (Model 0 = when no predictors were entered). Note: All models were significant overall ($p < 0.001$)
[#] Gender was coded as: male = 1; female = 2, with male as the reference category

Attention questions: energy content per serving

Predictors of correct responses

	β	Exp(B)	*p*	Nagelkerke R^2
Model 1			**<0.001***	**0.67**
Main effect of label			<0.001	
Label A vs. Label B	-0.29	0.75	0.376	
Label A vs. Label C	-5.86	0.003	<0.001	
Label A vs. Label D	0.87	2.38	0.038	
Label A vs. Label E	0.13	1.14	0.714	
Label by beverage interaction			0.433	
Model 2			**<0.001***	**0.67**
Main effect of label			<0.001	
Label A vs. Label B	-0.25	0.78	0.439	
Label A vs. Label C	-5.93	0.003	<0.001	
Label A vs. Label D	0.94	2.55	0.026	
Label A vs. Label E	0.14	1.15	0.684	
Label by beverage interaction			0.373	
Gender (male vs. female)[#]	0.21	1.24	0.170	
Age	-0.01	0.99	0.009	
Total AUDIT-C	-0.09	0.92	0.003	
Use of nutrition labels on food	0.04	1.04	0.602	
Understanding of nutrition labels on food	0.05	1.05	0.406	
Importance of health and weight in drink choice	0.06	1.06	0.282	

* These p values tested whether the model was significantly better than the previous model (Model 0 = when no predictors were entered). Note: All models were significant overall ($p < 0.001$)
[#] Gender was coded as: male = 1; female = 2, with male as the reference category

Predictors of incorrectly reporting the energy content per 100 mL (rather than the energy content per serving)

	β	Exp(B)	*p*	Nagelkerke R^2
Model 1			**<0.001***	**0.58**
Main effect of label			<0.001	
Label A vs. Label B	0.10	1.11	0.769	
Label A vs. Label C	3.64	37.94	<0.001	
Label A vs. Label D	-19.09	0.00	0.995	
Label A vs. Label E	-0.22	0.80	0.558	
Label by beverage interaction			0.777	
Model 2			**<0.001***	**0.59**
Main effect of label			<0.001	
Label A vs. Label B	0.07	1.07	0.850	
Label A vs. Label C	3.64	38.16	<0.001	
Label A vs. Label D	-19.17	0.00	0.995	
Label A vs. Label E	-0.25	0.78	0.518	
Label by beverage interaction			0.751	
Gender (male vs. female)[#]	-0.12	0.89	0.441	
Age	0.01	1.01	0.269	
Total AUDIT-C	0.07	1.07	0.020	
Use of nutrition labels on food	-0.03	0.97	0.729	
Understanding of nutrition labels on food	-0.09	0.91	0.103	
Importance of health and weight in drink choice	-0.09	0.92	0.079	

* These p values tested whether the model was significantly better than the previous model (Model 0 = when no predictors were entered). Note: All models were significant overall ($p < 0.001$)

[#] Gender was coded as: male = 1; female = 2, with male as the reference category

Attention questions: energy content per 100 mL

Predictors of correct responses

	β	Exp(B)	*p*	Nagelkerke R^2
Model 1			**<0.001***	**0.52**
Main effect of label			<0.001	

Label A vs. Label B	0.12	1.13	0.698	
Label A vs. Label C	0.61	1.84	0.087	
Label A vs. Label D	-2.65	0.07	<0.001	
Label A vs. Label E	0.16	1.18	0.613	
Label by beverage interaction			<0.001	
Label D by beer (vs. wine)	-1.57	0.21	<0.001	
Label D by spirits (vs. wine)	-4.38	0.01	<0.001	
Model 2			**<0.001***	**0.53**
Main effect of label			<0.001	
Label A vs. Label B	0.10	1.11	0.749	
Label A vs. Label C	0.65	1.91	0.073	
Label A vs. Label D	-2.66	0.07	<0.001	
Label A vs. Label E	0.17	1.19	0.594	
Label by beverage interaction			<0.001	
Label D by beer (vs. wine)	-1.58	0.21	<0.001	
Label D by spirits (vs. wine)	-4.44	0.01	<0.001	
Gender (male vs. female)[#]	0.05	1.05	0.695	
Age	-0.01	0.99	0.038	
Total AUDIT-C	-0.05	0.96	0.093	
Use of nutrition labels on food	0.14	1.15	0.036	
Understanding of nutrition labels on food	0.08	1.08	0.102	
Importance of health and weight in drink choice	-0.04	0.96	0.343	

* These p values tested whether the model was significantly better than the previous model (Model 0 = when no predictors were entered). Note: All models were significant overall ($p < 0.001$)

[#] Gender was coded as: male = 1; female = 2, with male as the reference category

Ability to rank different types of alcoholic beverages based on their energy content

Predictors of correct responses

	β	Exp(B)	*p*	Nagelkerke R^2
Model 1			**<0.001***	**0.26**
Main effect of label			<0.001	
Label A vs. Label B	-0.22	0.81	0.099	
Label A vs. Label C	-3.23	0.04	<0.001	

Label A vs. Label D	0.22	1.24	0.105	
Label A vs. Label E	0.08	1.08	0.547	
Model 2			**<0.001***	**0.27**
Main effect of label			<0.001	
Label A vs. Label B	-0.22	0.80	0.090	
Label A vs. Label C	-3.28	0.04	<0.001	
Label A vs. Label D	0.20	1.22	0.139	
Label A vs. Label E	0.06	1.06	0.669	
Gender (male vs. female)[#]	0.43	1.53	<0.001	
Age	0.00	1.00	0.956	
Total AUDIT-C	-0.02	0.98	0.398	
Use of nutrition labels on food	-0.08	0.92	0.120	
Understanding of nutrition labels on food	-0.01	0.99	0.774	
Importance of health and weight in drink choice	-0.01	0.99	0.785	

* These p values tested whether the model was significantly better than the previous model (Model 0 = when no predictors were entered). Note: All models were significant overall ($p < 0.001$)

[#] Gender was coded as: male = 1; female = 2, with male as the reference category

Predictors of incorrect ranking based on the energy content per 100 mL (rather than based on the energy per serving)

	β	Exp(B)	*p*	Nagelkerke R^2
Model 1			**<0.001***	**0.23**
Main effect of label			<0.001	
Label A vs. Label B	0.25	1.29	0.084	
Label A vs. Label C	2.06	7.86	<0.001	
Label A vs. Label D	-0.68	0.51	<0.001	
Label A vs. Label E	-0.05	0.95	0.749	
Model 2			**<0.001***	**0.24**
Main effect of label			<0.001	
Label A vs. Label B	0.25	1.28	0.091	
Label A vs. Label C	2.08	8.03	<0.001	
Label A vs. Label D	-0.70	0.50	<0.001	
Label A vs. Label E	-0.06	0.95	0.715	
Gender (male vs. female)[#]	-0.39	0.68	<0.001	
Age	0.01	1.01	0.050	
Total AUDIT-C	-0.04	0.96	0.071	

Use of nutrition labels on food	0.14	1.15	0.010	
Understanding of nutrition labels on food	-0.05	0.95	0.190	
Importance of health and weight in drink choice	-0.03	0.97	0.424	

* These p values tested whether the model was significantly better than the previous model (Model 0 = when no predictors were entered). Note: All models were significant overall ($p < 0.001$)
[#] Gender was coded as: male = 1; female = 2, with male as the reference category

Understanding of how a serving size relates to a standard drink

Predictors of correct responses

	β	Exp(B)	*p*	Nagelkerke R^2
Model 1			**<0.001***	**0.20**
Main effect of label			<0.001	
Label A vs. Label B	-0.14	0.87	0.546	
Label A vs. Label C	-0.90	0.41	<0.001	
Label A vs. Label D	0.12	1.12	0.612	
Label A vs. Label E	0.71	2.04	0.002	
Label by beverage interaction			<0.001	
Label C by beer (vs. wine)	0.88	2.41	0.010	
Model 2			**<0.001***	**0.22**
Main effect of label			<0.001	
Label A vs. Label B	-0.15	0.86	0.508	
Label A vs. Label C	-0.88	0.42	<0.001	
Label A vs. Label D	0.15	1.16	0.525	
Label A vs. Label E	0.75	2.11	0.001	
Label by beverage interaction			<0.001	
Label C by beer (vs. wine)	0.94	2.57	0.006	
Gender (male vs. female)[#]	-0.02	0.98	0.813	
Age	-0.01	0.99	<0.001	
Total AUDIT-C	-0.03	0.97	0.130	
Use of nutrition labels on food	0.05	1.06	0.294	
Understanding of nutrition labels on food	0.06	1.06	0.120	

Importance of health and weight in drink choice	-0.02	0.98	0.452	

* These p values tested whether the model was significantly better than the previous model (Model 0 = when no predictors were entered). Note: All models were significant overall ($p < 0.001$)

[#] Gender was coded as: male = 1; female = 2, with male as the reference category

Appendix 6: Supplementary figures for continuous measures

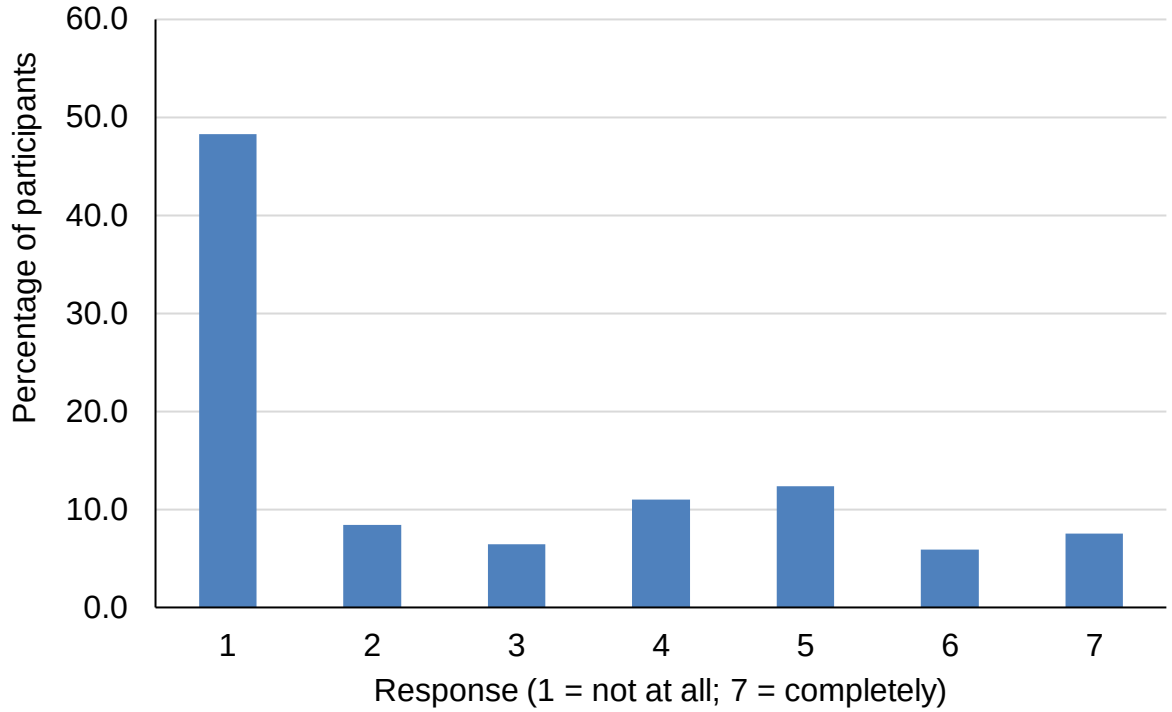


Figure A1. Percentage of participants that selected each response option when asked if the label implies that there is an amount that they should consume (n = 2,362).

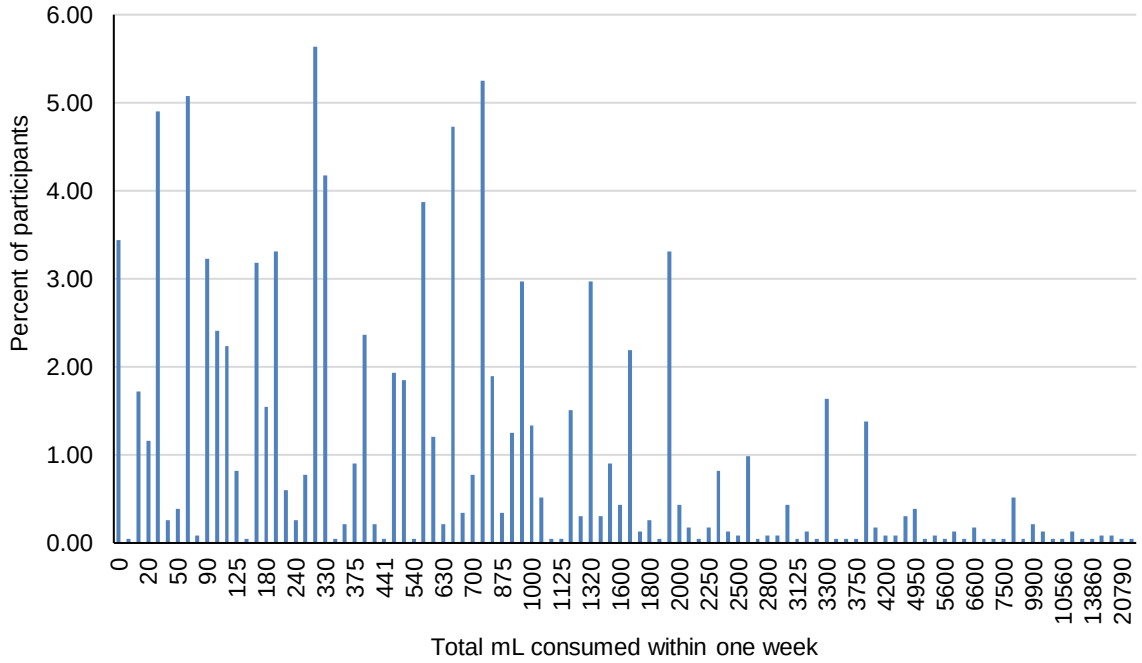


Figure A2. Percentage of participants that indicated they consumed each total mL value (n = 2,325).

Appendix 7: Percentage of participants in each group who stated that a serving is more than, less than, or equal to a standard drink, or selected "don't know"

Type of beverage	Type of energy label	Percentage of participants who selected "more than"	Percentage of participants who selected "less than"	Percentage of participants who selected "equal to"	Percentage of participant who selected "don't know"
Wine	Label A	46.5	10.8	33.8	8.9
	Label B	43.1	12.5	33.1	11.3
	Label C	26.1	16.6	42.0	15.3
	Label D	49.4	8.3	32.7	9.6
	Label E	63.9	8.9	24.1	3.2
Beer	Label A	68.4	7.1	20.6	3.9
	Label B	66.5	6.5	18.7	8.4
	Label C	67.9	6.9	17.6	7.5
	Label D	66.7	5.7	22.6	5.0
	Label E	74.7	4.4	17.7	3.2
Spirits	Label A	18.7	34.2	34.8	12.3
	Label B	19.9	21.1	49.7	9.3
	Label C	36.1	11.4	40.5	12.0
	Label D	25.3	25.9	38.0	10.8
	Label E	17.9	53.8	20.5	7.7