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Nudging food choice in a prison setting: an investigation using food choice data

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Abstract

Background: The prison population presents complex health needs and is disproportionately affected by poor health, compared to the general population. Diet has a clear role in prisoner health, and the prison food environment within which food choices are made is relatively under–researched. The aim of this study was to examine whether food choices in a women's prison changed after the introduction of a new menu design by the catering team.

Methods: The adjusted menu design incorporated an emoticon (a smiley face) placed next to designated 'Healthy Choice' foods on the menu sheets, which were used to preselect meals. Data comprised all women's ($n = 865$) food choices (more than 115,000 selections) for a period of 8 weeks (with the new menu) as well as 8 weeks prior (baseline period). The study design was a pre-post intervention study, and food selection was examined using chi-square tests and binary logistic regression models.

Results: The selection of promoted foods overall significantly increased under the new menu design (with the emoticon nudge strategy) compared to baseline; the effect size, however, was small according to the usual guidelines (21.4% compared to 20% at baseline; $\chi^2(1) = 32.6$, $p < 0.001$, $\varphi = 0.02$). Individuals were 11% more likely ($p < 0.001$) to select the promoted 'Healthy Choice' foods under the adjusted food choice architecture. A significant effect was found for lunch and evening meal – but not for desserts. A minority of individual food items that were promoted had significant positive changes in selection, and were 1.3–4 times as likely to be selected when emoticons had been introduced, compared to baseline.

Conclusions: Further research is needed to examine the potential added benefit of multiple complementary nudge strategies, and the relevance of the preselection of foods in advance of consumption.

KEYWORDS

choice architecture, food choice, food preference, nudging, prison

Key points

- Food choice changed with the introduction of an emoticon to the menu sheets in a prison.
- The emoticon was placed next to 'Healthy Choice' foods, and overall selection of these foods increased, but with a small effect size.
- Future research should investigate the introduction of further changes to the menu and the effectiveness of multiple versus single nudge strategies to promote 'Healthy Choice' foods.

INTRODUCTION

There are more than 85,000 people in prisons in the United Kingdom,[1] and the prison population presents complex health needs, with poorer physical and mental health, compared to the general population.[2] Prisons offer a potential opportunity to address health inequalities and break the cycle of disadvantage and poor health.[2] The relevance of diet to health and well-being is clear, and its role in prisoner health should not be overlooked.[3] There is a recognised need to improve diets,[4] with food specifically, playing a critical role in the health of a prison population.[5] Further, the importance of food and meals within a prison setting has been emphasised, in terms of social interaction and an event to look forward to, as well as nutrition.[6] With clear implications on the nutritional status of the prison population, an individual's food choice is of fundamental importance, and there has been limited research on the food environment within a prison setting and food choices made therein.

The provision of food in prisons can vary. Typically, a lunch may consist of a sandwich, pasta or wrap (with a portion of fruit, crisps or biscuits), whereas the evening meal may be a pie, casserole, fish or curry, with accompaniments (rice, potatoes, vegetables) and a piece of fruit or dessert.[6] Previous research has reported that food provision can emphasise convenience and high-carbohydrate foods[7–9] – while adhering to the food budgets, which are of the order of £2.12 per person per day.[10]

One study, published in 2006 and conducted with 505 women in two UK prisons, revealed perceptions around the food on offer, the lack of choice, and it being 'bland' and 'poorly cooked'.[9] This work also reported 'very poor health status' and low levels of meeting government recommendations on diet and exercise.[9] An earlier study in a men's prison in Wales found that almost two-thirds of participants ate fewer than three portions of fruit and vegetables a day.[11] Another UK study in 2009 found that only 10% of foods listed on the 'canteen' list (from which items can be purchased in prison) were fruits and vegetables.[12] More recently, an analysis of provision within a prison shop food concluded that this was not in line with dietary guidelines, with authors highlighting that excessive intake of energy, saturated fat, free sugars and sodium was likely, alongside insufficient intake of fruit and vegetables.[13]

The prison setting has been reported to be an obesogenic environment,[14] and the importance of food to weight gain and obesity in prison has been highlighted,[14] with suggestions that people in prison are generally well fed.[15] An analysis of food provision at two women's prisons revealed mean daily energy content of 12.6 MJ (3007 kcal),[8] well beyond the daily energy recommendations for women aged 19–64 years (8.4 MJ, 2000 kcal).[16] Further, meals offered to women in prison have been reported to have similar energy content to those offered to men in prison (and exceeding government recommendations for women).[17] A meta-analysis of 16 studies (9 from the United States of America, 4 from Australia, and 1 each from the United Kingdom, Japan and France) found incarceration to be associated with weight gain, particularly for women, and pointed to health promotion initiatives to address unhealthy weight gain.[18] More pronounced weight gain specifically for women is also reflected in other research studies.[19] Moreover, a small American study[20] found that women purchased supplementary food from the prison commissary (prison store selling a range of items including food and snacks) with energy content of more than 4.1 MJ (1000 kcal) per day. With women making up less than 5% of the prison population,[21] they may be disproportionately affected by the food environment and particularly vulnerable to weight gain, with the provision of a consistent positive energy balance coupled with a fairly sedentary lifestyle. Standards, specific to women in prison, were published by Public Health England in 2018[22]; these include standards related to nutrition and diet, with the intention that these be implemented to improve health and well-being. Pre-existing guidance from the National Offender Management Service on catering in prisons refers to 'wholesome, nutritious' food of 'sufficient quantity'.[23]

An analysis of the food provision and dietary intakes of 159 young adult men in a young offenders' institution in 1996–1997 concluded that although the food provided generally met recommendations, there was a wide variation in dietary intakes (including excessive fat intake and low intake of vitamin D and of a number of minerals [particularly selenium] for proportions of the population), which was attributed to food choices made by the young men.[24] Poor dietary choices have been reported as a barrier to healthy eating[17] and influencing weight gain in prison.[25] This, together with the need for health interventions in at-risk populations, underscores the relevance of the prison food environment, and efforts to ensure that food choice is beneficial to the needs of the population.[26] Evidence also points to women taking the opportunity in prison to focus on food as part of recovery and rehabilitation; one US study reported some women in prison deliberately making healthy food choices,[27] and another study involving women in prison in Portugal reported the importance of food and how changing eating habits can be a high point of recovery.[28]

Choice architecture,[29] that is, how choices are framed and how this influences subsequent decisions, is established. Food choice architecture specifically relates to aspects of a food choice, and how, for example, the relative availability, accessibility and presentation of different food options may impact individuals' food selections.[30,31] According to nudge theory,[29] small changes to the choice architecture can shift choices made, and these adjustments, nudge strategies, can aim to steer food choice towards a specific food. In doing so, nudge strategies can intend to reduce the effort and cognitive load for the specific food option, increase its

salience and emphasise social norms and tastiness of the food option.[30] Choice architecture interventions to change food selections have been reviewed,[30,32] with previous research conducted in a number of settings, including schools[33–35] and workplaces.[36]

Food provision and food choice within prisons are important beyond the general significance attributed to diet. Compared to other institutional real-world settings, such as workplaces and hospitals, prisons provide a greater proportion of daily food for individuals, and potentially on a more long-term basis. The prison food environment offers a unique opportunity to examine the food choice of a community with uniquely restricted food choice. This also means that there is greater scope and potential impact for positive shifts in food choice behaviour. Given the acknowledged importance of food choice and the need for further research within a prison setting, this study examined food choice in a prison, including the impact of a change to the menu design.

METHODS

Food choice in a prison setting

The setting for this study was a closed category women's prison in the United Kingdom. The prison operated a 4-week menu cycle, and for every lunch and evening meal there were five options to choose from – with the exception of Saturday and Sunday lunches, which were limited to three and four options, respectively. For weekday lunches and weekend evening meals, options chiefly comprised salads, sandwiches and instant noodles; weekday evening meals and weekend lunches were more varied and included, for example, curries, stews, pies and pasta (Table 1). With every weekday evening meal and weekend lunch, two dessert options were offered, that is, a piece of fruit or a low-fat yoghurt and one other option. Meals were prepared daily in the onsite central kitchen, before being distributed to in-wing serveries, where they were served to the wings' residents. A paper-based preselect menu system to choose options was used, and there were 84 choices to be made per menu cycle, that is, 4 weeks × 7 days × 3 daily choices (one for each meal occasion, i.e., lunch, evening meal, dessert). Paper menus were distributed to the wings, and women circled their choices for one menu cycle in advance, that is, four weeks of food choices all at once. The paper menu cycles with the choices were collected by catering staff, and all choices were collated into a spreadsheet.

New menu design

A change to the menu design was introduced by the prison catering team to promote the selection of specific

TABLE 1 Food items typically available on the 4-week menu cycle used in the prison.

Availability	Food type	Examples of food items
Weekday lunches and weekend evening meals	Sandwiches, wraps and baguettes	Sliced chicken sandwich, salad sandwich, tuna and cucumber wrap, cheese and onion baguette
	Salads	Egg salad, couscous salad, sardine salad, corned beef salad, beetroot and tomato salad
	Stotties (soft round bread)	Cream cheese and salad stottie, ham and tomato stottie, BLT stottie, peanut butter stottie, seafood stottie
	Noodles	Tomato noodles, chicken noodles, curry-flavoured noodles
Weekday evening meals and weekend lunches	Pasta-based meals	Pasta bolognaise, lasagne
	Traditional meals	Roast beef and Yorkshire pudding, battered fish, halal roast chicken leg, jerk chicken leg, cottage pie
	Pasty or pastry-based meals	Steak slice, lamb pasty, vegetable curry pasty, chicken and mushroom pie, cheese and mushroom quiche
	Stew or sauce-based meals	Beef in black bean sauce, halal lamb stew and dumplings, chicken casserole, halal beef chili, Thai green vegetable curry, vegetable madras
	Fast food−style meals	Chicken nuggets, vegetable pizza, chicken burger in a bun
Desserts[a]	Cake	Carrot cake, chocolate cake
	Traditional desserts	Apple crumble and custard, rice pudding, semolina
	Fruit	Piece of fruit
	Yoghurt and mousse	Low-fat yoghurt, Angel Delight

Abbreviation: BLT, bacon, lettuce, tomato.

[a]Offered alongside weekday evening meals and weekend lunches.

menu items. The change was small – the introduction of a smiley face (an emoticon) to the menu sheets. The emoticons were placed within a column next to the food options to be promoted – with notation towards the top of the menu sheet referring to the emoticon as denoting a 'Healthy Choice'. Figure 1 shows extracts from the menu sheet before and after the change. To avoid confusion, a fruit and vegetable image previously used on the menu sheets was removed (e.g., as shown with the 'Vegetable Samosa' in Figure 1 panel A, but not in panel B). All other aspects of the menu design remained unchanged, and, likewise, there were no changes to the foods offered or the selection process.

The menu options that were promoted included options across the lunches, evening meals and desserts; this had been based on the recipes for items, and consideration of the levels of fat, saturated fat, total sugars and salt against criteria for the front-of-pack UK nutrition labelling system.[37] In this way, foods had been allocated as low (green), medium (amber) or high (red) for fat, saturated fat, total sugars and salt, thereby classifying them based on their nutritional quality.[38] For each lunch, evening meal and dessert across the 4-week menu cycle, options that had the most favourable profile were promoted with the menu change. When two options had the same overall profile, then both menu options were designated to be promoted, and this occurred on 9 out of 84 meal occasions (lunch, evening meal, dessert) of the full menu cycle.

Across the 4-week menu cycle, a total of 93 menu options (32 lunch options, 33 evening meal options and 28 dessert options) out of a possible 324 were promoted with the emoticon. As some foods were repeated during a menu cycle, the 93 menu options corresponded to only 44 different foods across the 4-week menu cycle; for example, vegetable brunch was promoted on four meal occasions across the 4-week menu cycle. As menu options to be promoted depended upon what other foods were offered at the same time, a few foods were not consistently promoted across the menu cycle (but only when they were the most nutritionally favourable for that lunch, evening meal or dessert).

Food choice data and statistical analysis

The dataset was compiled from anonymous food choice data and comprised all individual choices made during the period. Overall, the final dataset related to 16 consecutive weeks, that is, 8 weeks prior to, and 8 weeks subsequent to, the introduction of the change to the menu. This period comprised two runs of the 4-week menu cycle when the original menu format was in use and two runs when individuals preselected food options using menu sheets amended with the emoticons. The choices of any women receiving food exclusive of the standard menu cycle, for example, following a vegan diet, were not included in the sample data. The dataset, once compiled, was cleaned and checked for missing values or inconsistencies, and a randomly selected 5% of data were checked in detail.

To examine the overall food choice patterns, chi-square tests were conducted. Likewise, the selection of 'Healthy Choice' options that were promoted (with the emoticons) was also examined, to determine how different the patterns of selection of these were, compared to baseline. Food choice was also assessed across meal occasions. For all of these, effect sizes were used to assess the strength of the relationships. The selection of individual food items that were promoted as the 'Healthy Choice' (with the emoticons) was examined and compared to baseline (before the menu

(A)

Name		Unit		Cell Number
○		Circle your Choice		W/C
Week 4		Lunch Meal		Tea Meal
SUN	1	Vegetable Samosa	1	Cheese and pickle Baguette
	2	Halal Chicken	2	Steak slice
	3	Sliced Turkey	3	Ham cheese Sandwich
	4	Pork Pie	4	Chicken Noodles
	5		5	Beetroot and Sweetcorn Salad
	A	Chocolate Cake		
	B	Yoghurt		
MON	1	Egg Mayo Stottie	1	Spanish Potatoes
	2	Halal Chicken Mayo Wrap	2	Halal Sweet and Sour Chicken
	3	Beef and Onion Sandwich	3	Pepperoni Style Pizza
	4	Vegetable Noodles	4	Traditional Pasty
	5	Corned Beef Salad	5	Ham Salad
			A	Angel Delight
			B	Fruit
TUE	1	Cream Cheese Stottie	1	Vegetable Spring Roll
	2	Peanut Butter and Jam Stottie	2	Halal Chicken Jalfrezi
	3	Ham and Tomato Baguette	3	Braised Sausages and Onions
	4	Curry Noodles	4	Pasta Bolognaise
	5	Coleslaw Salad	5	Chicken Sweetcorn Salad
			A	Rice Pudding
			B	Yoghurt

(B)

Name			Unit		Cell Number
○			Circle your Choice		W/C
			☺ Healthy Choice		
Week 4			Lunch Meal		Tea Meal
SUN	1	☺	Vegetable Samosa	1	Cheese and pickle Baguette
	2		Halal Chicken	2	Steak slice
	3		Sliced Turkey	3	Ham cheese Sandwich
	4		Pork Pie	4	Chicken Noodles
	5			5	☺ Beetroot and Sweetcorn Salad
	A		Chocolate Cake		
	B	☺	Yoghurt		
MON	1	☺	Egg Mayo Stottie	1	☺ Spanish Potatoes
	2		Halal Chicken Mayo Wrap	2	Halal Sweet and Sour Chicken
	3		Beef and Onion Sandwich	3	Pepperoni Style Pizza
	4		Vegetable Noodles	4	Traditional Pasty
	5		Corned Beef Salad	5	Ham Salad
				A	Angel Delight
				B	☺ Fruit
TUE	1	☺	Cream Cheese Stottie	1	Vegetable Spring Roll
	2		Peanut Butter and Jam Stottie	2	☺ Halal Chicken Jalfrezi
	3		Ham and Tomato Baguette	3	Braised Sausages and Onions
	4		Curry Noodles	4	Pasta Bolognaise
	5	☺	Coleslaw Salad	5	Chicken Sweetcorn Salad
				A	Rice Pudding
				B	☺ Yoghurt

FIGURE 1 Extracts from the menu sheets used to preselect meals: (a) original menu; (b) menu following the change – with the emoticon ☺ placed next to designated menu options, and notation indicating 'Healthy Choice'.

change). Specifically, the number of food items that were selected as a percentage of all food items available on the same occasion (i.e., lunch/evening meal on that day in that menu cycle week) was evaluated; for example, the number of seafood salads selected as a percentage of all foods offered for that specific meal occasion.

Binary logistic regression models were developed to examine whether the selection of a promoted food item (or not) could be predicted based on the time period (without or with the emoticon). Further, as different foods were offered on meal occasions (lunch/evening meal on different days of each week of the menu cycle), regression analysis of food choice was also considered at the meal occasion, where baseline comprised two previous occasions (from two runs of the menu cycle at baseline) and similarly the data from when the menu change was in place related to two subsequent occasions. The analysis conducted ignores dependency in the data, and that the food choices are from some of the same women throughout; in doing this, the *p*-value estimates will be slightly smaller, and we have focused on effect sizes in the interpretation of the results. All analyses were conducted using IBM SPSS software (IBM SPSS Statistics, version 25, IBM Corp. Armonk, NY, USA). Analysis was conducted on anonymised food choice data, and ethical approval was granted through the Faculty Research Ethics Committee.

RESULTS

The food choice dataset comprised the food choices (119,404 selections) of 865 women across 16 weeks; many women would not have been resident for the full 16-week duration, and this reflects the turnover rate in the prison. Data were cleaned; 765 missing cases (0.6%) attributed to incomplete menu sheets and administrative errors were identified.

Overall food choice

Overall food choice was significantly different with the new menu design compared to the baseline period, $\chi^2(323) = 791.56$, $p < 0.001$; however, according to the usual guidelines,[39] the effect size was small, $\varphi_c = 0.08$. Food choice (selection of promoted 'Healthy Choice' and non-promoted food items) after the emoticons were introduced and for the equivalent food items during baseline is shown in Figure 2. When considering all items that were promoted with the emoticons, their selection rose significantly compared to the baseline period (21.4% compared to 20% at baseline) $\chi^2(1) = 32.6$, $p < 0.001$, with a small effect size $\varphi = 0.02$. For lunch and evening meals specifically, an increase in the selection of promoted meals was also evident (lunch, $\chi^2(1) = 17.93$, $p < 0.001$, $\varphi = 0.02$; evening meal ($\chi^2(1) = 31.99$, $p < 0.001$, $\varphi = 0.03$). Desserts

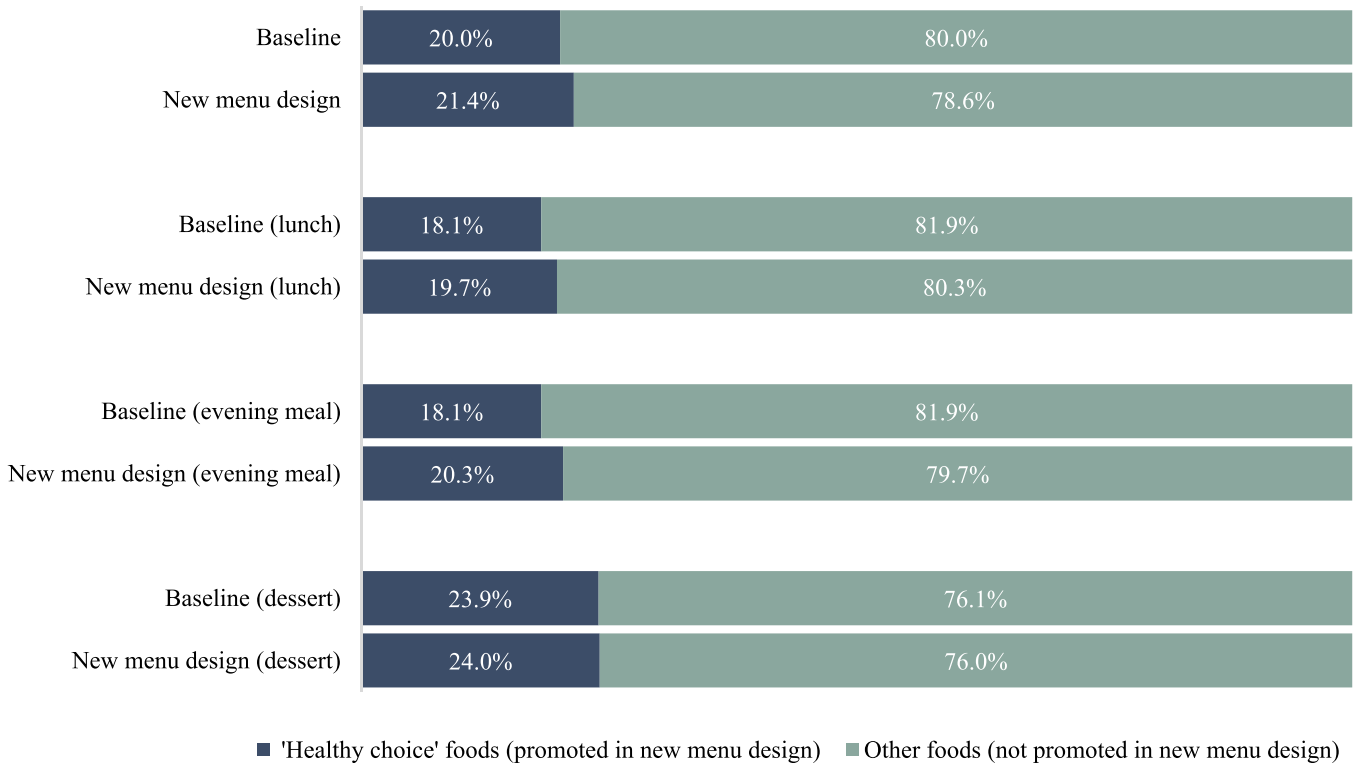

FIGURE 2 The selection of 'Healthy Choice' and other food items (not promoted in the new menu design), during baseline and with the new menu design (where 'Healthy Choice' food items were promoted), provided as percentages of foods selected (all meals: $n = 118,639$; lunch: $n = 39,588$; evening meal: $n = 39,590$; dessert: $n = 39,461$).

yielded a non-significant result ($\chi^2(1) = 0.07$, $p = 0.80$, $\varphi = 0.001$).

Selection of individual promoted food items

The number of individual food items (promoted) that were selected as a percentage of all food items selected for that meal occasion was also considered. Selection (compared to baseline) for 45 out of 65 promoted food items (for lunch or evening meal) increased (range of increases observed: 0.1%–15.0%), with two unchanged, and the remaining 18 items declining (range of decreases observed: 0.1%–4% decline). There were significant increases in individual food items (promoted) for only nine meal occasions, the most notable being for tuna and cucumber wrap (15.0% increase, $\varphi = 0.16$), vegetable madras (8.0% increase, $\varphi = 0.09$) and turkey salad (10.3% increase, $\varphi = 0.18$). Selection of one promoted food item, beetroot and tomato salad, significantly decreased (4.0%, $\varphi = 0.07$). Selection of promoted dessert items (yoghurt or fruit depending upon which was on offer) did not significantly change, except on 2 out of the 28 occasions (once for fruit 7.8% increase, $\varphi = 0.09$; once for yoghurt 8.1% decrease, $\varphi = 0.08$).

Independent effect of the new menu design

Binary logistic regression models were used to examine the independent effect of the new menu design on the selection of the promoted food items (Table 2). Controlling for prison wing, day of the week, serving temperature (i.e., hot/cold dish) and meal, the 'Healthy Choice' promoted foods were 11% more likely ($p < 0.001$) to be selected with emoticons than during the baseline period. When considering across meals, similar results were obtained for lunch meals (odds ratio [OR] = 1.13; confidence interval [CI] = 1.07–1.19) and evening meals (OR = 1.15; CI = 1.09–1.21). For desserts, however, non-significant results were observed overall (OR = 1.04; CI = 0.99–1.09).

Additional models across meal occasion (i.e., lunch, evening meal, dessert) investigated the effect of the new menu on the selection of the individual 'Healthy Choice' food items (promoted with emoticons). Effects were observed for 9 out of 56 lunch/evening meal occasions; all but one (beetroot and tomato salad) were a positive shift, with individuals up to four times as likely to select the foods when they were promoted with the emoticon. The largest effect, observed with turkey salad, indicated women were almost four times as likely to select this when it was promoted, compared to baseline. Interestingly, for

TABLE 2 Overall independent effect of time (new menu design, compared to baseline) on the selection of foods (for all promoted foods and meal occasions; for lunch/evening meal occasions with significant changes).

	n	OR	95% CI	*p*	Nagelkerke R^2
For all promoted foods and meal occasions					
'Healthy Choice' promoted foods	118,639	1.11	1.07–1.14	<0.001	0.12
'Healthy Choice' promoted lunch meals	39,588	1.13	1.07–1.19	<0.001	0.08
'Healthy Choice' promoted evening meals	39,590	1.15	1.09–1.21	<0.001	0.11
'Healthy Choice' promoted desserts	39,461	1.04	0.99–1.09	0.147	0.17
For lunch/evening meal occasions with significant changes					
Noodle salad	1355	1.97	1.14–3.42	<0.05	0.09
Turkey salad	1357	3.98	2.52–6.27	<0.001	0.08
Vegetable madras	1455	1.51	1.19–1.92	<0.001	0.04
Battered fish[a]	1450	1.24	1.00–1.54	0.05	0.02
Egg mayo sandwich	1462	1.38	1.06–1.81	<0.05	0.03
Sliced beef	1258	1.77	1.16–2.69	<0.01	0.03
Tuna and cucumber wrap	1356	2.03	1.60–2.56	<0.001	0.07
Beetroot and tomato salad	1452	0.57	0.38–0.85	<0.01	0.10
Vegetable brunch	1450	1.30	1.02–1.67	<0.05	0.04
Egg mayo stottie	1405	1.28	1.01–1.61	<0.05	0.03

Note: Adjusted for prison wing (all), day of the week (promoted foods, lunch meals, evening meals and desserts), serving temperature (promoted foods, lunch meals, evening meals) and meal (promoted foods). All selections are considered within relevant meals/meal occasions and are relative to baseline.

Abbreviations: 95% CI: 95% confidence interval; OR, odds ratio.

[a]For battered fish, $p = 0.053$.

its other appearance on the menu, when promoted alongside another 'Healthy Choice' item, non-significant results were observed.

While the tuna and cucumber wrap was twice as likely to be selected when promoted (compared to baseline), a non-significant result was obtained for it (elsewhere on the menu cycle) when it was not promoted (as another food option available on the same meal occasion had a more favourable nutritional profile). Similar results were obtained for the egg mayo sandwich, that is, while it appeared twice on the menu cycle, women were more likely to choose it compared to baseline, only when it was promoted on the menu with the emoticon. Likewise, the same was observed with the egg mayo stottie. Battered fish was available on four occasions during the menu cycle but promoted only once. On this occasion, women were more likely to select battered fish ($p = 0.053$; OR = 1.24; CI = 1.00–1.54). On another (non-promoted) occasion (when competing with turkey salad that was promoted), women were significantly ($p < 0.001$) less likely (OR = 0.64; CI = 0.52–0.80) to select it, compared to at baseline.

Women were significantly more likely to select fruit on only 3 out of 12 occasions that fruit was promoted (OR 1.71, 95% CI 1.10–2.68; OR 1.51, 95% CI 1.08–2.12; OR 1.54, 95% CI 1.20–1.98). Likewise, yoghurt yielded non-significant results apart from one occasion when women were less likely to choose yoghurt (OR 0.72, 95% CI 0.58–0.89).

DISCUSSION

This study examined the effect of a simple change to the menu sheets within a prison setting. An emoticon, a smiley face, indicating a 'Healthy Choice' was used to promote specific food options. For the overall selection of foods that were promoted, a significant increase in their selection was evident. An individual was 11% more likely to select the promoted 'Healthy Choice' foods than at baseline. Furthermore, findings revealed small but significant increases in the selection of promoted meal options for lunches and evening meals, but not for desserts. When considering the promoted foods individually, significant effects were observed only in a minority of cases (all but one comprised a positive shift towards the promoted food items) – with the most substantial effects indicating the selection of promoted foods were almost four times as likely as at baseline.

In this study, the addition of the smiley face acted as a nudge strategy. The concept of nudge and choice architecture, that is, the framing of choices and its influence on subsequent decisions,[29] is established, and in accordance with nudge theory, individuals' choices may be shifted by making small adjustments. In this case, the food choice architecture (encompassing how a food choice is framed, and how this influences an individual's food selections[30,31]) was changed with the addition of the emoticon. The use of icons or symbols (semiotics) has been previously examined as a nudge strategy and can affect salience to promote the selection of specific options, especially where there are several options to choose from and consumers use heuristics. Evidence points to the advantage of subtle (vs. explicit) messaging,[40] for example, a logo potentially accessing automatic processing (vs. more deliberative processing). Previous work has examined heart symbols,[40–43] and emoticons have also been assessed in previous food choice environments, including schools[31,44] and hospitals.[45]

In this study, the overall food choice shifted towards promoted foods; however, the effect sizes were typically quite small, and only a minority of individual food items had significant changes in selection. Evidence relating to nudging interventions points to a range of effect sizes, and one meta-analysis yielded a standardised mean difference of 0.23 indicating a small effect, with a sixfold increase in effectiveness between a typical nudge study and the best scenario, largely due to the type of nudge implemented.[32]

This study utilised emoticons in isolation, and it is not known whether combining emoticons with other nudge strategies would have provided a larger effect. Previous studies utilising multiple nudges (including the addition of semiotics, such as smileys, icons and logos) have shown these to shift food choice.[31,46,47] Indeed, evidence points to the potential utility of multiple strategies,[48] and further research is needed to this end.[30] Specifically, providing an enhanced description as well as adjusting the order of the options on the menu sheets should be considered; both have been shown to influence food choice behaviour.[49–51] The new menu in this study promoted specific menu options, with the smiley face emoticon and the green colour likely to be well understood and associated with 'healthiness'. Further work to understand the effect of demoting other menu options is needed. Previous research has indicated consumers' avoidance of 'red traffic lights',[52] and a more substantial demoting effect for red stickers denoting 'unhealthy' than for a promoting effect of green stickers denoting 'healthy'.[53] It is unknown if changes in the selections made by individuals endured (with the emoticons removed), and further research to explore the sustainability of effects is recommended. Likewise, the extent to which individuals may have noticed the emoticons, and how these were interpreted, is unknown; gaining insights into these important aspects, after similar future interventions would be valuable.

It is interesting to note that in this study, no effect was observed for desserts. The reason for this is unclear and may be related in some way to the following possible factors. First, dessert choice every day was limited to only two options. Second, promoted desserts were repeated multiple times across the menu cycle. Third,

fruit or yoghurt as the promoted dessert was competing with options typically considered more indulgent and desirable, for example, gateau, carrot cake, and apple crumble with custard. Some evidence shows that consumers may make more indulgent food choices when a healthy option is provided in the choice set, compared to when it is not.[54] Furthermore, the sustained selection of the more indulgent desserts may be related to comfort eating, suggested to be associated with the stressful experience of imprisonment.[14,55] Previous work has also discussed how women in prison seek solace in 'bad' or 'unhealthy' foods, and how indulgence in such foods has an 'anti-authority' association, driven by a desire to exercise remaining liberties.[55] Finally, individuals' compensatory behaviour may have been at play, that is, 'rewarding' the selection of a 'Healthy Choice' main meal, thereby limiting the number of 'Healthy Choice' desserts selected. Compensatory behaviour has been observed in previous research,[45] which cautioned that the selection of a 'healthy' item may trigger compensatory behaviour in consumers, resulting in the selection of another 'unhealthy' item.

In this study, the nudge strategy (a smiley emoticon added to the menu sheet) was particularly suited to the menu-centric food choice architecture within a prison setting. The change introduced to indicate 'Healthy Choice' options also resonates with a specific emphasis on branding meals as the 'healthy meal of the day', and the use of colour coding to 'promote healthier choices', as described in guidance for prisons.[22]

Many food decisions are largely automatic and guided by non-cognitive processing,[56] which are consistent with system 1 quick effortless processes, rather than system 2 deliberative and rational processes.[57,58] In this study, the preselect aspect, with food chosen in advance for a 4-week menu, is pertinent and different from other settings where food choice is made shortly before consumption. It may be that the prevailing choice architecture in this study supports greater emphasis on system 2 effortful and more reasoned cognitive processes,[57,58] compared to when food is selected shortly before consumption. Likewise, it is important to consider the relevance and role of temporal discounting,[59,60] and an individual's tendency to value an immediate reward more than in the future. Specifically, work to explore whether this difference (between immediate vs. future consumption) leads to more favourable choices with meal preselection in a prison setting would be valuable. Individual differences in temporal discounting are also important, and a systematic literature review pointed to high temporal discounting as a risk factor for unhealthy diets, overweight and obesity.[61]

This study's limitations should be acknowledged. Errors may have been introduced in the prison when food selections from the paper menu sheets were transferred digitally. The data relate to food choices in January through to April, and seasonality may render these different to other times. The menu options that were designated to be promoted were the most nutritionally favourable among the options offered at the same time, and therefore a few foods were not consistently promoted across the menu cycle; this may have caused some confusion and affected selections made. In considering the findings of this study, it is also relevant to note that the data examined relate to selections rather than food intake. The carceral context of this research and the deeper complexities of food and food choice in prison should also be acknowledged, with food habits likely to be characteristic to the unique food environment within a prison setting.

Research on food choice and dietary intake in prison is limited, and there is a need to understand food choice behaviour within prison settings. A particular strength of this study is that it incorporated all food choices, with the exception of any supplementary foods/snacks that may have been purchased from the 'canteen' list in the prison. Further work to explore nudge-based interventions is recommended, particularly given their typical low cost, and the potential effect at a prison population level. It is also relevant that typical changes to the choice architecture are small and do not impinge or undermine the paternalistic structure and boundaries associated with prison catering, nor alter the prison routine.

CONCLUSIONS

The importance of food within a prison setting and the health of a prison population is evident. The prison food environment provides a distinctive food setting and choice architecture. With a single menu-based nudge, the overall food choices made in the prison, shifted towards the promoted foods – but with low effect sizes. Further work is needed to examine the introduction of other changes to the paper-based preselect menu system, and the possible merit of multiple changes.

AUTHOR CONTRIBUTIONS

A. Fennessy: conceptualisation, methodology, formal analysis, writing – original draft, writing – review and editing. M. S. Homer: formal analysis, writing – review and editing. H. Ensaff: conceptualisation, methodology, formal analysis, writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

This study used third-party data, subject to restrictions, and the authors do not have permission to share.

TRANSPARENCY DECLARATION

The lead author affirms that this manuscript is an honest, accurate and transparent account of the study being reported. The lead author affirms that no important aspects of the study have been omitted and that any discrepancies from the study as planned have been explained.

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