



# Post-Secondary Food Service Manager Perspectives on Fruit and Vegetable Nudging Strategies: Qualitative Study

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## ABSTRACT

**Background:** Changing the choice architecture in post-secondary food service contexts to “nudge” customers to choose more fruits and vegetables (FV) shows promise in intervention studies to date. If such approaches are to become more widely adopted, they must be feasible and acceptable to food service managers. Among possible early adopters, managers of food services in post-secondary education institutions may have unique insights on implementation of such approaches, as they have dual mandates to support student health and maintain profitability.

**Objective:** The goal of this exploratory study was to examine current knowledge, practice, facilitators, and barriers to uptake of nudge strategies promoting FV in a sample of post-secondary food service managers.

**Methods:** A qualitative telephone interview study was undertaken with food service managers across Canada ( $n = 10$  institutions), recruited from a national professional organization. One or more representatives from each institution completed the interview. Interviews were audio-recorded, transcribed, and underwent framework descriptive and interpretative content analysis in NVivo (QSR International). Münscher's Taxonomy of Choice Architecture and the Ottawa Model for Research Use guided development and analysis.

**Results:** Managers from 9 universities and 1 technical college participated. Local context, governance, and resources varied widely. Eight of 10 institutions used some form of FV nudging as part of their marketing and health promotion, most commonly to reduce the effort associated with choosing FV. Nudging strategies aimed at increasing the range and composition of FV offerings, providing a social reference (opinion leaders) for choosing FV, and changing consequences with loyalty cards were also common. Other nudging strategies were used infrequently. Cost, operational ease of implementation, and students' privacy and choices were critical issues in adoption.

**Conclusions:** The results can inform development and testing of locally adapted nudge interventions. It is critical that managers be involved from the outset of any planned academic implementation study. *Curr Dev Nutr* 2021;5:nzab109.

**Keywords:** nudging, eating behavior, food service, foodservice, hospitality, post secondary, choice architecture, tertiary education, young adults, fruit and vegetable promotion

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Abbreviations used: CCUFSA, Canadian College and University Food Service Association; FV, fruit and vegetables; RD, registered dietitian.

## Introduction

Diet, either directly or through other factors like obesity, remains a prominent risk factor for mortality in Canada (1) and globally (2). Among possible targets for new approaches to improve population diet, several groups have been assessing the potential of marketing and health-promotion strategies to affect customer choices of foods eaten away from home (3). For such approaches to have a meaningful impact over the long term, food service operators would have to be willing to make some changes to their business models. Research is ongoing, but it is relevant to begin to consider the perspectives of food service operators as key stakeholders in any proposed changes. Eating away from home

continues to increase in Canada and elsewhere (4, 5). There is evidence from the United States, which has the most complete data on population diet over time, that food eaten in full-service and fast-food restaurants contributed ~21% of the energy intake in adults during 2003–2016 (6), an important contributor to daily intake.

The potential importance of food-choice environments to the population diet has been increasingly recognized over the past 15 y, with some groups developing evaluation tools and scales to assess selected aspects of the food environment [e.g., International Network for Food and Obesity/Non-communicable Diseases (NCDs) Research, Monitoring and Action Support (INFORMAS) program] (7) or food services (such as the Nutrition Environment Measures Surveys) (8). Another

line of work has focused on testing the potential of nudge strategies to influence consumer food choices. Nudging involves altering aspects of the choice environment where decisions are made (9, 10). Nudging refers to “any aspect of the choice architecture that alters people’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting the fruit at eye level counts as a nudge. Banning junk food does not.” (9).

Nudging shows promise for changing food-consumption behaviors of individuals. In Arno and Thomas’ (11) review of 42 general nudge studies, an average increase of 15.3% in “healthy nutritional choices” was found. Other work has demonstrated that nudging to increase fruit and vegetables (FV) intake, a frequent focus, had a moderately significant effect on increasing FV choices, with interventions that involve altering placement and combined nudges having the largest effects (12). Most empirical studies to date have been conducted in food laboratory contexts or in pilot food venues of short duration (13, 14). A few have been conducted in community, restaurant, and worksite contexts (15, 16).

Few studies have considered the perspectives of food service operators, who manage food-choice environments. Two small studies focused on specific interventions and 2 process evaluations of larger intervention studies were found. In 1 study, researchers asked 15 restaurateurs about the potential for menu redesign to make a difference to consumer choice (17). While these restaurateurs acknowledged rising customer awareness about food choices, personal health, and the environment, they were skeptical about the effectiveness of menu design to positively affect consumer choice. In another study, researchers interviewed 10 worksite canteen managers in England and Germany to explore options for providing better food-related nutrition/content information to customers (18). Digital menus were endorsed for operators with fixed menus but were considered challenging for operators with variable menus. As part of a large worksite trial comparing nutrition education and environmental changes in cafeterias, some of which would be considered nudges (16), interviews were conducted at baseline and at 7–9 mo with 27 managers and employees, as well as focus groups with research staff (19), to explore factors facilitating or impeding implementation. The 4 main themes that emerged were perceived benefits of participation, negotiation and flexibility of the implementation team, viability and intensity of the interventions, and workplace structures and cultures. Diverse specific issues within the latter 3 themes either facilitated or impeded implementation. Other researchers have also conducted key informant and focus group interviews in developing a worksite intervention but have not yet published the results, although main results of the trial have been published (15, 20). Additional work to understand food service contexts and to identify possible facilitators and barriers to uptake of nudge interventions in practice is clearly needed.

Among the different types of food services, post-secondary education environments have emerged as favored locations to test the effectiveness of nudge approaches for several reasons (21). Managers in these settings often have dual mandates to both generate income and promote student health (22), so may already have some knowledge and be receptive to trying out health-promoting new approaches. They also may be more familiar with the research enterprise and willing to work with lo-

cal researchers. Young adults, the major customers, are a key population for new population-based interventions to prevent cardiovascular and other common chronic diseases, as diet and physical activity habits exert their effects long term (23). It has also been noted that eating habits often shift to increased snacking, breakfast skipping, and decreased FV in the transition from adolescence to young adulthood (24–26).

The food-choice environment is very complex and thus a specific focus on increased FV consumption is justified by the large body of epidemiological evidence relating increased consumption to decreased mortality (27, 28). In adults, most public health agencies worldwide have recommended at least 400 g or 5 portions of FV per day (29). The majority do not meet these recommendations. In a widely distributed health survey, 87% of Canadian college and university students reported consuming <5 servings of FV per day (30), based on a single question. In the 2015–2017 Canadian Community Health Survey, ~70% of 20–34-y-olds reported eating FV <5 times/d (not servings; counting potatoes and fruit juice, but excluding fried potatoes) (31). More detailed analysis has shown FV intake to be remarkably stable over time, with some decline in fruit juice and potato consumption (32, 33). While this work is focused on the Canadian context, the need to increase FV intake among young adults is a global health issue (34).

To gain insight on food service manager perspectives in different locations, a descriptive qualitative interview study with managers from across Canada was conducted. The following research questions were addressed:

- Research question 1: How do food service operators in Canadian post-secondary institutions currently promote fruits and vegetables?
- Research question 2: Are food service operators aware of nudge interventions as a way of promoting healthy foods, especially fruits and vegetables?
- Research question 3: If familiar, what types of nudge-based interventions are used by food service operators to increase fruit and vegetable purchasing by customers?
- Research question 4: What are food service operators’ perceptions regarding the feasibility (facilitators and barriers) of using nudge interventions in food service outlets?

## Methods

### Study design

Various typologies for describing nudging interventions have been developed. Some include aspects of traditional marketing and health-promotion approaches, while others are more narrowly focused (35). For example, the Typology of Interventions in Proximal Physical Micro-Environments (TIPPE) is composed of choice architecture strategies intended to alter the microenvironments where choices are made, and consists of 3 high-order classes of nudging: the class that primarily alters properties of stimuli (i.e., ambience, functional design, labeling, presentation, and sizing), the class that primarily alters placement of stimuli (i.e., availability and proximity), and the class that alters both properties and placement of stimuli (i.e., prompting and priming) (36). Müncher and colleagues (37) proposed a more comprehensive Taxonomy of Choice Architecture, which includes both decision information and

**TABLE 1** Münscher Taxonomy of Choice Architecture<sup>1</sup>

| Category                | Technique   |
|-------------------------|---|
| A. Decision information | A1: Translate information<br>A2: Make information visible<br>A3: Provide social reference point   |
| B. Decision structure   | B1: Change choice default<br>B2: Change option-related effort<br>B3: Change range or composition of options<br>B4: Change option consequences |
| C. Decision support     | C1: Provide reminders<br>C2: Facilitate commitment  |

<sup>1</sup>Data from reference 37.

decision support, in addition to decision structure (see **Table 1**). Although no one typology has emerged as dominant, the Münscher typology was chosen for this work as a more comprehensive framework for describing the disparate strategies that have been used in experimental studies to date.

A qualitative telephone interview study with food service managers was designed, in line with the 4 previous studies with food service managers cited (15, 17–19). Ethics approval for the study was obtained from the University of Guelph Research Ethics Board (Certificate 18-05-031). This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the University of Guelph Research Ethics Board.

### Interview guide development

The semi-structured interview guide was developed from first principles, based on informal conversations with the managers at 3 local universities, a previous survey of students (38), and a series of local nudge pilot studies conducted over 2 y (39). The revised Ottawa Model for Research Use, a knowledge transfer framework that focuses on adoption of innovations, was used to organize thinking (40) (see **Supplemental File 1**). A key aspect of the model is to understand the awareness, attitudes, knowledge and skills, current practice, and concerns of potential adopters of new innovations in practice. While developed for health care, it also has application in the food service context.

In our initial conversations at the local universities, it was immediately obvious that the organization of food services, the physical resources, staff, and student preferences all differed substantially at each institution. Informants from the 3 universities also considered nudging to “fit” as part of their overall marketing/promotion of FV. The interview guide, therefore, focused first on a description of the local context and a discussion of local marketing practices, before discussion of nudging. Participants were presented with 14 specific FV nudging strategies from the literature, as previous work has found that vignettes are helpful in eliciting attitudes and beliefs (41). It was decided to avoid discussion of nutrition information on menus, as a mainly informational strategy already extensively studied (42–44). The interview guide was reviewed by the research team and pilot-tested in 1 person. The full interview guide is available in **Supplemental File 2**.

### Research participants and recruitment

The sampling frame consisted of members of the Canadian College and University Food Service Association (CCUFSA), a 40-y-old na-

tional professional association with >75 institutional members (<http://ccufsa.com/>). A manned booth was set up in the Exhibitors’ Hall at the yearly national conference in 2018, with the research team talking to conference attendees about the project. We provided a colorful postcard as a reminder and took the names and e-mail addresses of interested people. An e-mail invitation was also sent to the e-mail distribution list for the whole association, framed as focused on perspectives, opportunities, and challenges in FV marketing. Interested members from participating institutions selected 1 or 2 representatives to complete the telephone interview during work time.

### Data collection

Interviews were conducted in Fall 2018 and early 2019. Participants were sent the interview guide and consent form before the phone interview and verbal consent was recorded at the interview to minimize inconvenience to participants. Participants were given the option to receive a copy of their transcripts for confirmation of the dialogue and to ensure ideas and concepts they wanted to convey were appropriately addressed. Two participants reviewed their transcripts.

### Data management and analysis

The audio-recorded interviews were transcribed verbatim and identifying information was removed. Basic descriptive data on specific current/past activities were entered into Excel (v16.0; Microsoft Corporation). The 14 nudge strategies were categorized according to the Münscher framework (37) after the interviews, with discrepancies resolved by discussion. Commentary on current activities and interpretive thematic analysis was completed in NVivo (v12; QSR International). Two transcripts were initially coded for interpretive themes by 3 members of the research team to facilitate the development of a codebook. All transcripts were coded by both coders and reviewed by the third researcher (PB) for disciplinary use of terminology, clarity, and congruence with the quotes. The interpretive data were analyzed using a mixture of inductive and deductive approaches to identify key themes within the transcripts (45–47). Steps were taken to enhance credibility of analysis: subjects were offered the opportunity to review their transcripts and multiple coders were involved in all aspects of analysis. In thematic analysis quotes were used to back up both typical ideas, as well as divergent perspectives.

## Results

### Participants and food service organization

Of the 13 individuals who expressed interest in booking an interview, 12 participants from 10 institutions (~13% of CCUFSA members) completed a 45–90-min telephone interview. Results are reported by institution. Four of 12 individual participants were registered dietitians (RDs), 3 were executive chefs or a chef, 2 were either an executive director or assistant director, 2 were either a nutrition manager or manager of food services, and 1 was a marketing and communications coordinator. Nine institutions were universities (2 in British Columbia, 6 in Ontario, 1 in Quebec) and 1 was a technical college (Ontario). Student enrollments were estimated, with a mean of 30,000 students (range: 14,885–45,200). Seven out of 10 institutions were independently run by the post-secondary institution, one was outsourced to an

external company, and 2 institutions had a mix of independent and outsourced services, each set up differently. All had at least 1 residence dining hall (median = 3; range: 1–7) and franchises (median = 10; range: 1–19).

All 10 institutions offered a full range of food services, from residence-based dining halls to general cafeterias and snack bars for students, staff, and the public, as well as pre-purchased meal plans and pay-as-you-go options. Locations varied from urban to suburban settings and all offered a full range of hot and cold entrées and vegetable side dishes, salad bar and prepackaged salads, whole fruit and fruit cups, cut raw vegetables, and dips in containers. Nine also offered deli sandwiches with the option to customize vegetable additions and stir-fry meals with a range of vegetable ingredients. Six had dedicated vegetarian or vegan stations or options at some locations. Feedback on customer satisfaction was obtained in multiple ways, including ongoing review of sales data and direct feedback to frontline staff. Seven had formal advisory committees consisting of students and staff, and 5 had dedicated e-mail addresses for student feedback. Student surveys were also used. When asked about student health consciousness, most agreed it was very variable among students and that current fads had an influence on food services. The range of comments are exemplified by 1 quote:

“Some are very health conscious, and some are not. I think over the years I’ve seen more of an approach to wellness and healthy eating. I don’t see quite so much emphasis on weight-loss diets, although definitely paleo is big right now and the keto diet is really big right now. I think people are taking more of a holistic approach.”

The perceived demands and preferences of students relating to FV are displayed in the word cloud in [Figure 1](#).

### Current FV marketing approaches

All institutions were already promoting FV, and [Figure 2](#) shows the reported use of FV marketing techniques in the past 1–2 y, based both on responses about specific strategies, as well as the comments about additional approaches. In addition to traditional poster promotion of FV ( $n = 8$ ), discussion revealed widespread use of digital marketing strategies ( $n = 7$ ), as newsletters, Facebook, Instagram, and/or Twitter posts. Increasing choice/variety was a common strategy ( $n = 8$ ) that is commonly used in traditional food marketing and is an option in nudge frameworks (see [Table 2](#); B3—change range or composition of options). Addition of more FV to current recipes may include a marketing component and was widely used. Promotion of locally sourced produce was also common, with 1 institution developing a vertical garden. Some organizations had respected individuals who endorsed FV dishes (usually the RD) and/or offered cooking classes or recipes. One institution had an integrated healthy-eating campaign, with multiple components (48, 49). Other mentioned initiatives that may impact FV offerings are described in [Supplemental File 3](#).

### Awareness and use of nudge interventions

Seven of 10 organizations were aware of and used “nudging” approaches; 3 of these were evaluating effectiveness. After further discussion, 2 additional organizations used at least 1 nudging strategy but not the term “nudge.” The final institution was not aware of the term and did not mention using any of the 14 nudge strategies.

As shown in [Figure 3](#), there were 8 examples of strategies from the (B) decision structure category. Of these, 5 fit best under changing option-related effort (B2). Moving a salad bar close to the entrance or a central location, placing FV-rich foods in front of or closer to customers, or at a checkout counter had all been implemented to some extent by 6–8 institutions. At the other extreme, none of the institutions used an express check-out line for people buying FV-rich items/meals (B3), text messaging students about FV-rich dishes (C1), or facilitating commitment to pre-set goals (C2). This last nudge strategy would involve interested residence students earmarking a certain percentage of their meal plan deposit to FV-rich foods so that the students could overcome a temptation to eat other foods (e.g., burgers and fries) too frequently.

### Facilitators and barriers

[Table 2](#) provides a descriptive overview of the specific facilitators and barriers for each nudge strategy mentioned by 1 or more participants. For many nudges, it was not possible to assign facilitators and barriers to specific nudges, as local context and resources varied so much. The major theme categories for both barriers and facilitators noted were as follows: structural issues, operational factors, cost, time constraints, and perceived student choice and demands. These themes were often interrelated—for example, operational complexity often overlapped with managerial time constraints. There appeared to be saturation on the major facilitators and barriers associated with the major themes.

Structural issues were prominent in the discussions about making FV-rich foods more prominent in the center or entrance to the food service locations. Such changes will take several years as food services renovate various locations. Lack of overall space with other offerings was a barrier in some settings. With regard to increasing range of FV offerings, which was considered under current marketing, 1 participant highlighted ongoing constraints,

“Increasing availability or range of FV offerings . . . I think we already have a selection of them but the only thing that hinders the growth is the space available.”

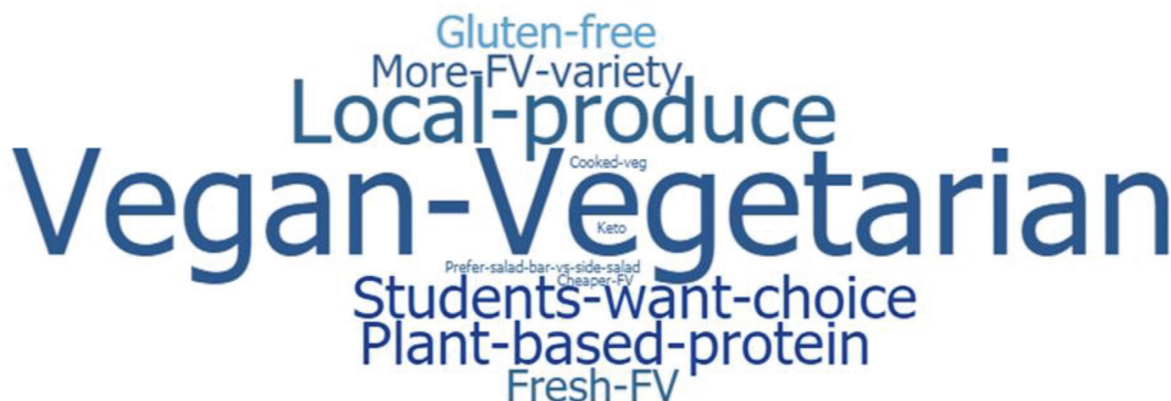
Operational factors were prominent in the discussions, specifically whether the nudge required the need for coordination, had technical and logistical requirements, and/or took significant time to set up. Nudges that could be easily implemented within the department or by only a few people were often considered easy to implement, such as moving large plates to the front of salad bars, offering loyalty cards, or promoting healthier foods on social media.

“There are a couple there. Like the bigger plates. Placing fruit and vegetable rich foods closer to customers. I think it’s a simple thing to do and negligible cost associated and easy to do from a time perspective.”

“I know we do that . . . moving the big plates to front and small to the back . . . I think that’s easy enough I think things that are easy like that to implement are important . . . and fine operationally.”

“And loyalty cards . . . Well they used to have a standard whole fruit loyalty card but expanding that program would be very easy and interesting to do.”

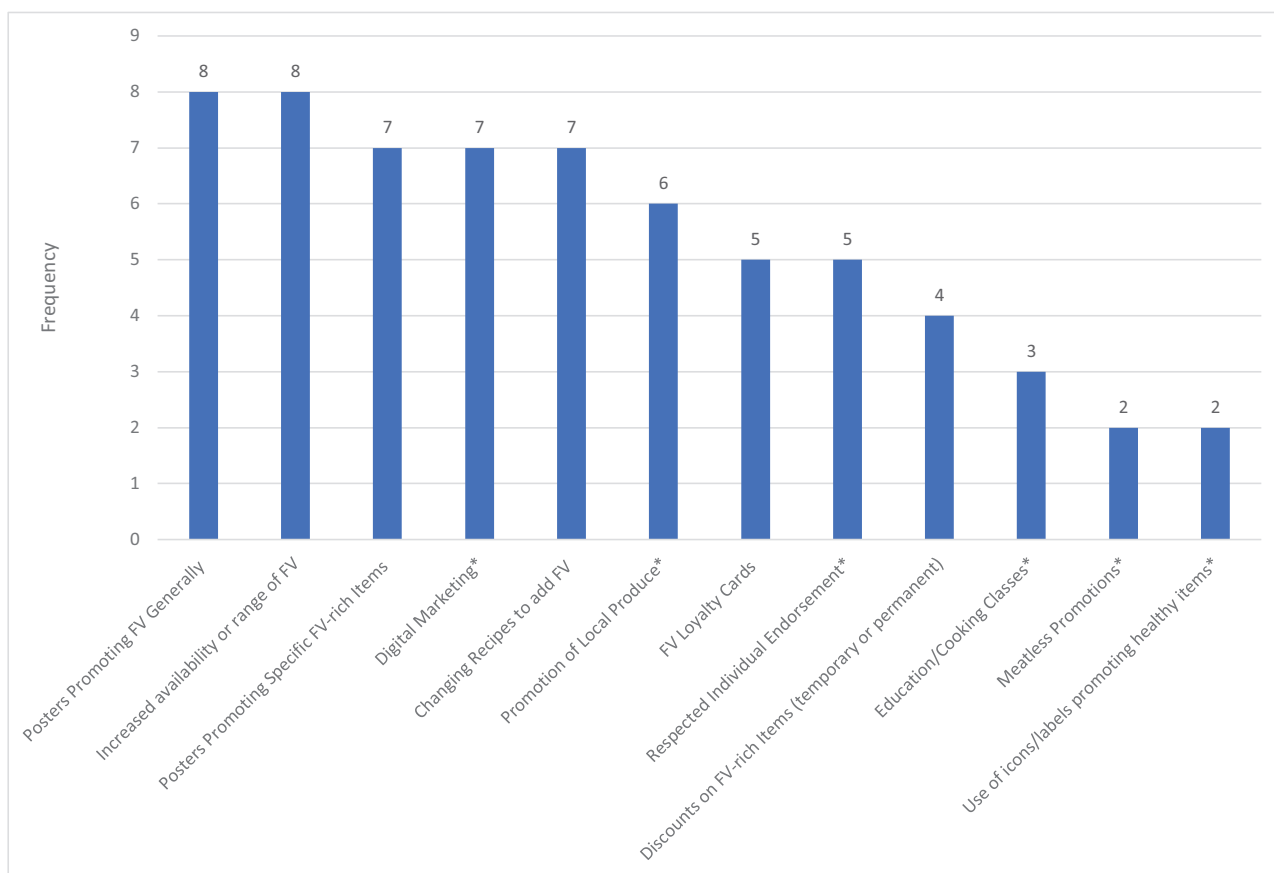
In larger institutions, even these nudges could be more challenging. For example, while promotion on social media could be accomplished by 1 person or a few people, some reported that multiple staff had to be



**FIGURE 1** Word cloud of themes on student demands related to FV offerings on campus. The size of text correlated with number of mentions. FV, fruit and vegetables.

trained to implement other nudges, like making FV more prominent at the beginning and end of menu board listings, moving larger plates to the front of a service area, or to redeem loyalty cards at busy checkouts to ensure consistency over time. Several comments related to staff work and buy-in for change.

“Yes, I would say they [the plates] are equally visible. ... we rely on our porters to restock it and you know it’s just such a busy environment to dictate that, the small ones go here and the large ones go... in different locations, that would be a challenge logistically.”



**FIGURE 2** Number of institutions reporting the use of selected marketing techniques that will promote greater FV consumption. \*Techniques that were not listed in the predefined list but were added after content analysis of the “additional comments” section of the question. FV, fruit and vegetables.

**TABLE 2** Perceptions, facilitators, and barriers of specific nudge interventions for FV<sup>1</sup>

| Technique category                                | Nudge example  | Commentary   | Possible facilitators (number of times noted)   | Possible barriers (number of times noted)   |
|---|--|--|---|---|
| Decision information<br>A1: Translate information | Developing creative menu item names <sup>2</sup>   | —  | None noted  | None noted  |
| A2: Make information visible                      | Writing FV-rich food options at the beginning or end of the menu boards (vs. in the middle) so they catch more attention | Could be something they would do only when re-writing the menu boards  | Operationally easy (1/10)   | May not make sense based on the type of menu (1/10)   |
| A3: Provide social reference point                | Having celebrities or respected or popular individuals endorse frequent consumption of FV-rich foods                     | Done with dietitians or chefs that were already staff of the institution   | Using the on-campus dietitian to post on social media (3/10)<br>Using chefs to promote local FV on menus (1/10) | Too small of an institution for a celebrity (1/10)<br>Costly to pay a celebrity (1/10)  |
| Decision structure<br>B1: Change choice defaults  | Changing the default combo option to an FV   | Lack of ability to implement this nudge because they do not offer combos in their FS locations other than retail franchise locations | None noted  | POS system programmed just for fries (1/10)   |
| B2: Change option-related effort                  | Move a station featuring FV-rich foods in the entrance or center of the service locations                                | Difficult unless the specific FS location was already undergoing renovations   | Easy to do when already renovating (3/10)   | Cost (1/10)<br>Lack of space at entrance (1/10)<br>Lack of ability to refrigerate FV items at entrance (1/10)<br>None noted   |
| B2: Change option-related effort                  | Placing FV-rich foods in front or closer to customers in display areas   | Most participants were already doing this  | None noted  | Consistency of staff implementing this (1/10)   |
| B2: Change option-related effort                  | Placing big plates in front and small/medium plates in the back for use at salad or any other vegetable-rich foods       | Common to offer only 1 plate size  | Operationally easy (2/10)   | Logistics (where the small vs. large would go) (1/10)<br>More than 1 plate doesn't fit on dining hall trays (1/10)<br>No space for refrigerated FV at checkout (1/10) |
| B2: Change option-related effort                  | Placing FV-rich items near checkout  | This was generally noted as an easy-to-do nudge  |   |   |

(Continued)

**TABLE 2** (Continued)

| Technique category                          | Nudge example   | Commentary   | Possible facilitators (number of times noted)   | Possible barriers (number of times noted)   |
|---|---|--|---|---|
| B3: Change range or composition of options  | Increase availability or range of offerings of FV <sup>2</sup><br>Add more vegetables to sandwiches and place stickers showing the higher vegetable content <sup>2</sup><br>Increased size of salad bar | —<br>Tried at 1 service<br>One service increased the size of the salad bar based on demand<br>This was generally noted as a difficult and not-popular idea | Easy for staff to be trained to do (1/10)<br>Easy for staff to be trained to do (1/10)<br>Easy to do when already renovating (3/10) | Lack of space to increase offerings (1/10)<br>Could not monitor effects due to limitations of the POS system (1/10)<br>Salad bar is fixed into the floor (1/10)<br>Lack of space to add extra checkout line (2/10)<br>Students would complain (1/10)<br>Don't want to single out students (4/10)<br>Operationally difficult to coordinate (3/10) (coordinating staff, making a list of what foods qualify)<br>Desire to want to switch over from a physical loyalty card to a digital version—more challenging (1/10) |
| B3: Change range or composition of options  | Creating an express checkout line for people buying FV-rich items/meals   |  | Requires minimal marketing to implement (1/10)<br>Could be implemented by 1 person (1/10)   | Lack of access to students' numbers due to privacy concerns (4/10)<br>Coordination (1/10)<br>Cost (1/10)<br>Structural (lack of access to electricity in specific areas) (2/10)<br>Heat of spotlights on FV (1/10)<br>Space already well-lit (1/10)   |
| B4: Change option consequences <sup>3</sup> | Loyalty cards for providing small incentives for frequent purchase of FV-rich foods <sup>3</sup>  | This was generally noted as an easy-to-do nudge  | Already have an app in place so it may be easier (1/10)   |   |
| Decision support<br>C1: Provide reminders   | Text-messaging students about FV-rich dishes  | Use social media instead   | None noted  |   |
| C1: Provide reminders                       | Improve the lighting for FV-rich dishes or stations (e.g., putting them under spotlights)   | This was generally noted as difficult to do  |   |   |

(Continued)

**TABLE 2** (Continued)

| Technique category        | Nudge example   | Commentary   | Possible facilitators (number of times noted) | Possible barriers (number of times noted)   |
|---------------------------|---|--|---|---|
| C2: Facilitate commitment | Having students earmark a certain percentage of their meal plan deposit into FV-rich foods to overcome temptation to eat other options too frequently | The most difficult nudge from the list to implement<br>Apprehension about students' perception of the intervention as forceful | None noted                                    | Setting up the technology to do this (5/10)<br>Students would not support being directed to where meal plan dollars are spent (2/10)<br>Challenging to categorize what foods qualify (1/10) |

<sup>1</sup>FS, food service; FV, fruit and vegetables; POS, point-of-sale.

<sup>2</sup>Nudge interventions were additional nudges mentioned by participants during the interview.

<sup>3</sup>The concept of an incentive being classified as a nudge has been considered to depend on the size of the incentive, with micro-incentives classified as nudges in the Münscher taxonomy (37). For purposes of this study, FV loyalty cards were considered as nudges.

The following statement was from a participant who had implemented and researched nudge interventions in the past:

“When we did the full-on nudge study a couple years ago, nudge intervention... it was more challenging than we thought because of staff buy in. Or staff training is maybe more of what it was. So, if we were there writing the menu items everyday then there's so many people you have to train to put the [FV] items first. To create a new process like that.”

The coordination of various nudges was noted to be difficult when it involved more than 1 department. When specifically talking about improving the lighting around FV or FV-rich meals, 1 participant noted:

“that would take work on multiple parties so we'd have to contact facilities (management), is it even possible to change the lighting for like one light bulb for one station? Umm, so I think once we start breaking into other parties it gets a little trickier.”

With respect to adding lighting, beyond coordination, 1 participant noted other issues:

“The spotlight piece has to do with the issue of gaining electricity. It sounds easy... umm, but depending on where that electricity is and what the spotlight is... some of the spotlights really do give out a lot of heat. So, there are technical things that you have to think of when you purchase a spotlight.”

Any nudge that would alter the point-of-sale system was considered logistically difficult, as these systems are tied to ongoing records for sales and ordering. In addition, such changes generally require changes to staff work and support from information technology specialists. With regard to changing the default combo option to an FV,

“Umm, that's a good idea and we have talked in the res[idence] about how you can get a salad... it's only programmed for fries and it's something we're aware of and we have thought like okay can we have some kind of small tossed salad in the back or what do we do?”

Nudges that altered movement of people within the service setting were logistically challenging. For example, the example nudge of an express checkout line for people with healthier options was not considered logistically feasible.

“Probably the express line... Because it would be a lot of logistics and customer service, people jumping in line...”

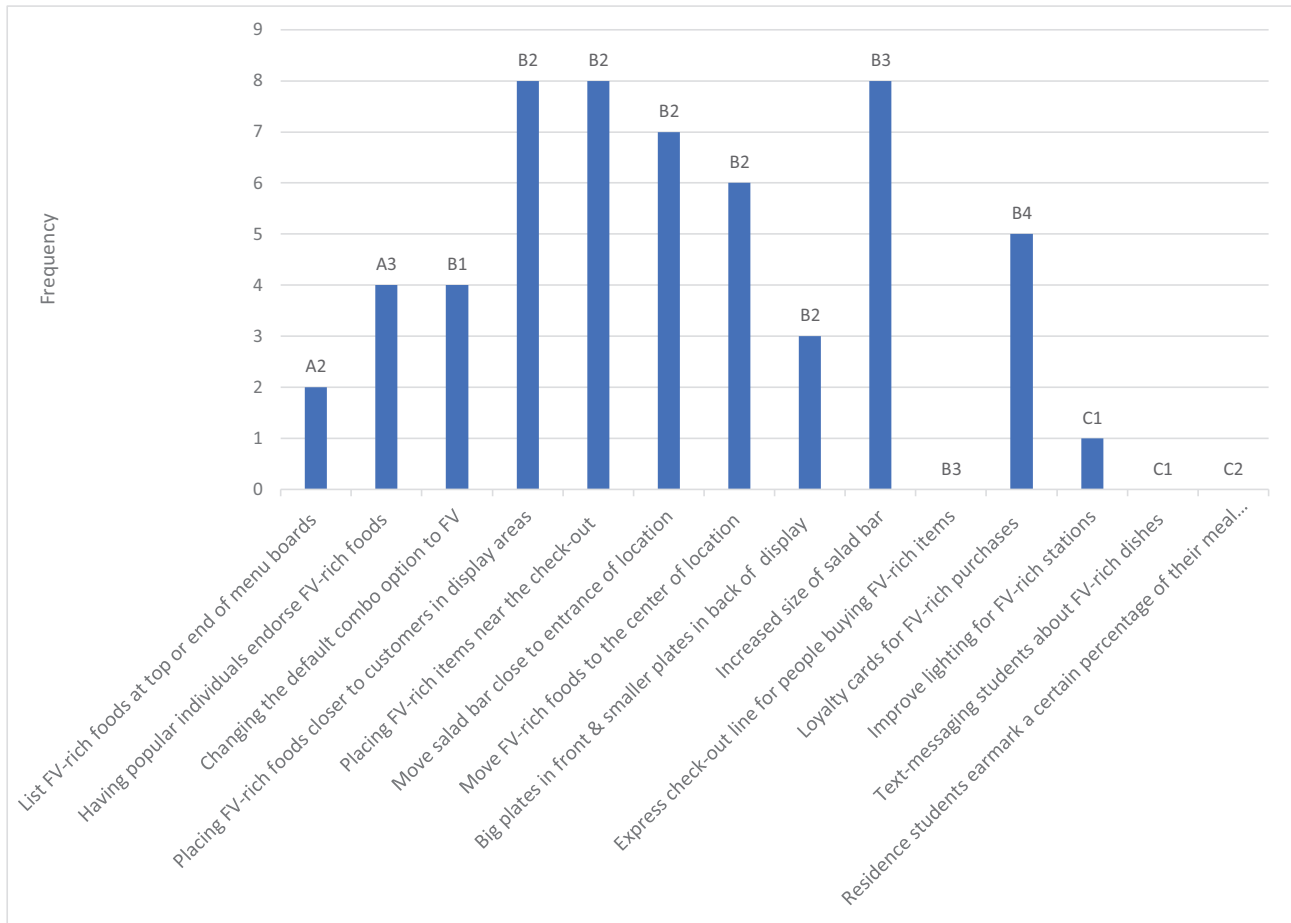
Many participants noted the lack of access to students' cell phone numbers; hence, the inability or difficulty in implementing a nudge that involves text messaging students:

“We're certainly not going to text message students. We don't have access to their phone numbers. We don't do e-mails either. . . we don't have any kind of master list of people's numbers and it changes so often you know.”

Low cost was a facilitator of nudging. The only nudges that were considered costly were those that would entail structural changes, as already noted. Time constraints were mentioned throughout the discussions.

Perceived student choice and demands figured prominently in discussion of some nudges. Managers know what students are currently eating from their sales data, surveys, student advisors, and other initiatives. The express checkout idea generated multiple comments and negative reaction.





**FIGURE 3** Current or recent use of specific nudge strategies for FV implemented in 1 or more food service locations on campus. Categories refer to (A) decision information, (B) decision structure, and (C) decision support. FV, fruit and vegetables.

“The residence is so busy that you’d never be able to divide people up and most... I do think the most popular is our hot dish section and people are putting healthy choices in there so it would be impossible to divide them up and it’s really important that we don’t shame anyone if they decide to get a (less healthy choice), so now they have to wait in a long line.”

The idea of earmarking a percentage of the student’s meal plan for FV purchasing was also not supported, based on perception of potential student reaction:

“And I don’t think that’s a tactic in my opinion that would be successful. I don’t think we can force people into spending more on FV. I think there are softer ways of doing that. People don’t like to be told that they should or have to eat or do, for that matter.”

From survey research, students at 1 institution had requested to have more “in-your-face” promotions to remind them to eat “healthy.” The following was a comment from a manager involved in that research that identified a source of tension between perceived wants and actions.

“But you know something that has come in our research which is extremely telling is that they have lack of awareness of what is happening even though it’s happening right in front of them.

They want healthy options and they’ve also stated they need nudging and reminding to do these things.”

### Discussion

Among the specific nudge strategies explored, the majority of organizations in this study had already adopted several aimed to reduce effort associated with choosing FV (i.e., B2 category), and changing option-related effort is indeed one of the most often reported types of nudging in recent empirical studies on nudging for healthy food (50–52). For example, researchers who reported moving target healthy items from bins in the center of a salad bar to bins at the edge significantly increased the chance of choice, and they attributed this to improvement in ease of access (51). However, our respondents noted that, although strategies aimed at reducing effort for choosing FV options within a station were, for the most part, relatively easy and inexpensive to implement, strategies that aimed at reducing effort for choosing FV options across stations could be difficult to implement if structural changes were required.

Four other types of nudging were found to be also relatively commonly used in these 10 organizations, mainly within decision structure and decision information. First, 8 had already increased range and variety of FV-rich options [i.e., Figures 2 and 3 (B3)]. A recent rigorous review identified that offering more variety of FV increased intake among children, with fewer studies confirming the effect in adults (53). Modest caloric effects were confirmed in adults (54) and a need for more real-world studies.

Another commonly used type of nudging was changing consequences of choosing the target option (i.e., B4—changing option consequences). Offering loyalty cards for small incentives was common, yet none reported having tracked any change in sales of FV since the initiation of such loyalty cards. The lack of systematic evaluation makes it impossible to assess whether the cost for incentives may be covered by the increase in sales of eligible FV items. If managers were provided evidence that the cost was covered or even exceeded by an increase in sales, such loyalty programs could be even more widely adopted, as they were widely considered to be feasible.

Changing the default choice (B1) was reported by 4 respondents, and only for some items, as most institutions used “a la carte” or item or weight pricing, as it was most preferred by students. Although changing the choice default has been one of the most often used nudging strategies in other public health domains (52), and is the norm in the commercial sector, particularly fast-food venues, it was not applicable to our participants. It may be worth exploring the value of offering selected combinations that include “healthy” FV-rich items without necessarily offering a discount or with minimal discount (e.g., a 5% discount) in some food locations and tracking the sale of such combinations to compare it with sales of the same FV-rich dishes sold separately in other food locations.

Finally, providing social reference points for choosing FV (i.e., A3) was relatively popular, with 4 institutions using this strategy. Providing social reference points is a common traditional and social marketing tool; it is considered nudging in that it utilizes people’s tendency to respect and imitate behaviors of highly valued individuals, such as role models or opinion leaders (55). However, it is interesting that none of these food services reported using another major method of providing social reference points—specifically, referring to descriptive norms that depict the observable behavior of other people relevant to FV choice (e.g., “Did you know that most people on campus choose ‘the FV-rich entrees’ every day?”). Such use of descriptive norms was successfully used to increase the choice of salads in a short-term field study conducted in a university food court (56).

Last, the types of nudging aimed at providing reminders of FV and those aimed at facilitating commitment for choice of FV (C1 and C2) were not currently used and faced significant barriers. The lack of use of these is understandable since they require coordination with other groups and cooperation of customers. For example, in order to be effective, reminders need to be provided to individuals at the right moment (e.g., within an hour prior to mealtime). General reminders, such as displaying posters encouraging choice of general FV (e.g., “Did you remember to choose FV today?”) in the food court for everyone to see is not considered a nudge and may have little impact. Although there may be a sizable group of students who aim to eat well, they cannot currently be singled out for provision of reminders without some kind of sign-up for apps or messages on their cell phones. While many apps are available for individuals to commit to health goals, formal research on their

uptake has not been published. Much more work on these categories of nudges is needed.

Further joint work is needed to frame and differentiate nudging in the domain of food service environments so that researchers and food service managers may collaborate on common goals. While our participants actively promoted FV, many questioned whether nudging was a form of marketing, health education, or an intervention in its own category. This issue is not yet resolved within the academic community, as noted in the Introduction and by others (35, 57). A subset of nudging techniques shared substantial overlap with traditional marketing practices used in food retail (e.g., endorsement by respected individuals, loyalty cards). However, although some nudging strategies may share the same psychological underpinnings with commercial marketing practices, nudging is unique in its purpose of promoting “healthy foods” that offer long-term health benefits and well-being (9, 58).

Within the nudging field, definitional issues have also been identified as a challenge (52). We found that categorizing some specific nudge strategies to a single category in the Münscher framework was problematic (e.g., express checkout), as multiple aspects of the choice environment were changed. Further work within the researcher community to come to some consensus on describing interventions is needed. Our results do show that, irrespective of definitional issues, multiple marketing and other strategies were already being used by our interested group to specifically promote increased FV consumption. Future studies should look at combining various operational, marketing, and nudging strategies to evaluate possible changes in FV intake over time. Food service operators are encouraged to consider nudging tactics as an important addition to their repertoire of promotional tools to positively influence food intake.

This study highlighted the variability in environments between post-secondary institutions depending on size, city characteristics, influence of a dietitian, age of university, accountability, and whether food services were contracted, mixed, or independently operated. The variability in environments is likely to contribute to variability in feasibility of different nudges. Consideration of adaptability and feasibility in diverse contexts is an important consideration in further developing nudge strategies for post-secondary food services. In addition, it will be important to assess effectiveness in local environments. Out of the 9 institutions that were implementing nudging, only 3 were measuring the effectiveness of their nudging efforts. Publication of local experience through professional groups and more researcher–manager collaborations will be important for spread of effective marketing and nudge approaches.

### Strengths and limitations

This exploratory qualitative study had some strengths and several acknowledged limitations. The participants could be considered as experts or key informants with specialized knowledge that can inform future studies and/or adoption of some or many of the identified strategies in other organizations. Perspectives and issues for food service operators has been an understudied area in the past. Furthermore, the listing of specific marketing and 14 nudging strategies in the interview guide was helpful in guiding conversation about a complex topic, as was a focus on 1 food group, fruits and vegetables, thus providing new insights to inform future research. Limited focus also allowed the interviews to be completed within a reasonable time. Use of both descriptive and interpretative analysis was a strength, as it was possible to better describe

the variation and complexity of post-secondary food services, while allowing new themes and insights to emerge. Many of the identified barriers and specific issues to implementation have not been well documented previously.

Among the limitations, the results are not generalizable to other post-secondary institutions in Canada or other jurisdictions. Of note, 7 out of 10 participating organizations were independent departments and may have been more willing to participate in our study since they have more discretion about adopting novel strategies such as nudging. In contrast, contracted food services provided by external companies are obligated to meet their contractual obligations to the post-secondary institution and may not have the mandate or capacity to try new approaches to food service. The importance of contractual arrangements in affecting the promotion of FV is unknown but will need to be addressed in future work. In addition, because only 1 technical college was interviewed, any differences in perspectives from this sector require additional study. Future research must take into account these differences among different food service organizations.

The use of specific examples of marketing and nudging strategies was not comprehensive of all possible marketing/nudging strategies. A notable gap was discussion of nutrition information on menus, which has been extensively promoted, but for which evidence of effectiveness is limited (42–44). While additional ideas were elicited during interviews, it is possible that additional strategies were missed. We undertook several approaches to support elicitation of as many strategies as possible. Questions were framed in different ways (marketing and nudging), potential participants were sent the interview guide prior to the interview, institutions chose the representatives, and a transcript review was offered. Several nonmarketing ideas for FV promotion emerged in discussion, suggesting we were at least partially successful in generating a comprehensive set of approaches. Further work with more food service operators in different sectors is now needed.

Participants completed interviews during work hours, so interviews were restricted in length. The interview guide was long, and this may have caused time pressure for both participants and the interviewer. The universally busy and tight schedules of food service managers will need to be considered in any future research. Last, social desirability bias for promoting FV was likely operating as managers described their current practices.

### Conclusions and implications for future research

This first study of post-secondary food service organizations on nudging of FV provided some important new information, which can inform further development of surveys or new intervention studies to improve the diets of people who have access to food services in their work or educational institutions. Our interviews confirmed that nudge approaches to the promotion of FV are promising and interested food service managers have key roles to play in further development of the field. While this study demonstrated a general interest among these managers to implement nudging strategies for healthy foods, future studies are needed to 1) determine which nudges are feasible in most settings (considering the variability in environments among post-secondary institutions found in this study), 2) review best strategies for implementation of nudging, and 3) evaluate the effectiveness of nudges in post-secondary settings, particularly longitudinal studies to better understand how nudging interventions fare in the long term. In addition,

future research around nudging in the food service sector should seek to clarify and better define nudging compared with general and social marketing and health promotion to find the best mix of strategies and services to both support health and profitability.

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