

Evaluation of a Fruit & Vegetable Pilot Program for Elementary School Children in Prince Edward Island

Final Report

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Abstract

The objective of this study was to evaluate the impact of the Fruit and Vegetable (F/V) Snack Program on children's preferences for and their willingness to try F/V. Subjects from three Island elementary schools, with one school from each of three school regions were included. A questionnaire adapted from Birch & Sullivan (1991), including numbered "faces" scales was used to determine changes in food preferences and to evaluate their willingness to try F/V, prior to and following a 6 week intervention. Analysis indicated that there was a significant increase in willingness to try cauliflower and turnip sticks ($p < 0.01$). Also, there was a significant increase in liking for all F/V offered during the F/V snack program; cantaloupe, cauliflower and turnip sticks ($p < 0.0001$) broccoli, carrots and cucumber ($p < 0.01$) and grapes ($p < 0.05$). Similarly, there was a significant positive change over the study in liking scores of cauliflower, cantaloupe and turnip sticks ($p < 0.0001$) carrots ($p < 0.001$) cucumber and broccoli ($p < 0.01$). Results suggest that the six week F/V intervention increased children's liking of F/V and their willingness to try F/V. Further study using matched comparison schools with an extension of the intervention period is recommended.

Introduction

The Fruit and Vegetable Pilot Project was conducted as an initiative of the Access to Safe and Healthy Foods Committee of the PEI Healthy Eating Alliance. One objective of this committee is to increase the availability of fruit and vegetables to school-aged children. In response to recent reports of low fruit and vegetable intake in PEI school children (Taylor *et al.*, 2002; 2003), a sub-committee was formed to develop, implement and evaluate a pilot fruit and vegetable snack program for elementary school children. The objective of the pilot was to determine the feasibility of a fruit and vegetable snack program and to assess the impact of the program on children's preference for and willingness to try fresh fruits and vegetables.

The evaluation of the pilot program was carried out by Dr. Jennifer Taylor and interns from the University of Prince Edward Island Dietetic Internship program. The evaluation employed a pre-post design to evaluate change in children's food preferences and willingness to try fruits and vegetables before and after 6 weeks of the program.

Background

It is important to consume five to ten servings of F/V a day because they have been shown to reduce the risk of developing several chronic diseases such as cardiovascular disease, stroke, diabetes, cancer and obesity (Nicklas *et al.*, 2001). Since F/V are low in fat, they are also good substitutes for other higher fat snack foods, which can subsequently reduce the risk of developing obesity (Nicklas *et al.*, 2001). Encouraging F/V as snack foods is important because the number of overweight Canadian children has doubled from 1981-1996 (Tremblay & Willms, 2000). The Health Behaviours in School-Aged Children (King *et al.*, 1999), a cross sectional national study, has identified a number of nutrition related concerns, including low fruit and vegetable consumption. Similar findings have been reported elsewhere in Britain (Gregory *et al.*, 1990). A recent survey conducted in P.E.I, confirmed that only 11% of children in grades 4-9 consumed the recommended five servings of F/V per day (Taylor *et al.*,

2003).

Given the low intake of F/V, interventions are needed to improve children's consumption of F/V. Both health advocates and researchers suggest that children must be reached at an early age to improve the total populations diet (Perry *et al.*, 1998). The fact that healthful dietary behaviours learned in childhood may continue on through adolescence and adulthood make early prevention strategies appealing and may lead to decreased health costs (Guthrie *et al.*, 2000). Schools are an ideal setting to establish children's eating behaviours because they have a greater influence than any other environment except the family (Kann *et al.*, 1995). Children consume as much as 40% of their total daily intake at school (Davison & Birch, 2001). However, recent surveys of food programs in Canadian schools (e.g. New Brunswick, Nova Scotia, Newfoundland, Manitoba and Prince Edward Island) have identified a number of concerns regarding the availability of foods in schools (Rankine, 1990; Nova Scotia Department of Health, 1993; Coalition for School Nutrition, 2001; Fieldhouse, 2002; Taylor *et al.*, 2002). Vending machines in particular do not feature healthy choices: a recent survey of programs and services in PEI schools indicated that the majority (four out of five) of foods sold in vending machines, which are available to all children, are low in nutrient density (e.g. candy, soft drinks) (Taylor *et al.*, 2002). A qualitative study of barriers and enablers to healthy eating among students in grades 5-8 in Nova Scotia identified having healthy food available at school as enablers of healthy eating in both boys and girls; similarly, failing to have healthy choices visible and available in school cafeteria and "having too much junk food sold in school canteens" was perceived as a barrier to healthy eating (Promoting Healthy Eating and Active Living Project, 2002).

Children's likes and dislikes are major determinants of their eating behaviours (Gurthrie *et al.*, 2000). A significant predictor of a child's preference towards a food is whether they like the food or not: a strong relationship has been found between children's preferences of F/V's and their actual consumption (Baxter *et al.*, 2002). Children's preferences towards a food are usually guided by taste alone, but other factors could also affect preferences, such as smell or the appearance of food (Drewnowski *et al.*, 1997). Availability and variety are important factors in the daily intake of fruit and vegetables (Hearn *et al.*, 1998). Children's preference for a food has

been shown to increase with repeated exposure, and with repeated exposure, neophobia (Pliner & Hobden, 1992), or fear of trying new foods, is shown to decrease. Child neophobia is a strong predictor of low F/V intake (Pliner, 1994). Since Birch and Marlin's (1982) early work which documented that repeated exposures to a food reduced neophobia and enhanced acceptance in children, it has been recognized that exposure to a food is an important prerequisite for food preferences and food acceptance (Birch, 1999; Koivisto & Sjödén, 1996). More recently, Wardle *et al.* (2002, 2003) have found that daily exposure to a unfamiliar or disliked vegetable increases the child's liking and consumption of that vegetable. Repeated exposure of F/V may also increase their willingness to try a new F/V (Pliner, 1994).

Intervention studies suggest that the nutritional quality of foods available affects daily intake (Luepker *et al.*, 1996). Targeting fruit and vegetable intake is potentially effective in that a positive rather than a negative message is promoted (Baranowski *et al.*, 2002) and because fruit and vegetables displace fat in the diet (Epstein *et al.*, 2001). Recent evidence suggests that F/V interventions have a positive impact on the increased consumption of F/V in children (Baer, 2003; Wardle *et al.*, 2003). An evaluation of the USDA's school based Fruit and Vegetable Pilot Program (USDA, 2003) also indicated that participating schools were very supportive of the program, and that student interest was high. Food service staff reported that the consumption of F/V that were already offered as part of the School Lunch Program increased. One school reported that candy sales dropped by 500 dollars a week after the pilot program began. Another benefit of this program was that the parents found that their children were asking for more F/V to be served at home (Baer, 2003).

Project Goals:

The goals of the pilot program were 1) to assess the feasibility of a fruit and vegetable snack program and 2) assess the impact of the F/V snack program on children's preferences for and their willingness to try F/V.

Methods

Project Description:

A pilot fruit and vegetable snack program was implemented over a six week period. All classrooms in each school were provided with a no cost fruit or vegetable snack tray once a week at the same time each morning (prior to recess). Children were encouraged by parent and student volunteers to sample all items offered. Three choices of either fruits or vegetables were offered each week, with each fruit and vegetable being offered twice during the program. One F/V considered to be unfamiliar was included each week. Food items were donated through community sponsorship and provided to the students free of charge. Parent volunteers contributed to the project by preparing and delivering the food trays and cleaning up after the snacks. A media launch of the project occurred at each school site during the first snack day. Attendees included local MLA's, the Minister of Health and Social Services and local media. Weekly parent information sheets were developed and distributed well as the "5 to 10 Are you Getting Enough?" fruit and vegetable brochures from the Canadian Cancer Society, but were not part of the evaluation.

Evaluation Design:

A pre-post design with a 6 week intervention period was utilized. An in class survey was used to evaluate food preferences and willingness to try. The questionnaire was reviewed by members of the Healthy Eating Alliance Access to Safe and Healthy Food Subcommittee and the Healthy Eating Alliance Steering Committee prior to distribution. Both committees include experts in health promotion and program design and implementation. The pre-test questionnaire was administered by trained dietetic interns and an experienced research co-ordinator during class prior to the first day of the pilot program. The questionnaire was also translated into French for the single Francophone school. The post test was administered during class using the same methods 6 weeks after the program began. A research co-ordinator explained the questionnaire to the students and reviewed the questionnaire upon completion.

A letter describing the program, its purpose and the process was sent home with

all students in the participating schools (Appendix). The parents were asked to call the school by the deadline if they did not wish their child to participate in the evaluation survey. Children were assigned a unique identifier code (child's initials, age, sex and parent's initials) prior to completing the questionnaire, so that their responses to the pre- and post test could be matched, and to protect their privacy and confidentiality.

Procedures:

Sample Selection: Each of the three school districts in Prince Edward Island were asked to identify one small size (<200 students) elementary school that would be willing and interested in participating in the pilot program. This was done in order to increase the representativeness of the sample and for feasibility reasons. All students in Grades 1-6 from three Island elementary schools were requested to participate in the study (n=379).

Instrument: A 3 point "schematic faces" questionnaire was used to assess food preferences (Birch & Sullivan, 1991; Guthrie *et al.*, 2000) and willingness to try fruits and vegetables (Pliner & Loewen, 1999). The instrument consisted of two questions for each of eight fruits and vegetables. For the "food preference" question, students were asked to indicate how much they liked the food by circling one of three faces labelled "yucky" "okay" and "yummy". For the "willingness to try" question, students were asked to indicate on a 5 point scale, with extremes labelled "not willing at all" to "very willing", how willing they were to try the food again or for the first time. Students could circle "X" if they never tried the food. The questionnaire was also translated into French for the single Francophone school.

Data Collection: The pre-test questionnaire was administered by trained dietetic interns and a research co-ordinator during class prior to the first day of the pilot program. Sample questions were copied on overhead transparencies and reviewed with students to ensure their comprehension of the questions, and how to complete the questionnaire, using foods not offered in the program. Each question on the actual

questionnaire was also copied on single overhead transparencies accompanied by realistic coloured pictures of each fruit and vegetable. These were shown to the students prior to completing the questionnaires to ensure accurate food identification. Questionnaires were also reviewed after completion. The post test was administered during class one to three days after the 6 week program ended using the same methods.

Statistical analysis: Frequency counts were generated for categorical variables and means were generated for the continuous variables (e.g preference and willingness to try scores). Chi-square analysis was used to determine if there were significant differences in the proportion of students between trial one and two who rated the foods “yummy” and who were “very or somewhat willing to try”. A paired T test was also used to assess differences in mean *liking* and *willingness to try* scores between trial one and two.

Results

A description of the sample is shown in Table 1. A total of 379 students from three schools participated in the program, representing all three school districts in PEI. There were fewer children (314, or 83%) who completed questionnaires for *both* pre and post data collection periods. Among these, there was equal representation from grades 1-3 and 4-6.

Table 1. Sample Description

School	School District	Number of students in school	Number of classes in school	Number of matching questionnaires
1	Western District	226	10	183 (58 %)
2	French District	31	2	28 (9%)
3	Eastern District	122	6	103 (33%)
Total		479	18	314

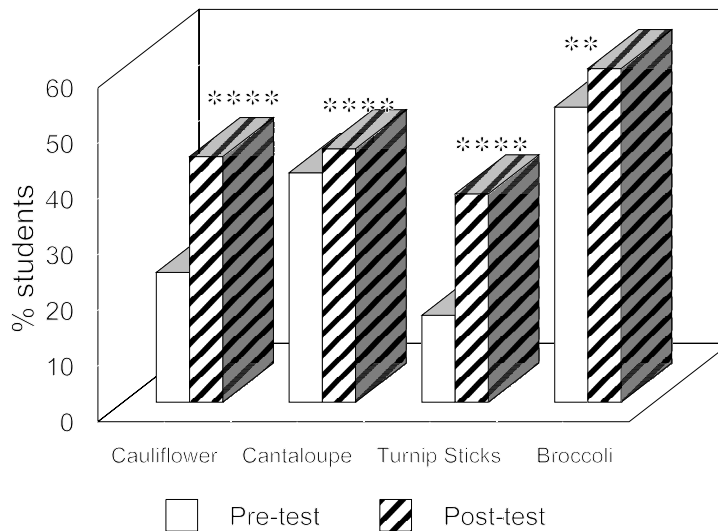
Liking:

Analysis indicated that there was a significant increase in the proportion of children who liked (rated “yummy”) cantaloupe, cauliflower and turnip ($p < 0.0001$), broccoli, cucumber, carrots ($p < 0.01$) and grapes ($p < 0.04$) prior to and after the F/V intervention (Figure 1).

Paired t-test analysis indicated that there were also significant changes in liking scores for carrots, cucumber, cauliflower, turnip sticks, cantaloupe and broccoli (Table 2).

There was no change in liking scores for Chinese pear, which was not offered during the program and served as a control.

Figure 1. % Students Who Rated Vegetables as “Yummy” Prior to and Following A Six Week Program



** $p < 0.01$

**** $p < 0.0001$

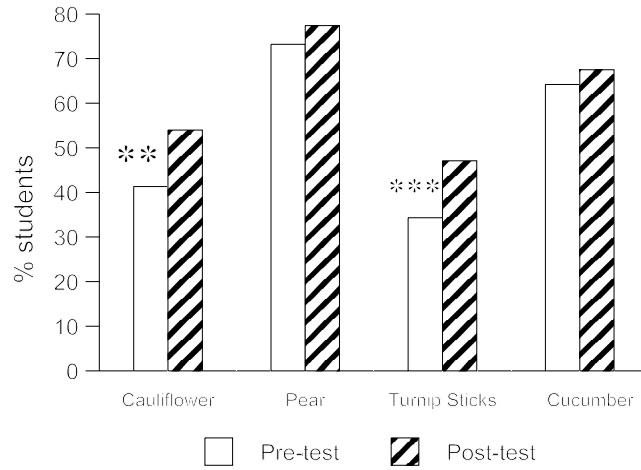
Table 2: Change in Liking Scores (Pre-Post Program)

	Mean Change	Std Error	t Value	p
Carrots	-0.1903	0.0584	-3.3	0.0013
Cucumber	-0.2186	0.0760	-2.98	0.0043
Cauliflower	-0.7427	0.0872	-8.5	<.0001
Chinese Pear	-0.0771	0.0827	-0.93	0.3518
Cantaloupe	-0.3525	0.0862	-4.09	<.0001
Turnip Sticks	-1.0447	0.0812	-12.9	<.0001
Broccoli	-0.2165	0.0774	-2.80	0.0055

Willingness to Try:

There was a significant ($p < 0.01$) increase in children's willingness to try cauliflower and turnip sticks ($p < 0.05$) for the first time or to eat them again (Figure 2). Fewer children (34-41%) were initially willing to try these vegetables compared to other FV offered, possibly because they are less familiar and less sweet tasting than some other vegetables. There was no change over the study in the proportion who were willing to try broccoli, cucumber, cantaloupe, grapes and carrots. Paired t-test analysis indicated that there were significant changes in willingness to try scores for cauliflower, turnip sticks and cantaloupe; the latter had the lowest mean change over the study (Table 3). For all F/V offered, there was at least a 50% decrease in the number of children who had never tried the F/V; all differences were significantly different (Figure 3). The most dramatic decrease was observed for turnip and cantaloupe, with a 78% and 65% decrease in the proportion of students who never tried these foods.

Figure 2. % Of Students Who Were “Willing to Try”¹ Fruits and Vegetables Prior to and Following a Six Week Program

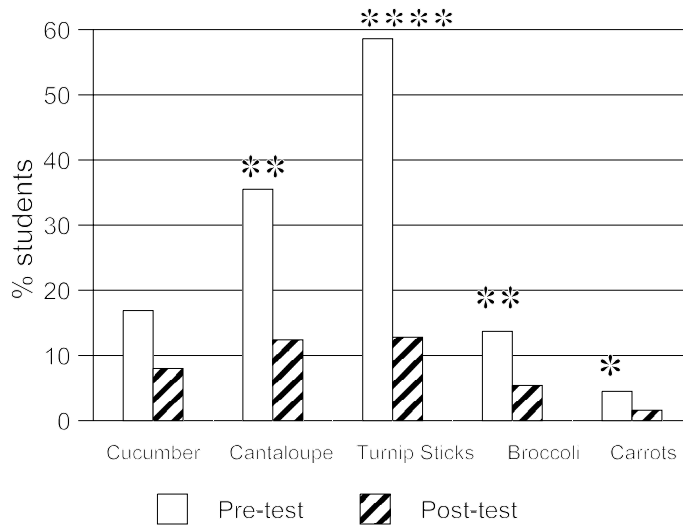


¹ Rated 3 or 4 on 5 point scale

*** p < 0.001

** p < 0.01

Fig. 3. % Of Students Who Had “Never Tried” Vegetables & Fruit Prior to and Following a Six Week Program



* p = 0.05
 ** p = 0.01
 **** p = 0.0001

Table 3. Change in “Willingness to Try” Scores (Pre-Post Program)

	Mean Change	Std Error	t Value	p
Carrots	-0.0873	0.0933	-0.94	0.3499
Cucumber	-0.1274	0.1058	-1.20	0.2296
Cauliflower	-0.3856	0.1254	-3.07	0.0023
Chinese Pear	-0.0873	0.0933	-0.94	0.3498
Cantaloupe	0.2332	0.1152	2.02	0.0439
Turnip Sticks	-0.4967	0.1253	-3.96	< .0001
Broccoli	-0.0424	0.1226	-0.35	0.7293

Conclusions:

The F/V pilot program suggests an overall increase in liking and willingness to try F/V in elementary school children. A significantly higher number of children rated all vegetables and fruits offered as “yummy” and were more willing to try cauliflower, cantaloupe and turnip after participating in the 6 week intervention. Our findings are consistent with those of Wardle *et al.* (2003), who reported that exposure of an unfamiliar vegetable increased children’s liking and consumption of that vegetable. Further, a recently published evaluation of the USDA Pilot Fruit and Vegetable Program indicated that 79/105 schools found that the program increased children’s acceptance of fruits and vegetables offered as part of school meals and many students reported improvements in their eating habits (Buzby *et al.*, 2003).

The present results are particularly encouraging, given the relatively low level of exposure (*one weekly snack per week for 6 weeks*) in our program compared to Wardle *et al.*, where parents were requested to offer the target vegetable to their child *every day for 14 days*.

While the pre-post design was useful in detecting changes in liking and willingness to try FV over the study period, the evaluation design would be enhanced with the inclusion of matched comparison schools, an extension of the time period of observation, and increased frequency of offering the snack. The feasibility and sustainability of these proposed changes need to be considered in light of available resources, which is discussed below in the Recommendations section. Finally, although we have obtained some anecdotal reports of the impact of the program within the school and home environment, it would be useful to conduct a systematic analysis of responses from parents, teachers, staff and students using a qualitative approach.

Recommendations:

1. The menu items and food donations should be planned and secured well in advance of the project and included in a program manual, which includes instructions for implementation and program standards.
2. There should be an evaluation component included in all snack programs to monitor effectiveness. A comparison or control school (s) should be included.
3. It is vital to have school and parent support for the project with volunteers readily available for the on site components of the project.
4. The workload for school staff should be minimal.
5. Each school site should have some flexibility in implementing the program. Future projects and guidelines should allow for this diversity and work with the strengths of each school community.

6. There should be a close association with the Island producers; both for donations, purchasing and being mindful of 'in season' items which was be easier to obtain.
7. Sponsorship dollars and donations for food items should be researched and already existing avenues of funding pursued (ie. G.I.F.T.).
8. An overall coordinator would be required to expand this project to more school sites. This position should be well placed within the school community and potentially already associated with other food access programs in the province.

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