



Reducing sugar in schools

Report on the Varndean School pilot study



THE
BEHAVIOURAL
INSIGHTS
TEAM

Executive Summary



Aims

- **Feasibility:** test whether a series of personalised healthy swap messages can be practically delivered to school students.
- **Sugar consumption:** test whether students reduce their consumption of 'sweet treat' items as a result of these messages.

Intervention

A series of emails containing personalised swap suggestions based on previous purchases. Students received these messages each Monday together with a reinforcement message each Wednesday for 7 weeks.

Findings

- No statistically significant difference in number of sweet treats and total sugars consumed per week.
- Intervention may have increased purchases of savoury items.
- Recruitment was difficult and message delivery was labour intensive.
- Promising concept, but given resource and time required to deliver, would not currently suggest further roll-out.

Background



In 2016, Brighton and Hove City Council (BHCC) applied to the second phase of the Local Government Association (LGA)'s Behavioural Insights Programme to work with the Behavioural Insights Team (BIT) to identify and trial interventions that could help reduce the consumption of sugar.

During the first phase of this programme, BIT worked with Liverpool City Council to reduce the amount of sugary drinks sold in hospital cafeterias. The intervention altered the choice architecture by providing highly salient labelling cues warning customers about the health impacts of sugary drinks at the point of purchase. It was successful and led to an estimated 7.3% reduction in the proportion of high sugar drinks sold during the trial period.



Background



For the second phase of this programme, we sought to trial a different type of behavioural intervention, focusing on improving students' food choices in school. Varndean School was selected in collaboration with BHCC as a suitable partner for a pilot study, as it is a relatively large school with an active interest in healthy eating and its cafeteria payment system operates entirely on a cashless card-based system (recording what each student has bought in the canteen).

The project focused on developing an intervention to reduce sugar consumption with potential to be scaled. The intervention we tested with Varndean School was a series of personalised 'sugar swap' messages (e.g. messages suggesting swapping a food item for a different item with lower sugar content). We investigated whether these messages could be practically delivered to school students, and whether students reduce their consumption of 'sweet treat' items as a result.

Our project methodology



We followed the BIT methodology for running a project. This report summarizes our work across these four project stages.

- Target**  Define the problem and determine the measurable target outcomes.
- Explore**  Map relevant behaviours and the wider context.
- Solution**  Consider and design the intervention(s).
- Trial**  Design and launch trial, evaluate, learn and adapt.

Target + Explore

Literature review and fieldwork at Varndean School



Literature review

In our literature review^[1] we presented an overview of interventions that have attempted to promote healthy eating in school settings in the UK and abroad.

Going beyond conventional approaches, we outlined how interventions drawing on insights from behavioural science have been trialed in school and other settings.

We distinguished broadly between two different kinds of intervention.

- Interventions that alter the choice architecture
- Alternative behavioural approaches focusing on self-monitoring

^[1] <https://www.local.gov.uk/our-support/efficiency-and-income-generation/behavioural-insights/lga-behavioural-insights-projects>

Reducing sugar consumption in secondary schools in Brighton and Hove

A literature review by the Behavioural Insights Team

March 2018

Literature review



Interventions that alter the choice architecture

These interventions alter the environment in which people make their food choices. Following the categorisation developed in a recent review by Cadario and Chandon, we discussed, in turn, healthy eating ‘nudges’ that alter the choice environment in order to influence one of three things: an individual's (1) attention, (2) interest or (3) action.^[i]

The first category includes interventions such as nutritional labelling; healthy eating cues are considered ‘interest’ influencing nudges; and interventions such as convenience enhancements or changes to plate sizes are ‘action’ influencing nudges. Simple changes to the choice environment, such as changing the placement of certain food items in a cafeteria, can have a meaningful impact on purchasing behaviour.

^[i] Cadario, R., & Chandon, P. (2017). Which Healthy Eating Nudges Work Best? A Meta-Analysis of Field Experiments. INSEAD Working Paper No. 2017/77/MKT.

Alternative approaches

While choice architecture is undoubtedly an important tool to help stem the tide of obesity, changing the choice architecture in the school environment alone does not equip young people with the skills to make healthy choices for themselves in less controlled environments. Therefore we also considered alternative behavioural approaches to reducing sugar consumption, focusing on self-monitoring.

In particular, we focused on the growing body of evidence suggesting that interventions which encourage self-monitoring may be useful in disrupting undesired habits.^[ii]

^[ii] Tang, J., Abraham, C., Greaves, C., & Yates, T. (2014). Self-directed interventions to promote weight loss: a systematic review of reviews. *Journal of medical Internet research*, 16(2).

Interviews and focus groups with students



As part of our fieldwork at Varndean School, we conducted a series of interviews and focus groups with students from year 7 to year 10.

The focus groups mostly covered questions around food in school, attitudes towards healthy eating, and perceived barriers to eating well. The interviews also gave us deeper insights into eating habits in general (discussing where, when, and what students would eat in a typical day).

At lunchtime the canteen is used most heavily by year 7s, who are allowed access to the canteen 10 minutes early. Younger students (year 7) reported buying all their food at school, but those interviewed tended to eat more snacks and did not buy hot lunches.

Older students (year 9/10) mostly reported bringing their own food to school - some topping up with fruit or snacks during breaktime. They reported not using the cafeteria much, due to long queues and annoyance about the payment cards (which cannot be topped up with coins). Some also complained about the quality of food, and how unhealthy it is (mostly year 10s).



“Mum normally makes me a sandwich, but I like to get a small snack from the cafeteria. I really want the cookies back from last year!”

(Varndean student, year 10)

Interviews and focus groups with students



Key insights from interviews and focus groups:

- Eating behaviour driven by **habits**: students reported that they often bought the same thing every day.
- **High awareness** of what a healthy diet is and which food items in the canteen were 'unhealthy'. There was a particular emphasis on the sugariness of drinks.
- While quite a few students cared about eating healthily; others had a key focus on the energy that food provides and **satiety**. Unhealthy options were sometimes favoured because they were perceived as being better value for money in terms of this.
- Students perceived a transition from about year 8 onwards, with older students paying more attention to nutrition, while year 7s enjoy the freedom of no longer being in primary school and "eat way too much candy".
- While some students spoke positively about healthy eating, at least one student mentioned that there could be stigma around this (e.g. eating couscous).
- **Parental oversight** of food consumed/purchased and parental influence decreases with age (although this also varies within lower age groups).

"I wouldn't pick something weird like couscous. You know how kids are – they'd make fun of you. [...]"

I don't think people care about eating healthily, but I think that I eat healthily for a teenager. [...]"

The burgers last year were really good. I wouldn't have cared if they would have been really unhealthy – it was worth it."

(Varndean student, year 10)

Fieldwork at Varndean School

During our visits to Varndean School we observed the canteen during lunch and breaktimes.

Our observations confirmed what we had heard in our conversations with students – the canteen is a very busy environment. Students have to make decisions very quickly and there is limited space to sit down and eat slowly. All of this favours habitual, quick decision making and food items that are quick to grab and eat.

We also spoke to the canteen manager, staff, and teachers about their perceived barriers to students' healthy eating and opportunities for improvements.

The canteen had already implemented some nudges (such as making water bottles very easy to see and reach, and moving other drinks to the highest shelf). However, given the crowded environment, we concluded it would make sense to try an intervention outside the canteen environment.



Explore phase outcomes



Based on our review of the literature and fieldwork, we proposed to implement and evaluate an intervention that aims to help students develop self-monitoring skills. Since students' food choices appear to be heavily driven by their habits, the idea was that feedback together with swap suggestions could help students to notice what they were buying and encourage them to try something different than usual.

Given the very busy environment, we decided on an intervention outside the canteen setting. The LGA and BHCC were also keen to test a novel intervention, as various changes to choice architecture have already been successfully tested in a variety of settings.

We aimed to test whether providing students with feedback about their previous purchases could prompt them to reduce the sugar content of their subsequent purchases. The impact of such feedback on young people's purchasing behaviour had not yet been empirically tested and doing so could greatly enhance our understanding of how to promote healthy eating behaviours.

Solution

Design of the personalised feedback messages to students



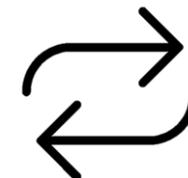


Email intervention components

Based on the review of the literature and our fieldwork, we designed an email intervention, providing students with personalised feedback on their purchases and suggestions for healthier swaps they could try. We had initially hoped to send students text messages rather than emails, to provide a more timely prompt, however, this was not possible in the school context.



The emails included three components:



Intervention development



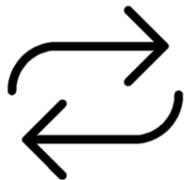
a) Feedback

- We used cashless payment information from the canteen to provide individualised feedback on each student's purchases in the previous week.



b) Message content

- We developed 5 types of messages, drawing on insights from the academic literature and our explore phase findings.
- In addition to the main message each week, we also created reminder emails to reinforce the main messages.



c) Swaps

- We defined 3 types of swaps offered. These were all lower in sugar than the items they were aiming to replace.

a) Feedback



Providing people with feedback can help them to become more conscious of their behaviours and improve their self-monitoring.

Feedback has proven successful in achieving positive behaviour change in a range of domains including energy consumption, recycling, smoking cessation, alcohol intake and professional practice compliance. Recently, studies designed to tackle childhood obesity have sought to use feedback and have employed digital technology to do so.

Hysong and colleagues developed the Actionable Feedback Model, which the four main characteristics of successful feedback interventions (starting with the most important ones): timeliness, individualisation, non-punitiveness and customizability.

We used cashless payment information to provide students with individualised feedback on their previous purchases.

Hysong, S. J., Best, R. G., & Pugh, J. A. (2006). Audit and feedback and clinical practice guideline adherence: making feedback actionable. *Implementation Science*, 1(1), 9.



“ Hi Lisa, last week you bought x1 cookie, x1 pain au chocolat and x2 bottles of Radnor Fizz”



b) We designed a range of different messages



Generic: provided a swap suggestion only.



Specific: provided a swap suggestion plus an appealing description of the swap item or a simple nutritional tip.



Cost: highlighted certain swaps as being cheaper or the same price as the originally selected item.



Rebellion: framed healthy eating as a way of pursuing social justice. Healthy swaps were suggested as a means of taking a stand against unfair practices of the food industry.



Reinforcement: provided encouragement when no high-sugar items were purchased.



b) Message examples

Message type	Example
1. Feedback + generic message	<i>“This week, why not swap the cookie for a chocolate rice cake?”</i>
2. Feedback + specific message	<i>“Did you know that fruit juices are a hidden source of sugar? This week, why not try swapping the fruit juice for a more refreshing bottle of water?”</i>
3. Feedback + cost message	<i>“Next time you go to buy an ice-cream tub, try swapping it for a Pip fruity lolly. It's cheaper and also really tasty!”</i>
4. Feedback + rebellion message	<i>“Did you know that companies use advertising and marketing to make us want unhealthy foods? You can fight back using smart swaps. Next time you go to buy a cookie, why not try swapping it for a tasty fruit pot instead?”</i>
5. Reinforcement message	<i>“Last week you didn't buy any high sugar items in the canteen. Keep it up - good food feels good!”</i>

c) Swap suggestions

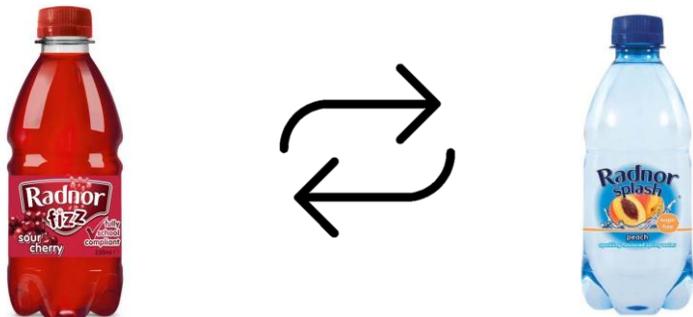
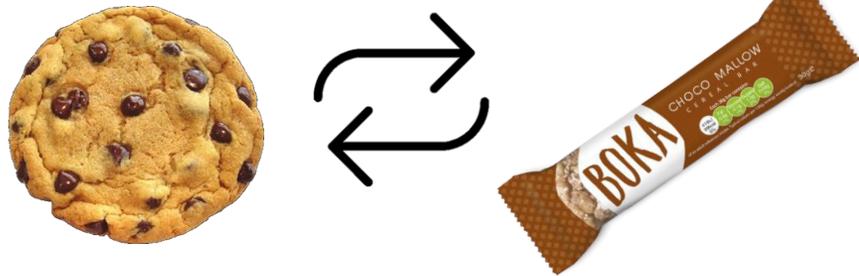
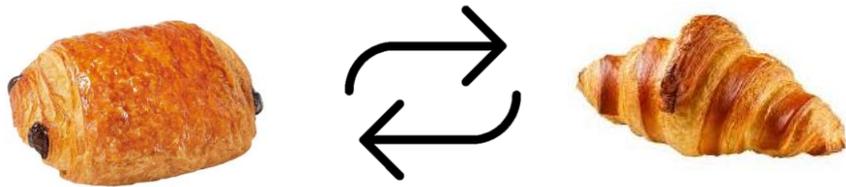


We proposed 3 types of swaps based on an exhaustive list of canteen items:

Swap type	Description
First Tier	Items close in nature to the originally selected sweet treat, but containing less sugar
Second Tier	Sweet snack items with less sugar, but not particularly close in nature to the originally selected item
Third Tier	Items very different to the originally selected item, either in terms of taste or healthiness.

NB: the only criterion used for all swaps was that the item contained less sugar in grams per serving than the original sweet treat.

c) Swap examples



Sweet Treat (sugar in grams per serving)	First tier swap	Second tier swap	Third tier swap
Pain au chocolat (7.5g)	Croissant (5.6g) Brioche bun (3.4g) Butter Crêpe (3.2g)	Boka cereal bar (1.4g) Metcalf's chocolate rice cake (5.3g) Metcalf's popcorn thins (5.2g) Walkers shortbread finger (3.4g)	Popcorn (0.3g) Popchips (1.2g)
Gingerbread cookie (20.9) Chocolate cookies (19.2g)	Boka cereal bar (1.4g) Metcalf's chocolate Rice cake (5.3g) Metcalf's popcorn thins (5.2g) Walkers shortbread finger (3.4g)	Croissant (5.6g) Brioche bun (3.4g) Butter Crêpe (3.2g)	Popcorn (0.3g) Popchips (1.2g)
Ice-cream tub deluxe (23g)	Pip ice-lolly (4.8g)	Yazoo milkshake (9g) Yeo Valley yogurt (11g)	Piece of fruit (0g) Fruit pot (0g) Fruit bag (0g)
Fruit juices (22g - 5.9g)	Flavoured water (1.7g)	water (0g)	water (0g)

Intervention email examples



Monday feedback messages

Hi Lisa, *last week you bought x1 cookie, x1 pain au chocolat and x2 bottles of Radnor Fizz in the canteen.*

Staying hydrated is important because it helps you concentrate. This week, why not try swapping the Radnor Fizz for a more refreshing bottle of water?



Wednesday reminder emails

Hi Lisa, we want the sugar swaps project to be a collaboration between our team and Varndean students.

This means your feedback is important to us. If you have tried the swap suggestion we sent you, how many stars would you give it? (1-5 stars)

Trial

Findings from the feasibility study



Feasibility study



Challenges

We planned to evaluate the intervention through a randomised controlled trial. During the intervention design we encountered several challenges to the planned evaluation:

- Small sample size and lack of statistical power
- Concerns about spill-over effects
- Parental consent increasing selection bias

Solution

- A **feasibility study** which will give us useful information as to whether healthy swaps can be scaled up in the future or whether they are infeasible.

What is a feasibility study?

- A feasibility study is a preparatory study conducted before a full-scale evaluation.
- Feasibility studies differ from RCTs. Feasibility studies are usually smaller in scale and may not randomly allocate participants to conditions.

Why do we do feasibility studies?

- The purpose of a feasibility study is to test whether an intense intervention **could** and **should** (due to cost and ethics concerns) be implemented in a larger-scale rigorous evaluation.

Study design



We created **a series of bi-weekly behaviourally-informed emails**, sent to all 123 consenting students for **7 weeks**. The full bank of swaps and message content is available [here](#).

123 students



Treatment group

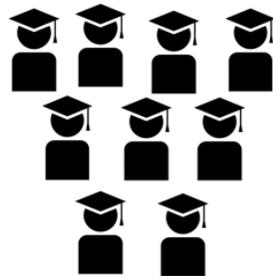
Monday Message



Wednesday Message



937 students



Comparison group

No messages



Research questions



- 1. Implementation:** Can the system of personalised messages be practically implemented? (i.e. could we realistically scale the intervention?)
- 2. Acceptability and adherence:** Are the swaps *acceptable* to students i.e. do they follow them and give positive feedback on them?
- 3. Intervention components:** What kind of swaps/messaging is most effective?
- 4. Limited efficacy testing:** Can we see indicative evidence of improvement in the aims of reducing sweet treats and sugar purchased?

Findings: 1. Implementation



Can the system of personalised messages be practically implemented? (i.e. could we realistically scale the intervention?)

- **Resourcing:** Building the message bank was resource intensive. For this to be scaled, a more automated system would need to be in place.
- **Accuracy of the purchasing data:** Although not an issue in this study, if this intervention were to be scaled, all participating schools would need to have access to accurate student purchasing data.
- **Low uptake:** Only 123 parents consented for their child to participate.



Findings: 2. Acceptability and adherence

Are the swaps *acceptable* to students, i.e. do they follow them and give positive feedback on them?

- **Acceptability:** Only 123 parents consented for their child to participate. This may indicate low acceptability of the intervention. However, among participating students, feedback was generally positive in terms of the sentiment towards both swaps and receiving feedback on purchasing history. Parents were more likely to sign up if their children were younger, ate more sweet treats prior to the study commencing and if their children were not eligible for free school meals.
- **Adherence:** We were not able to track email opening rates, so it is unclear if and how regularly students were opening the emails, so many students may not have received the intervention.

Findings: 3. Intervention components



What kind of swaps/messaging is most effective?

- **Message efficacy:** Due to the small sample in the treatment group, we cannot make firm conclusions on which messages or swaps produced better results.
- **Message content:** Students gave positive feedback about message content. Some students we spoke to indicated a desire for more specific nutritional information; *“Maybe if you said how much sugar was in them that would be good, maybe not in grams, maybe in like sugar cubes.”* Students we surveyed also expressed a slight preference for the swaps over the feedback.

Findings: 4. Limited efficacy testing



In the limited efficacy testing we sought to determine whether there is indicative evidence of improvements on the outcome measures of interest.

These were specified in advance of the evaluation and were:

- The number of 'sweet treat' items purchased in the post-treatment period per child.
- The amount of sugar in all purchased items in the post-treatment period per child (with and without fruit).
- The amount of total calories purchased in the post-treatment period per child (this is an outcome which we do not want to decrease necessarily, but do not want to increase).



Findings: 4. Limited efficacy testing

Due to the small sample size, all children whose parents provided consent for participation in the trial were assigned to the treatment group. This may lead to selection bias for several reasons, including:

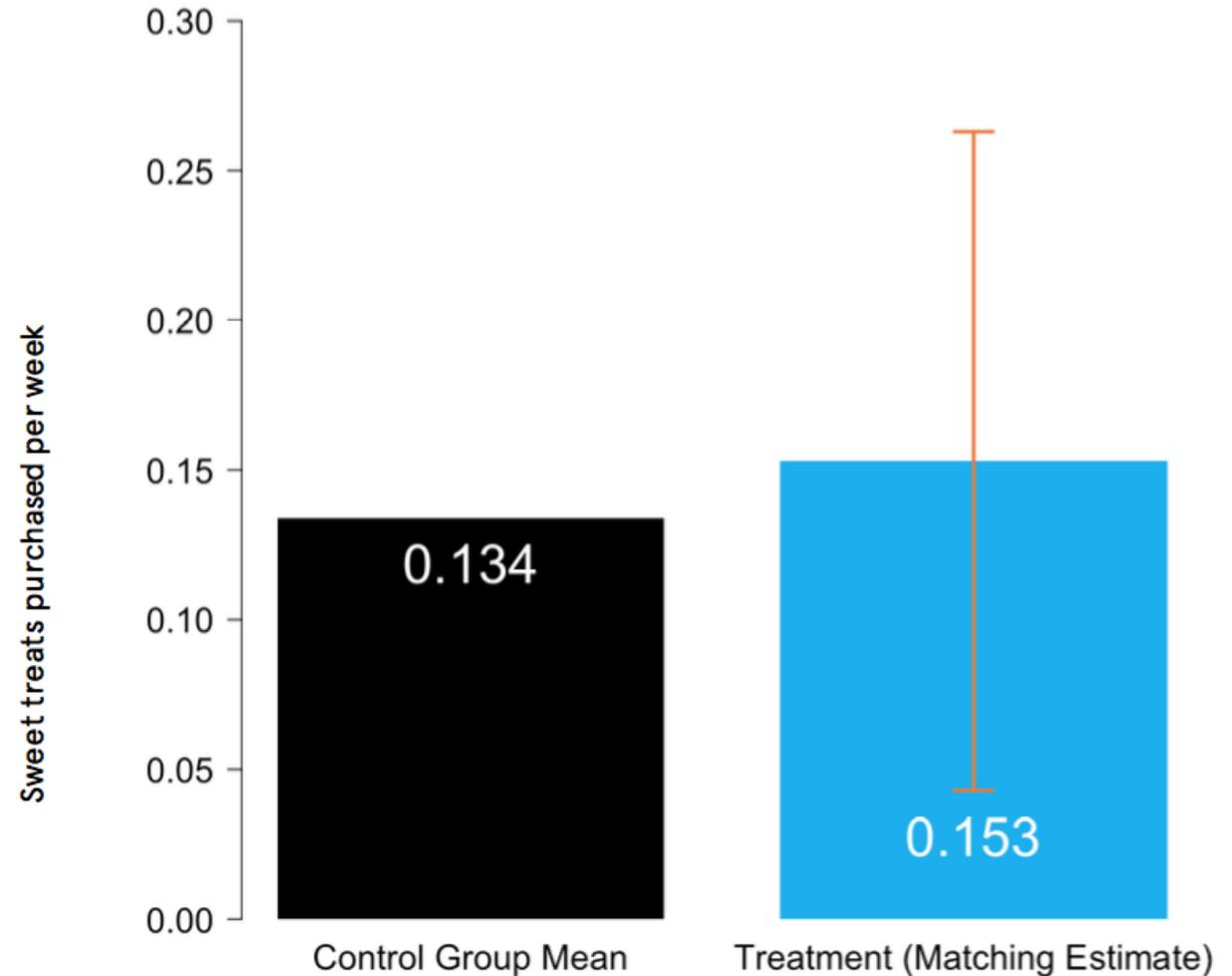
- proactive parents and children are more likely to sign the consent form and this may be correlated with dietary habits;
- parental decisions on consent may differ depending on their view of their children's dietary habits;
- children may put less effort into gaining parental consent depending on their own dietary habits.

We have done the best we can to produce a non-experimental estimate of the treatment effect of the swaps emails. We did this by trying to match participants and students in the control group for differences between them. However, because the numbers of participants and variables are low, our findings should **not** be considered causal estimates.

Findings: Sweet treats purchased



We find no statistically significant difference in the average number of sweet treats purchased per student across control and treatment groups.

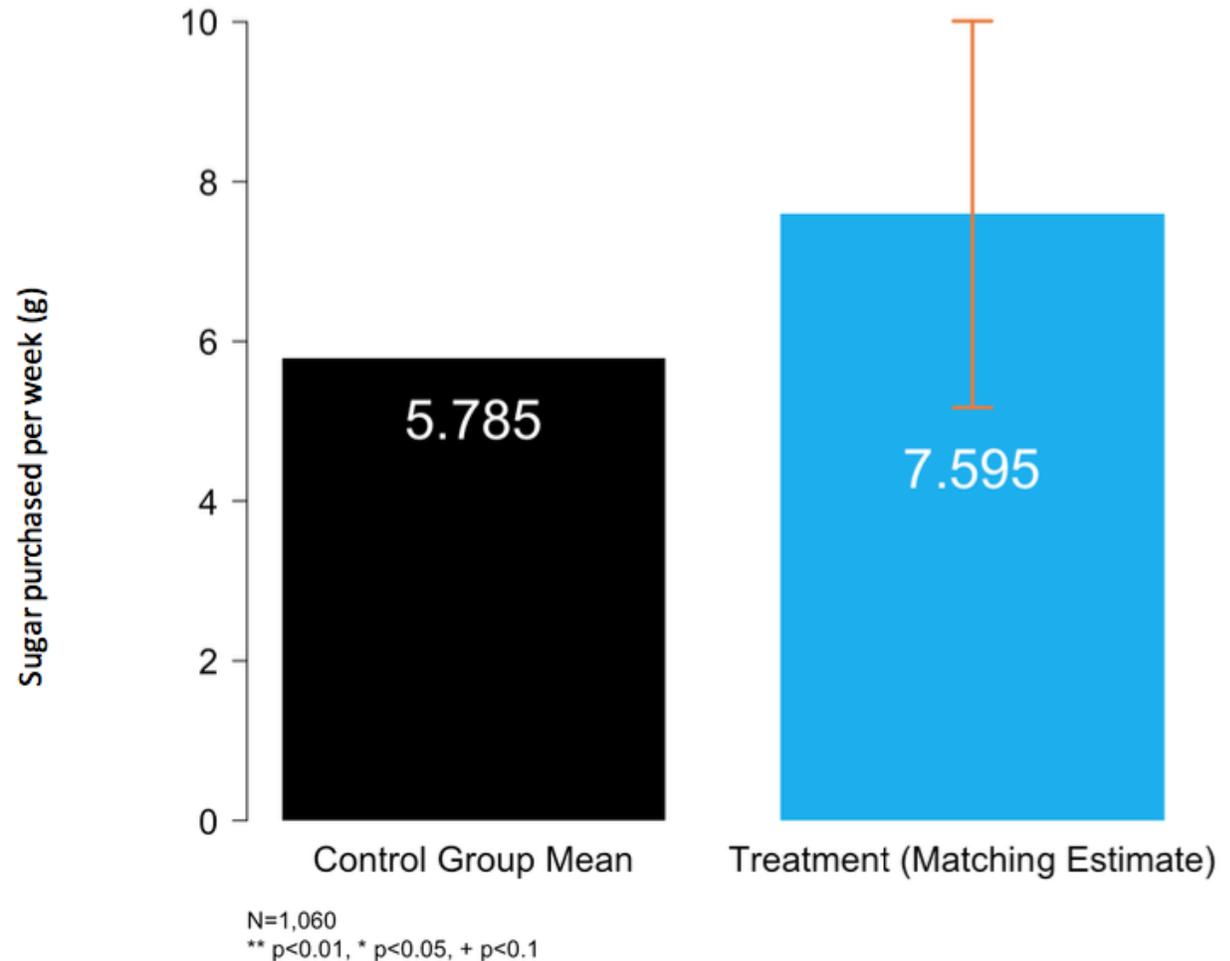


N=1,060
** p<0.01, * p<0.05, + p<0.1

Findings: Sugar purchased



There is also no statistically significant difference in the amount of sugar purchased per student between the control group and the treatment group.

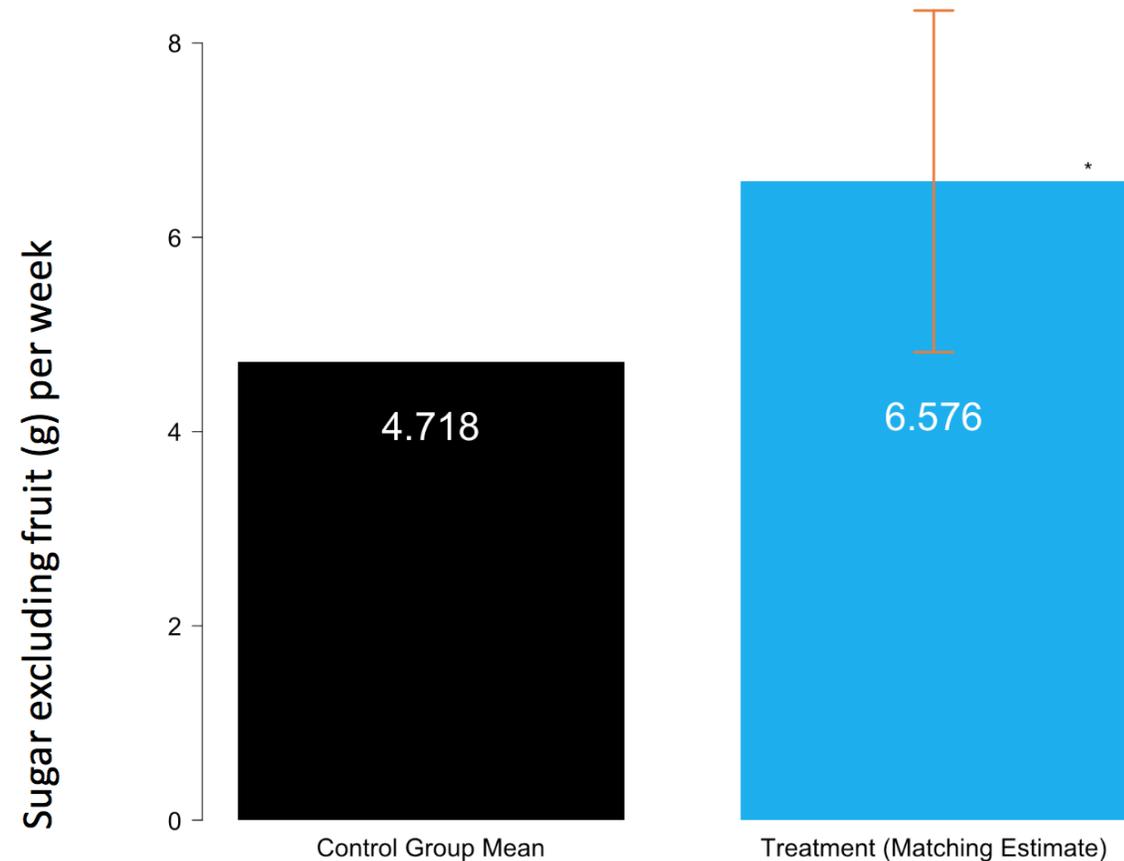


Findings: Sugar (excl. fruit)



When sugar from fruit is excluded, the amount of sugar consumed in the treatment group is slightly higher than in the control group.

As noted above, there are strong caveats about these results – they should not be considered causal estimates.



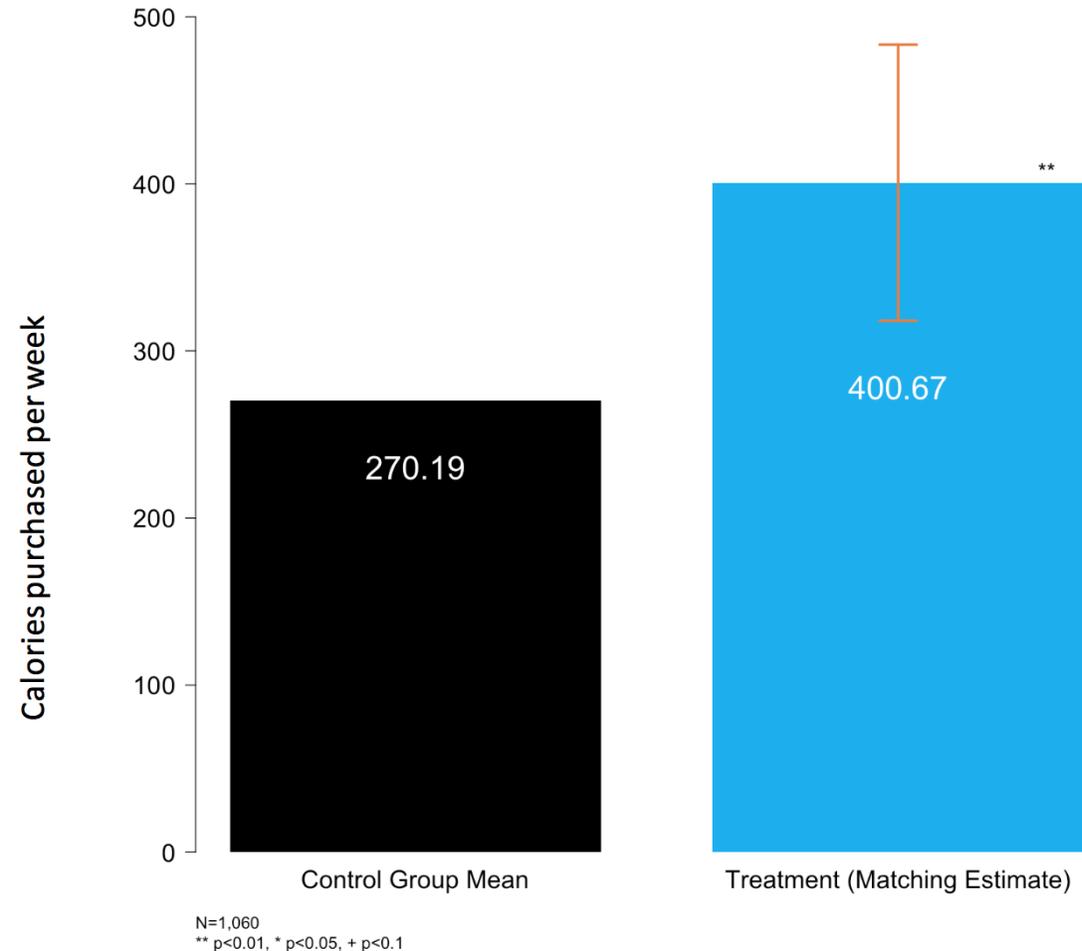
N=1,060
** p<0.01, * p<0.05, + p<0.1



Findings: Total calories purchased

The number of calories consumed in the treatment group is slightly higher than in the control group.

Again, there are strong caveats about these results – they should not be considered causal estimates.





Exploratory findings: Limited efficacy testing

- After seeing these results, we also explored whether the intervention affected the total number of items purchased by students, the number of savoury items purchased, and the number of items purchased on our healthy swaps list.
- These are **exploratory** findings because we did not pre-specify examining these outcome measures.
- **Total items:** We find that this number is higher in the treatment group (statistically significant) – our matching estimate is higher by 0.58 items per week in the treatment group compared to an average of 1.41 items in the control group.
- **Savoury items:** We find that these 0.58 items per week more in the treatment group are composed of 0.32 more savoury items per week (statistically significant), an increase in purchased healthy swaps of 0.22 (marginally significant) and an increase in other items of 0.02 (not significant).

Discussion



Based on the results from the limited efficacy testing, we think it is plausible that the intervention was **successful in encouraging students to try savoury items and the suggested swaps**, but **not successful in reducing purchases of sweet treats**.

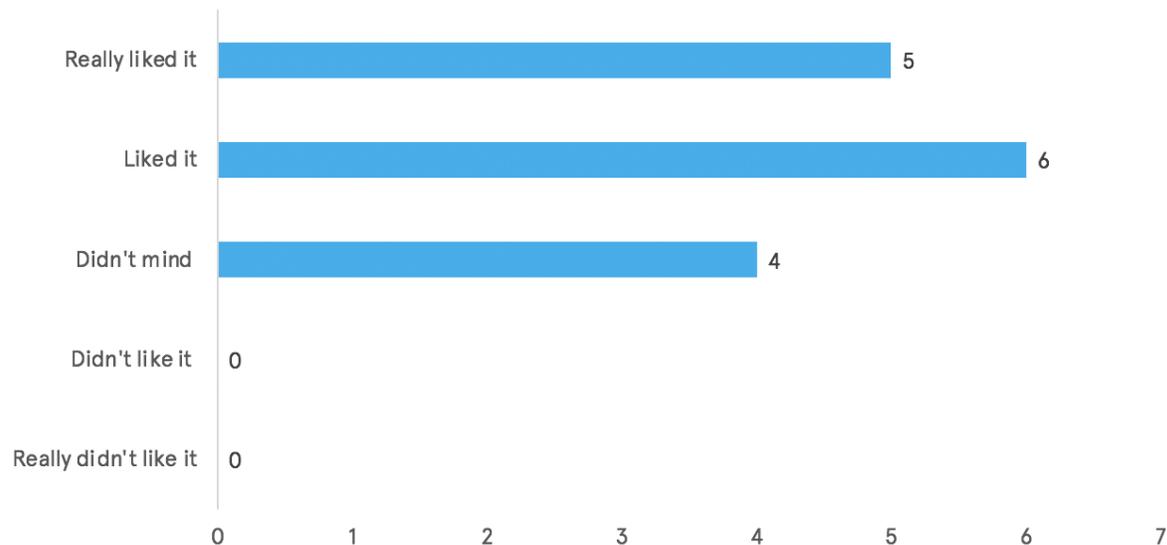
It appears that students who received the intervention made more purchases in the canteen – particularly of savoury items and swaps. This explains why we observe more calories and more sugar (excl. fruit) in the intervention group (as these items also contain some sugar). We cannot tell how this affected students' overall food consumption (as we only have data on food purchased in the canteen).

Finally, it is important to note that the differences we observe could simply be due to underlying differences between the students whose parents consented for them to participate in the study and those whose parents did not.

Qualitative student feedback



How did you feel about receiving messages that had sugar swap suggestions (e.g. 'why not trade the cookie for a Metcalfe's chocolate rice cake')? I ...



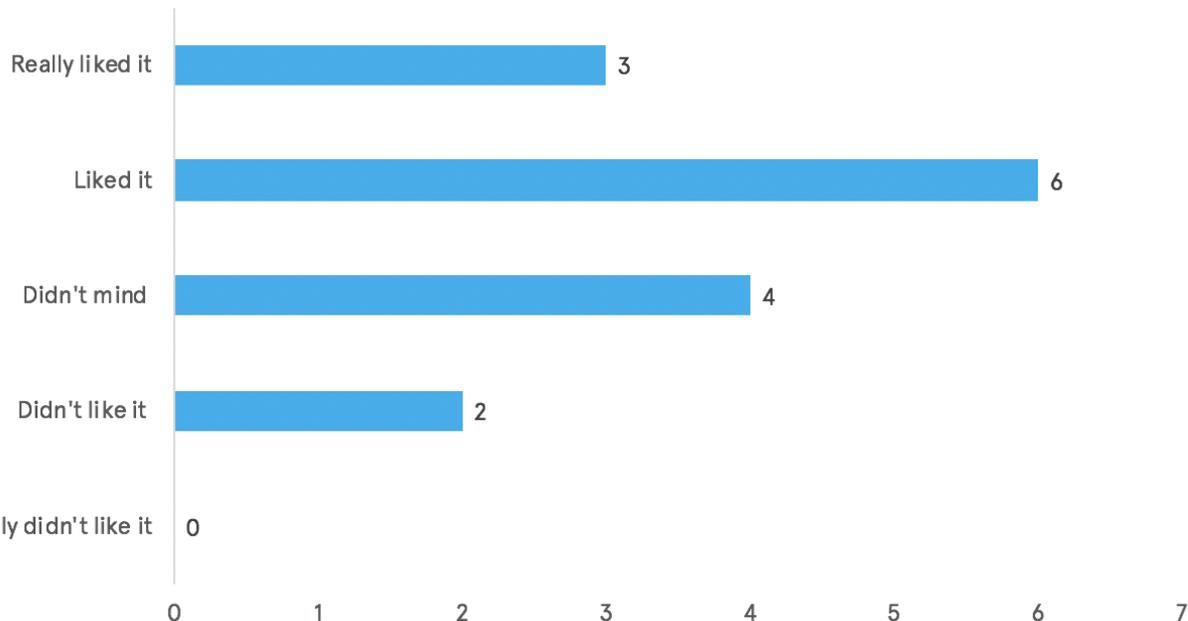
In an effort to gain a deeper understanding of students' experiences of the intervention, we asked those in receipt of messages to complete a short survey. In spite of incentivisation, only 15 students responded to our survey. It is, therefore, important to interpret the following findings with caution.

The majority of students who responded to the survey reported that they either liked or really liked receiving messages that had substitution suggestions. Four students said that they didn't mind receiving these messages and no student reported not liking these messages.

Qualitative student feedback



How did you feel about receiving messages that reminded you of what you had been buying in the canteen? I ...



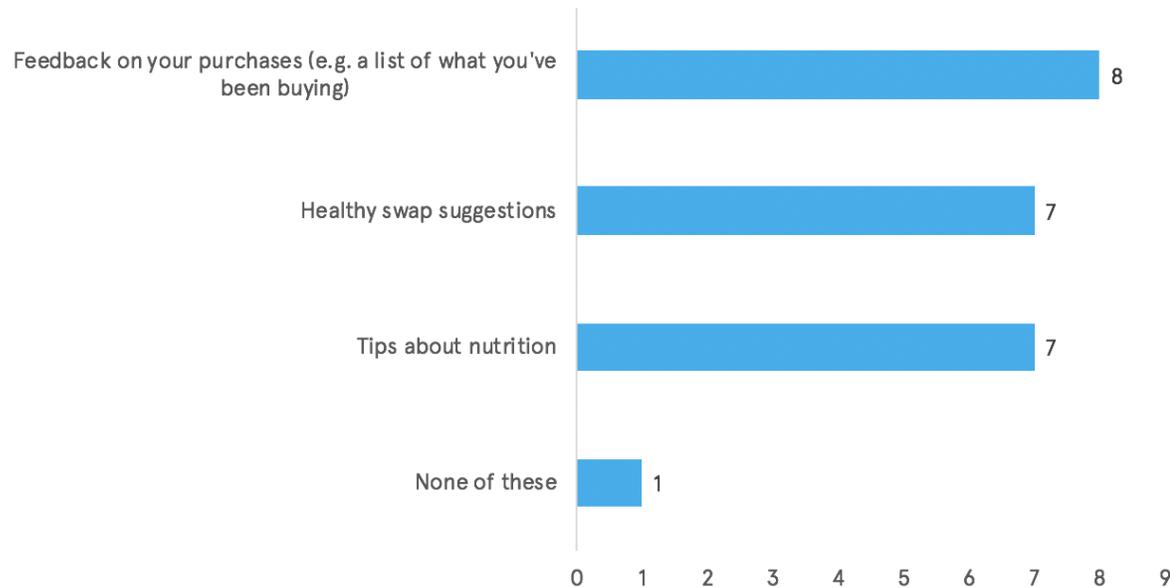
When asked about their experience of receiving weekly purchasing breakdowns, respondents generally expressed positive sentiments too.

Nine of the fifteen respondents reported that they either liked or really liked receiving messages reminding them of what they had bought in the canteen. Four students said that they didn't mind receiving these messages and two students reported that they did not like being reminded of their canteen purchases.

Qualitative student feedback



In the future, which of the following would be useful to receive? (You can tick more than one option).



When asked about the kinds of information that may be useful to receive in the future, feedback on purchases was cited eight times, followed by healthy swap suggestions and nutritional tips which were each selected seven times. Two students reported that they would find none of this information useful.

We then asked students if they would wish to continue receiving these messages next year. The majority of students were undecided about this, with eight responding 'maybe'; five students expressed a desire to continue receiving messages and two students said that they would not like to receive any more messages.

Qualitative student feedback



At the end of our survey, we asked students an open question about whether they would have changed the messages in any way or whether we could have done anything else to help them eat more healthy food in the canteen.

A few respondents mentioned a desire for more information about the price of swaps and nutritional content.

One student noted that some of the swaps were not good quality and that the standard of the food in the canteen in general could be improved. Full answers are shown in the Appendix.



“I would like it if it told me about the nutritional values of each swap and give a bit more information about each one”

Conclusions and practical takeaways from trial



Based on the results from the limited efficacy testing, we think it is likely that the intervention was successful in encouraging students to try savoury items and the suggested swaps, but not successful in reducing purchases of sweet treats. This meant that overall the intervention was associated with slightly higher levels of total calories purchased in the canteen.

Unfortunately there was low uptake for the intervention, as participation required written parental consent - only approximately 12% of eligible students participated. Future interventions should build in extra time and resource to gain parental consent, potentially seeking this at the start of the school year, or at other times where there are opportunities to interact with parents directly.

While students provided positive feedback about the general idea of the intervention, we cannot be certain that they read the messages (at the right time). It may be worth exploring whether text messages might be appropriate in some settings, as they can be delivered in a more timely way than emails.

Finally, designing and implementing the email intervention was very labour intensive, as it required weekly data transfers of purchasing data from the school. While the process of generating the email messages was semi-automated, it still required manual checking of each message. For the intervention to be scaled, a more automated system would need to be in place.



Recommendations



We think the intervention we have tested is promising, but further evidence would be needed before we would recommend implementation at scale. More broadly, we believe five kinds of interventions should be prioritized in schools' food settings:

- 1. Changing the choice architecture** around food in school. These interventions encourage healthy eating (and discourage unhealthy eating) by changing the ease and convenience of certain foods over others.
For example, this includes:
 - including prompts and labels to encourage healthy choices
 - serving healthy options before the unhealthy options are available
 - reducing the handling (or friction) costs of eating fruit and vegetables (e.g. by serving sliced fruit)
 - hiding unhealthy choices from sight while presenting healthy ones attractively.
- 2. Removing unhealthy items** from schools, particularly by replacing sugary drinks in canteens and vending machines with tap water options.
- 3. Banning unhealthy items in lunchboxes:** extending the impact of removing items from schools by including packed lunches.
- 4. Preordering:** asking children to pre-order their lunches can lead to healthier choices, as they are less swayed by present bias in their food choices.
- 5. Testing incentive schemes** to discourage unhealthy eating. This appears particularly effective among older primary school children.



Appendix - full answers to open survey questions

- “Given complements on what good food we have eaten”
- “Maybe given some reviews from people who have tried this or the food”
- “Please encourage schools to provide healthier food and nice food! Some swaps I was recommended were just not good quality (but I do understand that schools are on a very tight budget)”
- “Talked about the price of the other options”
- “Maybe explain how much energy is in a snack and why sugar isn’t good”
- “Other than the error no” [student had received email with incorrect purchasing data]
- “Overall the emails it was fine”
- “Maybe give daily updates”
- “The messages are perfect as they are”
- “Have more veggie/vegan food!”

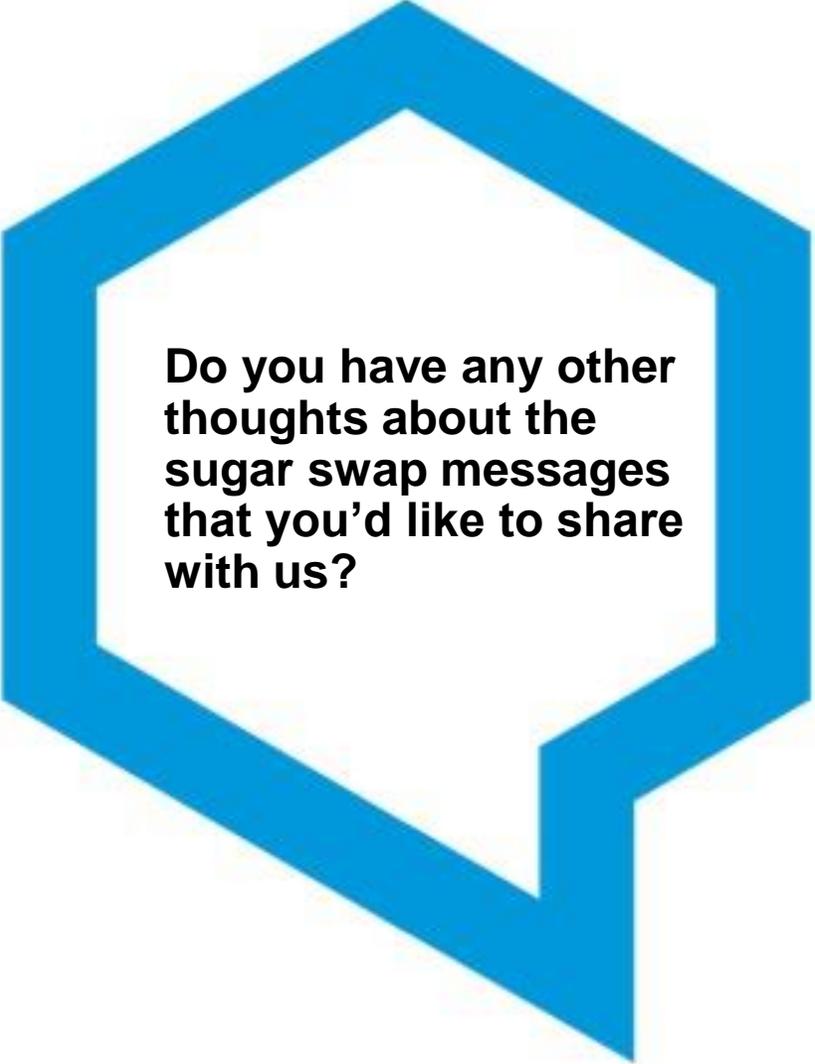


Could we have changed the messages in any way or done anything else to help you eat more healthy food in the canteen?



Appendix - full answers to open survey questions

- “I think that its [sic] a very good idea and should be encouraged by school for all students. Maybe to improve it I would of [sic] liked to be able to message directly sugar swaps, for example: I try a swap and then I can tell you if I liked it because I ended up getting the same recommendations – but that’s a small thing! Overall I think it was very good”
- “Give a option of a healthy brand instead of one type of food”
- “There was an error where it gave me a suggestion to try the thing it was swapping”
- “I would like it if it told me about the nutritional values of each swap and give a bit more information about each one”
- “Give more detail on the nutritional impact on swapping the foods”
- “If there’s a swap I could make I would like to know the price of it”
- “It was really useful”



Do you have any other thoughts about the sugar swap messages that you’d like to share with us?