

## Evidence Brief: Impact of food skills programs on fruit and vegetable consumption among children and youth



### Key messages

- Food skills programs can lead to significant increases in fruit and vegetable-consumption in children and youth aged 4 to 18 years
- Parental involvement is important to sustain healthy eating behaviours at home
- Current food skills initiatives in the province can be evaluated when more Ontario-specific data is available

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### Issue and Research Question

Nutrition has long been identified as a component of good health and well-being. Nutrition is a major modifiable risk factor of non-communicable diseases such as cardiovascular disease, obesity, diabetes and some types of cancer.<sup>1,2</sup> Fruit and vegetable (FV) intake can help to prevent or lower their risk of these diseases.<sup>2</sup> The protective factor of FV has been observed in Canadian children and adolescents (2 to 17 years), with those consuming FV five or more times daily experiencing lower rates of overweight and obesity.<sup>3</sup>

Fruit and vegetables are an important source of vitamins and minerals, and dietary fibre,<sup>4</sup> each of which are essential in supporting healthy growth and development,<sup>5</sup> in addition to contributing to reduced chronic disease risk.<sup>6</sup> There is growing concern that Canadian children and youth are at risk for nutrition-related conditions such as diabetes and obesity. The prevalence of diabetes for those aged 15 to 19 is 0.5%, and the prevalence of overweight or obesity is 29.4% for youth aged 12 to 19 years.<sup>7</sup> These rates are problematic as childhood behaviours such as high consumption of fast food and sugar-sweetened beverages and sedentary lifestyles can have negative impacts later on in adulthood.<sup>8-10</sup> There is evidence to

show that Canadian children may be engaging in unhealthy food practices.<sup>11</sup> For example, data from the Canadian Community Health Survey (CCHS, Cycle 2.2) suggest that large proportions of Canadian adolescents aged 9 to 18 have inadequate intake of vitamins and minerals, including vitamins A and D, magnesium and calcium,<sup>12</sup> and that young children (4 to 8 years) have inadequate calcium intake.<sup>13</sup> Both children and adolescents have sodium intakes above the tolerable upper intake level.<sup>12,13</sup>

Overall, fruit and vegetable intake is low among children and youth in Ontario. Average intakes are 4.43 servings a day, with 64% consuming less than 5 servings of FV daily.<sup>14</sup> While this data is from 2004, recent smaller studies suggest that low FV intake continues to be a problem among young children and youth.<sup>15-17</sup> Canada's Food Guide (CFG) recommends 5 to 6 servings per day for 4 to 13 year olds, and 7 to 8 servings for 14 to 18 year olds.<sup>18</sup>

In an effort to promote healthy food choices and to educate children and youth about food and nutrition, food skills programming has been introduced in many communities.<sup>19</sup> Food skills encompass a set of skills related to food preparation, handling and food safety. This can refer to skills at both an individual or household level, and represents skills that individuals should be familiar with, understand and be able to apply in practice.<sup>20,21</sup> Food skills can be categorized into five major types: knowledge (e.g., nutrition, label reading, food safety), planning (e.g., meal organization, food prep, budgeting), conceptualizing food (e.g., adjusting recipes, creatively), mechanical techniques (e.g., chopping/mixing, cooking, following recipes) and food perception (e.g., using senses – texture, taste, when foods are cooked).<sup>21,22</sup> The Ontario Public Health Standards (OPHS) highlights food skills programming as a focus area for all public health units stating that “opportunities for skill development in the areas of food skills and healthy eating practices” should be available for priority populations.<sup>23</sup>

Food skills interventions largely target the development of skills for the preparation and

handling of nutritious foods, often focusing on FV. Given the importance of FV intake in growth, development, and chronic disease prevention, and that some children and youth do not meet CFG FV intake recommendations, it is important to investigate the impact of these programs on FV consumption in order to inform future OPHS programming.

Therefore, the goal of this Evidence Brief is to summarize the current literature examining the question: *Do food skills programs increase consumption of fruits and vegetables among children and youth?*

## Methods

PHO Library Services conducted searches in electronic databases including Ovid MEDLINE, Embase, CINAHL, and ERIC. Electronic databases were initially searched on May 28 and 29, 2015 for articles published from 2005 to 2015, limited to reviews, systematic reviews and meta-analyses and other synthesized literature. An updated search was conducted on March 28 and 29, 2016. Articles retrieved by the search strategy were assessed for eligibility using the following criteria: English language articles were eligible for inclusion if they were recent (2005 and later), targeted school-aged children and youth, focused on food skill interventions that took place in schools or in the community, and reported data on one or more outcomes focused on FV intake. Articles were excluded if the population targeted adults only, if the paper did not report fruit or vegetable consumption, or targeted specific diseases (for example allergies, asthma, cancer). Food skills activities that were part of a multi-component intervention but which were not the sole focus and could not be separated for independent analysis were also excluded. One reviewer screened titles and abstracts with a 20% sample screened by a second reviewer to assess overall agreement between reviewers. Consensus was reached on all disagreements via discussion. The quality of articles was assessed using the *Health Evidence Quality Assessment Tool* for review articles. Articles rated weak (a score of 4 or less) were excluded. All articles meeting the inclusion

criteria were retrieved for full text review and information was extracted from each article using a standardized data extraction form. The full search strategy is available upon request from PHO.

## Main Findings

The search identified 1306 articles, from which seven systematic reviews are included in this Evidence Brief. Reviews focused on primary and secondary school students. Three reviews included children ranging in age from 4 to 12 years old,<sup>24-26</sup> and four included children and youth ranging 5 to 18 years old.<sup>27-30</sup> Multiple study designs (e.g., RCTs, non-randomized control trials, cluster-randomized control trials, quasi-experimental, etc.) and measurement tools (e.g., food frequency questionnaire (FFQ), 24-hr dietary recalls and food diaries, surveys, direct observation, and interviews) were used across interventions.

The majority of reviews focused on interventions that took place in the United States (US),<sup>24-30</sup> followed by the United Kingdom (UK),<sup>26,28,30</sup> Ireland,<sup>26,28</sup> Norway,<sup>29,30</sup> Finland,<sup>30</sup> the Netherlands,<sup>30</sup> Spain,<sup>30</sup> and Australia.<sup>30</sup> The types of food skills interventions and initiatives were relatively similar across countries. These interventions ranged in duration with the shortest occurring one hour per week (full length of initiative not stated),<sup>24</sup> and the longest running for three years.<sup>24,27,30</sup>

All reviews included multi-component interventions consisting of nutrition education and hands-on activities that took place in the classroom or school environment, at-home or in the community. Interventions that took place in classrooms included: nutrition education, food preparation lessons, skill building activities, workshops, watching videos, cooking lessons, taste testing, and gardening.<sup>24-30</sup> School-level interventions consisted of: media campaigns (e.g., posters, announcements, contests), assemblies, taste testing, increased FV exposure and variety in lunchrooms, healthier options for school tuck or snack shops, workshops for teachers, and training for food service staff on

purchasing, promoting and preparing FV for consumption.<sup>27,28,30</sup> The purpose of some activities was not explicitly stated, such as the nature of assemblies and taste testing.

At-home and community-focused components included parental involvement (e.g., parent education workshops and meetings, newsletters, brochures, healthy eating magazines and food calendars, homework activities and home packages, school cookbooks, and family/parent nights) and interactions with community organizations and community gardens.<sup>25-30</sup> In addition, there were two reviews that had a strong focus on garden-based interventions,<sup>24,29</sup> one that focused on cooking programs,<sup>25</sup> and one review that specifically targeted the Food Dudes programme (based in the UK).<sup>26</sup>

Overall, a low-to-moderate increase in FV consumption was observed among children and youth following food skills interventions.<sup>24-30</sup> Five reviews reported quantifiable increases in FV consumption in either gram amounts or 'servings' of FV: three reported an increase ranging from 0.30 to 3.40 servings of FV per day,<sup>27-29</sup> one reported an increase of 30 grams per day,<sup>30</sup> and another reported an increase of 0.01 to 0.71 portions (0.8 g to 56.8 g).<sup>26</sup> The remaining two reviews provided only qualitative descriptions, but suggested overall increases in intake of FV as a result of food skills programs/activities.<sup>24,25</sup> This finding of increased FV consumption in the systematic reviews is consistent with a meta-analysis that reported a statistically significant increase in FV intake among children and youth aged 6 to 15 years old (Standardized Mean Difference [SMD] 0.15 [0.02 to 0.29]).<sup>30</sup> Post-intervention follow-up data was only assessed by authors of three reviews,<sup>26,28,30</sup> and ranged from three months<sup>26,28</sup> to more than two years-post intervention;<sup>28</sup> in each case, increased FV intake was maintained at follow-up.

## Discussion and Conclusions

Interventions targeted skills that mainly fell into four of the five major food skills categories:

knowledge, planning, mechanical techniques, and food perception.<sup>21,22</sup> No interventions aimed to directly target food conceptualization skills, such as creative use of leftover meals or food recipe modification.<sup>21,22</sup> All interventions were multi-component and each included some form of experiential learning. Most programs engaged parents, through simple communication materials (e.g., newsletters) or direct participation in workshops and homework activities.

Results from the reviews suggest that interventions that combine traditional nutrition education with hands-on practical experience can positively influence mediators for fruit and vegetable consumption. Health behaviours that improved following food skills interventions included: willingness to taste or try FV,<sup>24,29</sup> increased preferences for FV,<sup>24,25,29</sup> and increased general nutrition and dietary knowledge.<sup>24</sup> These improvements often coincided with increased FV intake.

The evidence did not draw conclusions of one type of dietary measurement tool being more effective than other types. One review identified that the limited number of studies included in the review made it difficult to comment on differences related to assessment tools.<sup>28</sup> Similarly, the effectiveness of some interventions over others was not discussed. Given the diverse range of interventions included, this may suggest that a specific approach is less imperative than increased engagement and involvement of children and youth in programs and initiatives.

Evidence from this Evidence Brief suggests that food skills programming and initiatives increase fruit and vegetable consumption among children and youth.

## Implications for Practice

The literature shows that food skills programs had a significant impact on improving fruit and vegetable consumption among children and youth aged 4 to 18 years old. While most programs took place in the school environment,

parents were also actively involved at home. Parental involvement is important given that parents who engage in healthy behaviours are more likely to increase the availability of fruits and vegetables in the home.<sup>31</sup> In Canada, more than 50% of households with children report involvement of children participating in grocery shopping and assisting with cooking and meal preparation.<sup>32</sup>

Although a low-to-moderate increase in FV intake was observed, most studies in the included reviews had no follow-up post intervention or had only short-term follow-up. As a result, the effectiveness of interventions may be underestimated as effects may build over time; or the effectiveness may be overestimated if children and youth revert back to baseline following the completion of the intervention. Future studies should include interventions that are at minimum 12 months in duration, as this has been identified as a key component for intervention success,<sup>28</sup> and a follow-up period that ideally takes place several months or years after an intervention. In doing so, the impact of food skills interventions on dietary modification and long-term maintenance of behavioural change can be better understood. Last, additional studies are needed to gain a better understanding of the effectiveness of the growing and diverse food skills interventions being implemented in Ontario, and Canada.

## Limitations

The limitations of primary studies were similar across all reviews. These included issues with methodological quality, short intervention durations, and lack of follow-up to assess long-term impact on FV consumption. Fruit and vegetable intake data was self-reported, which might have led to over-estimation of intake. Reviews also reported outcomes differently, with some reporting fruits and vegetables in terms of servings, and others reporting portions and/or grams. This made it challenging to compare results across reviews. No studies specific to Ontario or Canada were included in the reviews, which made it difficult to speak to local application of food skills interventions.

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## Specifications and Limitations of Evidence Brief

The purpose of this Evidence Brief is to investigate a research question in a timely manner to help inform decision making. The Evidence Brief presents key findings, based on a systematic search of the best available evidence near the time of publication, as well as systematic screening and extraction of the data from that evidence. It does not report the same level of detail as a full systematic review. Every attempt has been made to incorporate the highest level of evidence on the topic. There may be relevant individual studies that are not included; however, it is important to consider at the time of use of this brief whether individual studies would alter the conclusions drawn from the document.

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