Study protocol

Study title: Perceived effectiveness of salt warning labels on a UK restaurant menu: a real-world pilot experiment

Short title: Salt warning label restaurant study

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Background

Diet-related disease is a key driver of poor population health, and social inequalities in health (1). In England, adults consume 40% more salt than the national guidelines (no more than 6g per day), and this is associated with increased risk of stroke and cardiovascular disease (2, 3). This excess intake is largely driven by processed food, and food eaten out of home (2, 3). Indeed, there are some restaurant menu items that contain over half, or even an entire day's worth of salt. Currently, there are no policies that address or make UK consumers aware of these 'excessive' menu items.

In a handful of cities in the United States (US), policy has been introduced that requires 'excessive' menu items to be indicated by a nutrient warning label. Indeed, in 2016 and 2019 respectively, New York City (NYC) and Philadelphia enacted a law requiring chain restaurant menu items that exceed the daily recommended limit for sodium in the US (≥ 2300mg) to feature a sodium warning label (see **Figure 1**) (4). In 2023, also in NYC, the Sweet Truth Act was signed into law, which requires chain restaurants to include added-sugar warning labels on menu items (including drinks) containing more than a day's worth of added sugar according to US guidelines (> 50g) (see **Figure 2**) (5). There is overwhelming support for these policies in the US; for example, 85% of NYC residents support the added sugar warnings, and those who visit chain restaurants more frequently demonstrate the greatest support (6).

Figure 1: Sodium warning labels on a restaurant menu

Figure 2: Added sugar warning labels on a restaurant menu

Experimental evidence suggests that nutrient warning labels on restaurant menus can help to inform consumers and nudge them to make healthier food choices. An online randomised controlled trial (RCT) of US adults found that icon-only and icon-plus-text added-sugar warning labels demonstrated greater perceived message effectiveness ([PME], product unpleasantness, health concern, discouragement from consumption) than the control label (QR code) (7). Another online RCT of US adults found that added-sugar warning labels on fast-food and full-service restaurant menus reduced the relative probability of ordering ≥1 high-added-sugar item by 2.2%, reduced added sugar ordered by 1.5g, (4.9g if the label was noticed), and improved knowledge of added-sugar content (8). Likewise, a series of online RCTs demonstrated that sodium warning labels reduced average sodium ordered from restaurants (by 19 – 81mg), and increased both knowledge of sodium content and perceived health risks compared with no label (9). Finally, in an online RCT of Uruguayan adults, separate nutrient warning labels (black octagons featuring the word 'excess') for total fat, saturated fat, sugars, and sodium on menu items in a mock online ordering website reduced the proportion of participants selecting an 'excessive' item by 14% (10).

Post-implementation evaluation of nutrient warning label policies on restaurant menus is largely positive. In NYC, following implementation of sodium warning labelling, mean sodium content of purchases significantly decreased (-524mg) in full-service restaurants (FSR), relative to Yonkers (a different city in New York) which did not implement these labels (11). No significant change was observed in quick-service restaurants (QSR) (11). In terms of menu item reformulation, sodium content of items per serving in FSR and QSR in NYC approximately one year pre- and one year post-enforcement of the sodium warning icon rule was not observed to significantly differ (12). However, findings may be limited by follow-up data collection occurring less than one-year post-enforcement; additional time may be needed for restaurants to reduce the sodium content of menu items.

To date, the impact of nutrient warning labels has not been tested in a real-world randomised controlled trial (i.e., in a restaurant), or in a UK context. Recent work suggests that UK consumers support the introduction of nutrient warning labels, and their PME was rated as significantly higher relative to a control label (QR code) (13). This study aims to test the effect of a menu featuring salt warning labels (design informed by previous work (13)) on perceived message effectiveness relative to a menu with no labels in a real-world restaurant environment. The study will also act as a pilot experiment for examining the impact of the salt warning label on food choice and subsequent salt intake in real-world conditions.

Primary objectives:

- To measure the PME of a menu featuring salt warning labels relative to a menu with no labels
- To measure label awareness, perceived knowledge gain, and perceived influence of the label on food choice

Secondary objectives:

- To identify whether there is an effect of the salt warning label on:
    - Food choice (label/no label)
    - Total salt selected
    - Total salt intake
- To examine support for the introduction of a salt warning label policy in the UK

Experimental design

The study will be a between-subjects randomised controlled trial design. The between-subject factor is the menu labelling. In the experimental condition, a nutrient warning label will be placed next to menu items that are high in salt. In the control condition, there will be no labels. The outcome will be (i) perceived message effectiveness, (ii) salt selected, label (y/n) selected, and salt intake. This will allow us to examine whether the salt warning label intervention impacts perceived message effectiveness and food choice relative to the control condition.

Participants and recruitment

Recruitment

Participants will be recruited via social media adverts (Facebook, Instagram), a database maintained by researchers at the University of Liverpool, and word of mouth. Interested participants will be asked to click a link which will take them to an online screening questionnaire (Appendix A). Participants can bring a maximum of nine guests to the restaurant. Guests will be pre-screened in advance to ensure eligibility. In pre-study instructions participants will be informed that any guests they bring will participate in the study.

Sampling

We will stratify based on education level to be largely representative of the UK population (14, 15). We will recruit (approximately):

- 50% NQF 4 Level 4 or above (University degree or equivalent) and 50% NQF Level 3 or below (no University degree)

We will also aim to fulfil the following quotas for age and gender, based on the composition of the UK population (16, 17):

- 50% 18 – 39 and 50% 40 and over
- 50% female and 50% male

We will only recruit up to 10% of the sample as current University students. Students have a high SEP in terms of education, but typically have low disposable income, which may impact relative health motives. This could distort the results if students are recruited in high numbers.

Inclusion and exclusion criteria

Participants are eligible to take part if they:

- Are a UK resident
- Are aged 18 years and above
- Are fluent in English
- Eat an out-of-home meal at least once a month on average
- Have no dietary allergies
- Are not vegan

There are no additional exclusion criteria as this is a real-world study.

Methods

Procedure

Participants will be asked to attend one session at a restaurant from Monday – Saturday between 12 – 5pm. All participants will be asked to verbally consent to taking part in the study, and will be given the opportunity to ask questions before the study begins.

Participants will be asked to order lunch from a menu. The menu will either feature nutrient warning labels next to the relevant menu items (experimental condition), or no labels (control condition). A researcher will ask participants to write their order down on an order form, communicate the order with the kitchen, photograph the meal when it is ready to be served, and photograph the plate when the participant is finished with the meal in order to estimate amount consumed.

After finishing their meal, participants will be asked to fill out an online questionnaire (on an iPad) about their sociodemographic characteristics, health motives, label awareness, salt awareness, perceived message effectiveness, perceived knowledge gain, perceived influence, and support for the introduction of a restaurant salt warning label policy in the UK. The questionnaire will also ask (i) whether any food or drink items were shared with other participants, and, if so, what item(s) were shared and (ii) whether they added any condiments to their meal (see Appendix E).

Participants will be reimbursed with £25 for their time, as it is thought that this would cover most of their lunch, time, and travel, and would incentivise people from different SEP strata to participate. As a default, participants will:

- Pay for their meal and receive a £25 reimbursement via invoice

However, if a participant expresses that this will be an issue, they can choose to:

- Have the meal cost taken from their reimbursement. I.e., a researcher will use a prepaid card to pay for the meal. If they spend less than £25, they can opt to receive the remaining money via invoice. If they spend more than £25, they will have to pay this difference at the restaurant.

To measure food intake for the rest of the day after the intervention took place, participants will receive a link for a dietary recall questionnaire the next morning by e-mail (intake24). We will ask the

participant to complete the dietary recall questionnaire the same day they received the e-mail (i.e. the day following the intervention). Following completion, participants will be emailed a debrief form regarding the study aims (see Appendix F).

We will conduct a small pilot experiment with one table of participants (n = 4) prior to study commencement in order to run through the procedure with all involved researchers.

Setting

The study will be conducted in a full-service restaurant in Liverpool City Centre.

Intervention

Participants will be asked to order lunch from a menu consisting of main dishes and light bites/small plates. In the control condition, participants will be given a menu with no labels (see Figure 3). In the experimental condition, participants will be given a menu with nutrient warning labels corresponding to items that are high in salt (see Figure 4). The labels will feature beneath the menu item name and will be the same height as the name text, as per nutrient warning labelling guidelines for restaurant menus in Philadelphia (18). There will be a standard drink offering at each visit, including alcoholic drinks.

Labels will be placed next to items that exceeded 50% of the adult daily recommended limit for salt in the UK (3g) (19).

Participant groups will be randomised to either the experimental or control condition using a block randomisation schedule (https://www.sealedenvelope.com/simple-randomiser/v1/lists). Participants seated at the same table will be in the same condition. Therefore, to adjust for possible differences in group sizes and consequently numbers in each condition, we will randomise in blocks of 50. The menu contains eight main dishes and eight light bites/small plates (five of which are high in salt).

Figure 3: Menu (A) for the control condition

MENU

EVERYDAY FROM 11.30AM

Light Bites/Small Plates

Mushroom Soup £5.50
served with crusty bread and butter

Cajun Chicken Flatbread £7.95
Flatbread filled with Cajun Chicken, roasted pepper, herb salad & lime mayonnaise

Beetroot Hummus Flatbread £6.95
Flatbread served with Hummus, house salad & pomegranate dressing

Ruban Toasted sandwich £8.95
Sliced pastrami, Baltic pickles, Sauerkraut with melted Gruyere

Mexican Cheese on toast £5.95
A blend of melted cheese, chillies and spring onion.

Loaded Dirty Fries £5.95
Melted cheese, Baltic chilli and BBQ sauce - Add Chicken or Halloumi for £1.50

Loaded Dirty Fries with chicken £7.45
Melted cheese, Baltic chilli and BBQ sauce - Add Chicken or Halloumi for £1.50

Loaded Dirty Fries with halloumi £7.45
Melted cheese, Baltic chilli and BBQ sauce - Add Chicken or Halloumi for £1.50

Mains

Chefs Homemade Scouse £8.50
Served with crusty bread, pickled cabbage and beetroot

Steak & Ale Pie £11.50
Served with house fries and mushy peas

Baltic Black & White Burger £10.00
Black Burger Bun, Grilled Halloumi, peppers, tomato, lettuce, chilli BBQ relish served with house fries

6oz Baltic Cheese Burger £10.95
A 6oz burger patty, Brioche bun, lettuce, tomato served with burger relish & House fries

Steak & Eggs Hash £11.50
Grilled 4oz Ribeye steak, creamy peppered hash potatoes topped with fried egg

Super Food Salad £7.95
Baltic house salad, quinoa, pomegranate, tenderstem Broccoli, cucumber, tomato, red onion served with Soy honey dressing Add Chicken or Halloumi for £1.50

Super Food Salad with chicken £9.45
Baltic house salad, chicken, quinoa, pomegranate, tenderstem Broccoli, cucumber, tomato, red onion served with Soy honey dressing

Super Food Salad with halloumi £9.45
Baltic house salad, halloumi, quinoa, pomegranate, tenderstem Broccoli, cucumber, tomato, red onion served with Soy honey dressing

Our service and kitchen staff handle a wide range of ingredients including nuts, dairy and ingredients containing gluten. Please inform your server of any food allergies or intolerances prior to ordering your food.

THE BALTIC HOTEL 16 Jamaica Street, Liverpool thebaltichotelliverpool.com

Figure 4: Menu (B) for the experimental condition

Measures

Participant characteristics

Demographics

Participants will be asked to report their gender, age and ethnicity. Self-reported height and weight data will also be collected to calculate body mass index (BMI), so participants can be classed as having underweight, healthy weight, overweight or obesity.

Frequency of eating OOH

"How often, on average, over the past year have you eaten out at a restaurant?" Response options: not in the last year, less than once per month, 1 – 3 times per month, 1 – 2 times per week, 3 times per week or more.

Measures of socioeconomic position (SEP)

- Education level

Two measures of SEP will be collected. Education level (defined by the National Qualifications Framework [NQF] ranging from no formal qualifications [NQF1], GCSEs or equivalent {NQF2], A levels or equivalent [NQF3] to degree level or above [NQF4+](15)) will be recorded as evidence suggests that individuals with a higher education level are more motivated by health when making food choices (20).

Employment status

Participants will be asked what their employment status is. Response options: full-time; part-time; student; retired; temporary / permanently sick or disabled; looking after home / family; other.

Primary outcomes

PME

PME will be measured using an adapted version of the UNC PME scale. The scale measures health concern, product attitude, and discouragement of product consumption (21). Participants will answer 3 PME questions using a Likert scale ranging from 1 – 5 anchored by "not at all" and "a great deal": Prompt: "Think back to the menu that you ordered from…" "The menu made me concerned about the health effects of consuming items high in salt", "The menu made consuming items high in salt seem unpleasant", "The menu discouraged me from wanting to consume items high in salt". The mean response to the three items will be calculated. PME is used as an early indicator of a health message's potential to change behaviour (e.g., reduce selection of items high in salt) (22). The scale has been used extensively in similar experiments to identify the potential impact of nutrient warning labels, has strong construct validity, and is predictive of longer-term actual behaviour (21, 23-28).

An attention check will be placed after the PME questions. "This question is an attention check, so please answer truthfully. How many times have you visited the planet Mars? Several times / Just once / Never".

Correct answer: Never

Label awareness

“Did you notice any warning labels next to any of the menu items when making your meal selection?” (yes/no).

If [yes], “What did the label tell you about?” Response options: Healthy items, Organic, Calcium, Sustainable, Added sugars, Vegetarian, Unhealthy items, Salt, Fibre, Gluten Free, None of these, Not sure.

If [yes], “Please describe what the label said” (open text response). Responses that mention high in salt or similar will be coded as aware.

Salt awareness

“Did you think about the salt content of the meals when making your selection?” (yes/no)

Note: For the below questions, both groups will be shown an image of the labelled menu. Some question phrasing is slightly altered for the control condition.

Perceived knowledge gain

“Did you learn something new from the salt labels on the menu?” (yes/no).

Control: Same as above

Perceived influence

“Did the salt label influence which food you ordered from the menu” (yes/no).

“If [yes], how did the salt label influence your choice?” Response options: I avoided choosing a meal high in salt; I chose a meal high in salt; Other (free text response)

Control: “Would the salt label have influenced what food you ordered from the menu?” (yes/no)

If [yes], how would the salt label have influenced your choice? Response options: I would have avoided choosing a meal high in salt; I would have chosen a meal high in salt; Other (free text response)

Policy support

If the UK Government introduced policy requiring restaurant menu items high in salt to feature these labels, how would you feel?” Likert scale ranging from 1 – 5 anchored by “strongly oppose” and “strongly support”.

Control: Same as above

Additional thoughts on label

“Please use this box to add any additional thoughts which you may have about the salt label” (open text response).

Control: Same as above

Secondary outcomes

Total salt purchased

Determined based on the total order of the participant, including food and drink. Prior to study commencement, all menu items will be sent for nutritional analysis to determine salt content/100g. Menu items will be weighed before being sent for analysis using kitchen scales (Vitafit VT706), so that specific salt content per serving can be calculated.

Labelled item selected

Determined based on whether the food item selected featured a high in salt warning label (yes = 1, no = 0).

Total salt consumed

Salt consumption will be determined from the order that the researcher takes and an estimation of the proportion of the meal that was consumed. The researcher will take a photograph before and after consumption and will estimate the percentage consumed component(s) of the meal, taking into account whether participants leave a proportion of all meal components or specific components (e.g., low salt or high salt components). Participants will also be asked whether they shared any of their meal with someone else. A random 10% selection of percentage estimates will be performed by a second researcher to measure reliability. Food consumption will then be calculated by subtracting an estimation of the proportion of the meal that was consumed (taking into account if any has been shared) from the food purchase.

Later salt intake

Participants will receive a link to a dietary recall questionnaire (Intake24, https://intake24.co.uk/) via email the next morning after taking part in the study, which they will be prompted to complete before midnight that day. They will be asked to provide as much detail as possible on what they had for dinner, snacks, and drinks after the restaurant visit. Based on this information and salt values calculated by Intake24, we will estimate the total salt consumed by the participants for the rest of the day after the visit.

Other macronutrient intake

Total kcal, sugar, and saturated fat intake [i.e., other nutrients that are not the main warning focus] will be calculated based on the nutritional content of the order of the participant.

Additional measures

Food choice motives

The “health” subsection of the Food Choice Questionnaire (29) will be used to measure the extent to which health motives may influence participants’ food choices. The subsection consists of 6 items, e.g. “It is important to me that the food I eat on a typical day….is nutritious” answered on a 4-point Likert scale ranging from “Not at all important” to “Very important”. We will calculate the mean response for the six items.

Aim guessing

Participants are told that the study is about dining habits in restaurants. At the start of the post-meal assessments, participants will be asked what they think the aims of the study were (free text response). Any participant that guesses the study aims to be investigating the influence of food warning labels on food choice will be coded as being aware of study aims. One researcher will code awareness of aims (R.E.) and a second researcher will independently verify the coding.

Study flow

<table>
<tr><td>Recruitment</td><td colspan="2">- Participants will be recruited via online adverts, word of mouth, and an existing participant database maintained by researchers at the University of Liverpool.
- A link to the screening questionnaire will be provided. (Appendix A)
- Participants will be stratified by SEP, age, and sex.</td></tr>
<tr><td>Information sheet and informed consent</td><td colspan="2">- Eligible participants will be e-mailed an information sheet (Appendix B) and consent form (Appendix C). Participants can ask any questions about the study via e-mail.
- The researcher will schedule a study visit day, leaving 30-minute gaps between participant groups. Participants may bring a maximum of nine guests aged 18 years or older to the restaurant.
- As the guests did not yet receive an online information sheet and consent form, all participants will also be provided with information by the researcher and provide verbal consent. The researcher will answer any questions prior to the study.</td></tr>
<tr><td rowspan="2">Meal choice task</td><td colspan="2">- Participants will be invited to visit the restaurant. They will be assigned in advance to either the control or experimental condition. Any guests will be in the same condition as the primary participant (i.e., participants will be randomised by table). They will also be given a participant number which they will be required to enter in any questionnaire they complete.</td></tr>
<tr><td>Control condition
- Participants will receive a standard menu without nutrient warning labels.</td><td>Experimental condition
- Participants will receive a menu featuring a nutrient warning label next to items high in salt. Text at the bottom of the menu will read “[label image] indicates that the salt content of this item is higher than 50% of the daily recommended limit (6g per day). High salt</td></tr>
</table>

		intake can increase blood pressure and risk of heart disease and stroke."
	- The participants will be asked to order lunch from the menu and a drink (optional) and write this down on an order form (Appendix D) - A researcher will communicate the order with the kitchen, take a photo of the meal when it is ready to be served and take a second photo when the participant is finished with the meal. The researcher will send themselves each photo on WhatsApp labelled with the participant ID.	
Post-meal assessments (Qualtrics) (Appendix E)	- After finishing their meal, participants will be provided with an iPad. They will answer a question about what they think the aim of the study was in an open-ended response format.	
	- Next, participants will complete measures of PME, label awareness, salt awareness, perceived knowledge gain, perceived influence, and policy support.	
	- Finally, participants will answer questions on demographic characteristics (including frequency of eating OOH) and health motives.	
Later intake	- After the restaurant visit (same day), participants will receive a link to an online questionnaire assessing their dietary intake for the rest of the day after the restaurant visit, to be completed before they go to bed (Intake24). - This will enable us to calculate salt consumed post intervention for the rest of that day. - They will also be requested to answer some additional questions on demographic characteristics.	
Additional demographic questions (Appendix F) and debriefing (Appendix G) (Qualtrics)	- After completing the dietary intake questionnaire, participants will be asked to answer some additional questions on demographic characteristics. - Upon completion, participants will be debriefed on study aims.	
Reimbursement	- Participants will receive £25 which will likely cover their lunch costs and serve as an incentive for people from different SEP strata to participate. Participants will either (i) pay for their own meal at the restaurant and receive £25 via invoice or (ii) have their meal paid for by a researcher using a prepaid card; if this costs less than £25, they can request to receive the remaining amount via invoice, if this costs more than £25, they will need to pay the difference at the restaurant.	

Statistical analysis

Participant characteristics

Participant characteristics will be presented overall and by experimental condition in a table. Data will include age, gender, ethnicity, highest educational qualification, employment status, BMI, frequency of eating OOH, and hunger. Continuous variables will be summarised as means and standard deviations, and categorical variables will be summarised as counts and percentages.

Measured variables

Primary

A linear regression will be used to assess differences between menu conditions in terms of PME. The between-subjects predictor will be label condition, and the dependent variable will be PME.

Highest education level (categorical: NQF level 4 or above, NQF level 3 or below) will be included as a covariate in the model to account for stratification (30). Health motives (continuous) will be included as a covariate as this may predict outcomes (e.g., health motivated individuals may be more likely to believe a menu with labels will change their behaviour) (30). Age and gender will also be included as covariates as previous work suggests that this can influence ratings of label PME and salt intake (13).

Descriptive analysis will be used to report (overall and by condition) participants' label awareness, salt awareness, perceived knowledge gain, perceived influence, and policy support (dichotomised into support/oppose). Logistic regressions will be performed to assess the odds of (i) being aware of the label, and (ii) being aware of the salt content of the meals in the labelled menu group, using the control menu group as the reference category. The same covariates as above will be included.

Secondary

Linear regressions will be performed to assess differences in menu conditions in terms of total salt purchase and total salt intake. The same covariates as above will be included.

A logistic regression will be performed to assess the odds of selecting a high salt meal in the labelled menu group, using the control menu group as the reference category. The same covariates as above will be included.

As some participants are likely to bring guests to the restaurant and guest tables are the unit of randomization, there may be clustering for outcome variables (i.e., the variation in PME and/or salt purchase/intake may be partially explained by table). We will test for clustering effects by comparing the within-table variability for outcome variables to the between-table variability. We will use the likelihood ratio test to ascertain the difference in likelihoods between the two. If this is statistically significant ($p < .05$) then there is enough evidence to suggest that there is a clustering effect of table groups eating together. If there is evidence of clustering then we will perform a series of linear mixed model analyses, with label condition as an independent variable, and table group as a random effect for primary and secondary outcomes.

Exploratory analyses

Linear regressions will be performed to assess differences in menu conditions in terms of later salt intake, and intake of other macronutrients. This is to examine whether individuals engage in any compensatory eating behaviour after seeing the labels (e.g., they are aware that they consumed a

high salt meal and therefore reduce their salt intake later in the day), or whether intake of other macronutrients (e.g., calories) is impacted. Again, the same covariates as above will be included.

Sensitivity

Sensitivity analyses will be conducted to test if results are the same after removing any participants that correctly guess the aims of the study (i.e., the effect of salt warning labels on food choice, or similar). If many participants identify the study aims (e.g., > 25%) we will examine if study aim awareness status moderates any effects of labelling by including this as a covariate (categorical) in analyses. Any deviations in findings from the main analyses will be reported.

Missing data

We do not foresee missing data being a problem as when we design measures in Qualtrics all fields will require a response, and all data will be collected by a researcher during the restaurant visit. However, it is possible that some participants will not complete the online questionnaire to assess later intake after the restaurant visit. Any missing data for later nutrient intake will be imputed.

Multiple comparisons

The alpha will be set at .05 for primary and secondary outcome analyses. To adjust for multiple comparisons, the alpha for exploratory analyses alpha will be reduced to .01.

Sample size

The label in the present study (or a similar label) has not previously been tested in a real-world UK context, in terms of PME or food choice. A RCT examining the effects of 'high in' added sugar labels on PME found large effects (d = 0.58 – 0.63) (7). A meta-analysis on food labelling found a small effect (OR = 0.65, or d = .24) of warning labels in terms of reducing consumers' probability of selecting less healthy items (31). However, a RCT examining the effects of 'high in' sodium labels on salt (g) and 'high in' item choice found very small effects (d = 0.03 and 0.04 respectively) (9), but there are important methodological differences (e.g., menu size) between this study and the present study. The primary purpose of the present study is to examine PME, so we will therefore power the study for this primary outcome, but in doing so we will have reasonable power to detect small-medium effects for our secondary outcome (food choice).

In the present study, G power calculation indicates a minimum sample of 260 participants (130 per condition) will provide sufficient power (80%, two-tailed) to detect small-medium between condition effects (d = 0.35) of the salt warning label on PME, salt purchased, and salt intake using between-subject ANOVAs (as planned).

Prior to the study we do not know with certainty what the rate of participant recruitment will be, and effect size estimates have a degree of uncertainty. To balance the trade-off between costs (e.g., in research time, participant burden) and likelihood of the study providing convincing evidence, we will conduct interim analyses When we have collected data for 260 participants (130 completers in each condition), we will conduct interim analyses to assess whether the results are convincing enough to conclude that an effect on PME and odds of selecting a high salt meal are present or absent (32). The interim analyses will examine the effect size estimates of these two outcomes and current statistical significance. If it is extremely unlikely that either of the predicted effects would be observed up to maximum sample size capacity (n = ~500) based on time and resource constraints, then we will cease data collection at this point and conduct planned analyses. However, if the

observed effect size suggests that a detectable effect ($d \geq 0.25$) is present but is not statistically significant, data collection will continue and we will attempt to recruit the largest possible sample size up until the end of September 2024 at the latest. In this scenario, consistent with best practice recommendations for interim analyses and to account for multiple testing, the p value for these outcomes will be adjusted to 0.025.

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Appendices

Appendix A – Screening questionnaire

Where do you live?

- ○ In the United Kingdom (1)
- ○ In a different country (2)

Are you fluent in English?

- ○ Yes (1)
- ○ No (2)

What is your age (in years)?

_____

What is your sex? A question about gender identity will follow.

- ○ Male (1)
- ○ Female (2)

Which of the following best describes your gender?

- ○ Man (1)
- ○ Non-binary (2)
- ○ Woman (3)
- ○ Prefer to self-describe (4)
- ○ Prefer not to say (5)

Are you a University student?

- ○ Yes (2)
- ○ No (3)

What is your highest educational qualification? If you are a student, please select the qualification being studied for.

- ○ Less than high school (no formal qualifications) (1)
- ○ High school completion (e.g., GCSEs or equivalent) (2)
- ○ College or foundation degree (e.g., A Levels or equivalent) (3)
- ○ Bachelor's degree (4)
- ○ Master's degree (5)
- ○ Doctorate or professional degree (6)

Do you have any dietary allergies?

- ○ Yes (please describe) (1) _____
- ○ No (2)

Do you have any dietary requirements?

- ○ No (1)
- ○ Vegetarian (2)
- ○ Vegan (3)
- ○ Other (please describe) (4) _____

How often, on average, over the past year have you eaten out (e.g., at a restaurant, café)?

- ○ Not in the last year (1)
- ○ Less than once per month (2)
- ○ 1 - 3 times per month (3)
- ○ 1 - 2 times per week (4)
- ○ 3 times per week or more (5)

Please provide your email address so that the researcher can contact you:
Make sure there are no typos in your email address.

_____

Appendix B – Information sheet

Liverpool Restaurant study

You are being invited to participate in a research study. Before you decide whether to participate, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and feel free to ask us if you would like more information or if there is anything that you do not understand. Please also feel free to discuss this with your friends, relatives and doctor if you wish. We would like to stress that you should only agree to take part if you want to.

1. **What is the purpose of the study?**

To investigate dining habits in restaurants.

2. **Why have I been chosen to take part?**

We are recruiting healthy volunteers who fulfil the following criteria:

- Is a fluent English speaker
- Is aged 18 or older
- Eat out in restaurants or cafes at least once per month
- Do not have a dietary allergy

3. **Do I have to take part?**

No. Participation in this research is completely voluntary. You are free to withdraw at any time without explanation and without incurring a disadvantage.

4. **What will happen if I take part?**

As part of the study, you will be asked to visit a restaurant to purchase and consume a meal. At the restaurant you will be met by a member of our research team. We will also ask you to complete a short questionnaire about your background and eating habits. After your visit to the restaurant, we will send you another online questionnaire for you to complete the next day. The research team can provide you with a full schedule for the study, if required.

5. How will my data be used?

The University processes personal data as part of its research and teaching activities in accordance with the lawful basis of 'public task', and in accordance with the University's purpose of "advancing education, learning and research for the public benefit. University of Liverpool employee Victoria Heath (V.Heath@liverpool.ac.uk) acts as the Data Protection Officer for this study and any queries

relating to the handling of your personal data can be sent to her or the principal investigator (see contact details below). Further information on how your data will be used can be found in the table below.

How will my data be collected?	Through questionnaires you complete.
How will my data be stored?	On a password protected computer server.
How long will my data be stored for?	Your personal data (e.g. name) will be stored for up to 28 days and then deleted. All other information will be stored indefinitely.
What measures are in place to protect the security and confidentiality of my data?	We will store all data on password protected computer servers and we never share any of your personal data outside of the research team for this project.
Will my data be anonymised?	After the study your personal information will be stored separately from your other questionnaire responses to create an anonymised data set. After 28 days all personal information will be deleted, but up to this point you can contact us and ask to see your information or have it deleted.
How will my data be used?	Your anonymised data will be combined with other participants' data in order to be analysed.
Who will have access to my data?	The research team for this project will have access to your data.
Will my data be archived for use in other research projects in the future?	After the research team have anonymised your data and completed this research project, they will place the anonymised data sets on an archive (e.g. Open Science Framework) in case any other researchers want to use it for future research purposes.
How will my data be destroyed?	Your personal data will be destroyed electronically (deleting the files and removing them from the computer server).

6. Expenses and / or payments

You will be compensated £25 for taking part in this research.

7. Are there any risks in taking part?

There are no anticipated risks to you if you take part in the study greater than would be expected in everyday life. If you have a severe food allergy then we suggest you do not take part as the study will involve eating out in a restaurant.

8. Are there any benefits in taking part?

There are no direct benefits, other than the monetary payment.

9. What will happen to the results of the study?

We intend to publish the results from this study in a scientific journal. However, as explained above any personal information you provide is deleted before this and you would therefore not be identifiable in report. If you are interested in the results of the study, please let us know and we will share the results of the study with you when we publish it.

10. What will happen if I want to stop taking part?

You are under no obligation to take part in this study; it is completely your choice. If you do decide to take part, you are free to withdraw at any time and without giving any reason or explanation. Data collected up until the period you withdraw may be used, but only if you are happy for this to be done. Otherwise you may request that your data be destroyed and no further use is made of them.

11. What if I am unhappy or if there is a problem?

If you are unhappy, or if there is a problem, please feel free to let us know by contacting Prof. Eric Robinson (contact details below) and we will try to help. If you remain unhappy or have a complaint which you feel you cannot come to us with then you should contact the Research Governance Officer on 0151 794 8290 (ethics@liv.ac.uk). Please provide details of the name or description of the study (so that it can be identified), the researcher(s) involved, and the details of the complaint you wish to make.

12. Who can I contact if I have further questions?

Lead researcher

Dr Rebecca Evans

2.80, Eleanor Rathbone Building

Bedford Street South

University of Liverpool,

Liverpool

L69 7ZA,

UK

R.K.Evans@liverpool.ac.uk

Senior researcher

Prof Eric Robinson

2.33b, Eleanor Rathbone Building

Bedford Street South

University of Liverpool,

Liverpool

L69 7ZA,

UK

eric.robinson@liverpool.ac.uk

Data protection officer

Victoria Heath

The Foundation Building,

765 Brownlow Hill,

University of Liverpool,

Liverpool,

L69 7ZX,

UK

V.Heath@liverpool.ac.uk

I confirm I have read the information sheet

- Yes

Appendix C – Consent form

Participant Consent Form

Research ethics approval number: 11251

Title of the research project: Liverpool Restaurant study

Name of researcher(s): Dr Rebecca Evans, Prof Eric Robinson

1. I confirm that I have read and have understood the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to stop taking part and can withdraw from the study at any time without giving any reason and without my rights being affected. I also understand that I have the right to lodge a complaint.

3. I understand that the information I provide is for research purposes (see information sheet) and it will be held securely in line with data protection requirements at the University of Liverpool. In addition, I understand that personal information collected about me that can identify me, such as my name, will never be shared beyond the study team.

4. I understand that shortly after completing the study, researchers will keep my personal data (e.g. name) and store it separately from my other questionnaire responses for up to 28 days on a computer, so that my anonymised questionnaire responses can later be deposited in an online data archive for sharing and used by other authorised researchers to support other research in the future.

5. I understand that I can ask for access to any of the information I provide and I can request the destruction or alteration of that information if I wish for up to 28 days after participating in the study. I understand that following this I will no longer be able to request access to or withdrawal of the information I provide because this information will have been deleted.

6. I agree and consent to take part in the above study.

_____	_____	_____
Participant name	Date	Signature (initial)

Appendix D – Order form

ORDER FORM

Booking Name: University of Liverpool

Table Number:

Group size:

STUDY ID	INITIALS	EMAIL ADDRESS	MEAL	DRINK

Appendix E – Post-exposure assessments

Please enter your participant ID. If you are unsure what this is, please ask the researcher.

_____

Please select the letter which is circled on your sticker label. If you are unsure, please ask the researcher.

○ A (1)

○ B (2)

End of Block: Default Question Block

Start of Block: Aim guessing

What do you think was the aim of this study?

_____

End of Block: Aim guessing

Start of Block: Food sharing

Did you share any of the food or drink items?

○ Yes (1)

○ No (2)

Display This Question:

If Did you share any of the food or drink items? = Yes

What items were shared? Please also give an estimation in % of how much of each item was shared.

_____

Did you add any condiments (e.g., sauce, salt) to your food?

- ○ Yes (1)
- ○ No (2)

Display This Question:

If Did you add any condiments (e.g., sauce, salt) to your food? = Yes

What condiments did you add? Please also give an estimation in teaspoons of how much of each condiment was added.

_____

End of Block: Food sharing

Start of Block: PME

Please consider the following statements in relation to the menu you ordered from.

	Not at all (1)	A little bit (2)	Somewhat (3)	Quite a bit (4)	A great deal (5)
The menu made me concerned about the health effects of consuming items high in salt. (1)	○	○	○	○	○

The menu made consuming items high in salt seem unpleasant. (2)	○	○	○	○	○
The menu discouraged me from wanting to consume items high in salt. (3)	○	○	○	○	○

End of Block: PME

Start of Block: Attention check

This question is an attention check, so please answer truthfully. How many times have you visited the planet Mars?

○ Several times (1)

○ Just once (2)

○ Never (3)

End of Block: Attention check

Start of Block: Awareness

Did you notice any warning labels next to any of the menu items when making your meal selection?

○ Yes (1)

○ No (2)

Display This Question:

If Did you notice any warning labels next to any of the menu items when making your meal selection? = Yes

What did the label tell you about?

- ○ Healthy items (1)
- ○ Organic (2)
- ○ Calcium (3)
- ○ Sustainable (4)
- ○ Added sugars (5)
- ○ Vegetarian (6)
- ○ Unhealthy items (7)
- ○ Salt (8)
- ○ Fibre (9)
- ○ Gluten free (10)
- ○ None of these (11)
- ○ Not sure (12)

Display This Question:

If Did you notice any warning labels next to any of the menu items when making your meal selection? = Yes

Please describe what the warning label said.

_____

Page Break

Did you think about the salt content of the meals when making your selection?

○ Yes (1)

○ No (2)

End of Block: Awareness

Start of Block: Additional assessments

Display This Question:

If Please select the letter which is circled on your sticker label. If you are unsure, please ask th... = B

Here is the menu you ordered from. The menu features salt warning labels next to items that exceed 50% of the daily recommended limit for salt intake: [menu B image]

Display This Question:

If Please select the letter which is circled on your sticker label. If you are unsure, please ask th... = A

Here is a slightly different version of the menu you ordered from. The menu features salt warning labels next to items that exceed 50% of the daily recommended limit for salt intake: [menu B image]

Did you learn something new from the salt labels on the menu?

○ Yes (1)

○ No (2)

Display This Question:

If Please select the letter which is circled on your sticker label. If you are unsure, please ask th... = B

Did the salt labels influence which food you ordered from the menu?

- ○ Yes (1)
- ○ No (2)

Display This Question:

If Did the salt labels influence which food you ordered from the menu? = Yes

How did the salt label influence your choice?

- ○ I avoided choosing a meal high in salt (1)
- ○ I chose a meal high in salt (2)
- ○ Other (please describe) (3) _____

Display This Question:

If Please select the letter which is circled on your sticker label. If you are unsure, please ask th... = A

Would the salt labels have influenced which food you ordered from the menu?

- ○ Yes (1)
- ○ No (2)

Display This Question:

If Would the salt labels have influenced which food you ordered from the menu? = Yes

How would the salt labels have influenced your choice?

- ○ I would have avoided choosing a meal high in salt (1)
- ○ I would have chosen a meal high in salt (2)
- ○ Other (please describe) (3) _____

If the UK Government introduced policy requiring restaurant menu items high in salt to feature these labels, how would you feel?

- ○ Strongly oppose (1)
- ○ Oppose (3)
- ○ Neutral (4)
- ○ Support (5)
- ○ Strongly support (6)

Please use this box to add any additional thoughts which you may have about the salt label.

_____

End of Block: Additional assessments

Start of Block: Demographics

What is your age (in years)?

_____

What is your sex? A question about gender identity will follow.

- ○ Male (1)
- ○ Female (2)

Which of the following best describes your gender?

- ○ Man (1)
- ○ Non-binary (2)
- ○ Woman (3)
- ○ Prefer to self-describe (4) _____
- ○ Prefer not to say (5)

What is your highest educational qualification? If you are a student, please select the qualification being studied for.

- ○ Less than high school (no formal qualifications) (1)
- ○ High school completion (e.g., GCSEs or equivalent) (2)
- ○ College or foundation degree (e.g., A Levels or equivalent) (3)
- ○ Bachelor's degree (4)

- ○ Master's degree (5)
- ○ Doctorate or professional degree (6)

What is your current employment status?

- ○ Full-time (1)
- ○ Part-time (2)
- ○ Student (3)
- ○ Retired (4)
- ○ Unable to work due to sickness/disability (5)
- ○ Looking after home/family (6)
- ○ Unemployed (7)
- ○ Other (please describe) (8) _____

What is your ethnic group? Choose one option that best describes your ethnic group or background.

- ○ **Asian or Asian British** Bangladeshi Chinese Indian Pakistani Any other Asian background (3)
- ○ **Black, Black British, Caribbean or African** African Caribbean Any other Black, Black British, or Caribbean background (5)
- ○ **Mixed or multiple ethnic groups** White and Black Caribbean White and Asian White and Black African Any other Mixed or multiple ethnic background (6)
- ○ **White** English, Welsh, Scottish, Northern Irish or British Irish Gypsy or Irish Traveller Roma Any other White background (7)

○ **Other ethnic group** Arab Any other ethnic group (8)

What is your height?

○ In centimetres: (1) _____

○ OR in feet and inches: (2) _____

○ Prefer not to say (4)

What is your weight?

○ In kilograms: (1) _____

○ OR in stone and pounds: (2) _____

○ Prefer not to say (4)

How often, on average, over the past year have you eaten out (e.g., at a restaurant, café)?

○ Not in the last year (1)

○ Less than once per month (2)

○ 1 - 3 times per month (3)

○ 1 - 2 times per week (4)

○ 3 times per week or more (5)

End of Block: Demographics

Start of Block: Health motives

Several different factors influence our choice of food. Read each item carefully and decide how important the item is to you. There are no right or wrong answers, we are interested in what is important to you. It is important to me that the food I eat on a typical day…

	Not at all important (1)	A little important (2)	Moderately important (3)	Very important (4)
Contains a lot of vitamins and minerals (1)	○	○	○	○
Keeps me healthy (2)	○	○	○	○
Is nutritious (3)	○	○	○	○
Is high in protein (4)	○	○	○	○
Is good for my skin/teeth/hair/nails etc. (5)	○	○	○	○
Is high in fibre and roughage (6)	○	○	○	○

Appendix F – Additional demographic assessments

Please enter your participant ID. If you are unsure what this is, please ask the researcher.

_____

Do you consider yourself to be a disabled person?

- ○ Yes (1)
- ○ No (2)
- ○ Prefer not so say (3)

Do you have any physical or mental health conditions or illnesses lasting or expected to last for 12 months or more?

- ○ Yes (1)
- ○ No (2)
- ○ Prefer not to say (3)

How would you describe your national identity? (select all that apply)

- ☐ British (1)
- ☐ English (2)
- ☐ Welsh (3)

- [ ] Scottish (4)
- [ ] Northern Irish (5)
- [ ] Other (please describe) (6) _____
- [ ] Prefer not to say (7)

What is your religion?

- ○ No religion (1)
- ○ Buddhist (2)
- ○ Christian (including Church of England, Catholic, Protestant, and all other Christian denominations) (3)
- ○ Hindu (4)
- ○ Jewish (5)
- ○ Muslim (6)
- ○ Sikh (7)
- ○ Any other religion (please describe) (8) _____
- ○ Prefer not to say (9)

Do you identify as trans?

- ○ Yes (1)

- ○ No (2)
- ○ Prefer not to say (3)

Which of the following best describes your sexual orientation?

- ○ Asexual (1)
- ○ Bi/bisexual (2)
- ○ Gay or lesbian (3)
- ○ Queer (4)
- ○ Straight/heterosexual (5)
- ○ Pansexual (6)
- ○ I identify in another way (please describe) (7) _____
- ○ Prefer not to say (8)

Are you currently? (select all that apply)

- ☐ Cohabiting or living with a partner (1)
- ☐ Divorced or civil partnership resolved (2)
- ☐ Married or in a civil partnership (3)
- ☐ Separated (4)

- [ ] Single (5)
- [ ] Other (specify, if you wish) (6) _____
- [ ] Widowed or surviving partner from a civil partnership (7)
- [ ] Prefer not to say (8)

In the last 12 months, have you taken any of the following types of leave? (select all that apply)

- [ ] Adoption leave (1)
- [ ] Maternity leave (2)
- [ ] Paternity leave (3)
- [ ] Shared parental leave (4)
- [ ] Parental bereavement leave (5)
- [ ] Other (specify, if you wish) (6) _____
- [ ] None of the above (7)
- [ ] Prefer not to say (8)

Do you have any caring responsibilities? (if you share care responsibilities equally then please answer as the primary carer)

- ○ Yes (1)
- ○ No (2)

○ Prefer not so say (3)

Display This Question:

If Do you have any caring responsibilities? (if you share care responsibilities equally then please... = Yes

Please select all that apply:

☐ Primary carer of a child or children (under 18 years) (1)

☐ Primary carer of a child or children who is disabled or has a health condition, or illness, or temporary care needs (under 18 years) (2)

☐ Primary carer or assistant for a disabled adult or adults (18 years and over) (3)

☐ Primary carer or assistant for an older person or people (65 years and over) (4)

☐ Secondary carer (another person carries out main caring role) (5)

☐ Prefer not to say (6)

What was the occupation of your main household earner when you were about aged 14?

○ Modern professional & traditional professional occupations such as: teacher, nurse, physiotherapist, social worker, musician, police officer (sergeant or above), software designer, accountant, solicitor, medical practitioner, scientist, civil / mechanical engineer. (1)

○ Senior, middle or junior managers or administrators such as: finance manager, chief executive, large business owner, office manager, retail manager, bank manager, restaurant manager, warehouse manager. Clerical and intermediate occupations such as: secretary, personal assistant, call centre agent, clerical worker, nursery nurse. (2)

○ Technical and craft occupations such as: motor mechanic, plumber, printer, electrician, gardener, train driver. Routine, semi-routine manual and service occupations such as: postal worker,

machine operative, security guard, caretaker, farm worker, catering assistant, sales assistant, HGV driver, cleaner, porter, packer, labourer, waiter/waitress, bar staff. (3)

- ○ Long-term unemployed (claimed Jobseeker's Allowance or earlier unemployment benefit for more than a year). (4)

- ○ Small business owners who employed less than 25 people such as: corner shop owners, small plumbing companies, retail shop owner, single restaurant or cafe owner, taxi owner, garage owner. (5)

- ○ Other such as: retired, this question does not apply to me, I don't know. (6)

- ○ Prefer not to say (7)

Appendix G – Debrief text

Project Title: Dining habits in restaurants

Researchers: Dr Rebecca Evans & Prof Eric Robinson

We would like to thank you for your participation in this research.

Aims: The study aimed to assess how salt warning labels on restaurant menus affects what people choose to buy and eat.

Design: Some participants were provided with a standard menu (no nutrient warning labels) and the other participants were provided with a manipulated menu featuring nutrient warning labels next to meals high in salt. We will compare the perceived effectiveness of the menus in terms of discouraging salt intake, and the total amount of salt ordered and consumed with and without the labelling intervention. This will help us to examine if this could be an effective intervention to encourage healthier eating when eating out.

Thank you for your participation. If you have any further questions, please contact:
Lead researcher: Dr Rebecca Evans, University of Liverpool, R.K.Evans@liverpool.ac.uk
Senior researcher: Prof Eric Robinson, University of Liverpool, Eric.robinson@liverpool.ac.uk

If you have any concerns or complaints that you wish to discuss with a person who is not directly involved in the research, please contact Research Ethics and Integrity Office at ethics@liv.ac.uk.

Please click the next arrow to ensure your response is submitted.