FOOD LITERACY
BEST PRACTICES for PROGRAM DESIGN

FOOD MATTERS
MANITOBA

with support from the Public Health Agency of Canada

FOOD MATTERS MANITOBA
PARLONS ALIMENTATION

Public Health Agency of Canada
Agence de la santé publique du Canada

Summary

Food literacy is being proposed as a new model for interventions promoting access and enjoyment of healthy food. This report reviews a collection of papers from researchers working in public health, nutrition, and food studies in Canada, the US, Australia, and Europe.

The main components of food literacy that emerged were knowledge, skills, and perceptions or emotions around food, with the latter two, as well as critical knowledge, being particularly important. It was emphasized that interventions should be designed to be experiential and hands-on, and that content and delivery should be tailored to different populations. Children and youth and low-income households were most commonly identified as groups that could benefit the most from food literacy education. However, the evidence is complicated in both cases. While convenience foods have become more accessible, and there is some evidence that food skills are not being transferred to children and youth, more studies are needed to confirm the extent of this loss in a Canadian context. And while low-income households have been found to be lower in certain areas of food literacy, in other areas (such as the involvement of children in cooking in the home) they are higher (Hartman, Dohle, Siegrist 2013). Thus, it is again important that interventions be tailored to specific populations.

There is a call for greater access in Manitoba to food literacy education, particularly through the school system. Food literacy interventions have been found to have short-term effects in terms of changes in perception and dietary behaviour, but more evidence is needed on whether these changes are sustained. There is need to develop better validated evaluation tools, but a good strategy is to base program evaluation on the food literacy framework used.

It is hoped this review will enable Food Matters to use the concept of food literacy to design programs that empower people to choose and prepare healthy foods according to their culture and values, and use food to bring pleasure, empowerment, and meaning to their lives.

Contents

Introduction

Food literacy is being proposed as a new model for interventions promoting access and enjoyment of healthy food. The term originates from health literacy, which describes the ability `to access and interpret the information that empowers one to make decisions to support one's health (Velardo 2015). Food literacy expands upon models of nutrition education by incorporating other components of an individual's relationship to food beyond knowledge. By taking a more holistic approach, food literacy may prove to be more effective in influencing dietary behaviour, as well as encouraging awareness of the broader food system.

This report reviews a collection of papers from researchers working in public health, nutrition, and food studies in Canada, the US, Australia, and Europe. Some were studies of nutrition, food skills, or food literacy interventions, some sought to measure food literacy or food skills among certain populations, and some were scoping reviews examining how food literacy is being defined. This paper presents a description of the components of food literacy, as well as some best practices around choosing a target population, intervention design and evaluation, and what outcomes to expect.

What is Food Literacy?

Knowledge

Nutrition

Most papers identified knowledge as the first component of food literacy. This encompasses, first, nutrition knowledge (Perry et al, 2017, Desjardins & Alzevedo 2013, Doustmohammadian et al, 2017), which other papers break into: understanding what constitutes a healthy diet and how certain foods influence health (Call to Action, 2017, Cullen et al, 2015, Howard & Brichta 2013, Health Canada 2015, Vidgen & Gallegos 2014); familiarity with the basic nutrients of different foods (Call to Action, 2017); and knowing how to read a nutrition label (Howard & Brichta, 2013, Desjardins & Alzevedo 2013, Call to Action 2015, Health Canada 2015), including understanding nutrition language ("e.g. high fibre, low sodium") (Perry et al 2017).

Critical Knowledge

There is a trend towards expanding food literacy to include holding a critical understanding of the wider food system. Truman et al (2017), for instance, offer two definitions of food literacy in their paper, and their second definition centres exclusively on food literacy as critical knowledge (Truman et al, 2017). A critical perspective in this case means being able to understand the different values and relationships of power at play in the food system, and to imagine other possibilities (Sumner 2015).

Critical knowledge is an important aspect of food literacy, not only as part of food knowledge, but also for understanding the context in which food literacy occurs. The trend towards food deskilling (which is continually cited as the impetus for food literacy programs) is not an apolitical problem. Food illiteracy occurs in the context of the global market-based food system, a system guided by the interests of corporations above all else (Engler-Stringer 2010). In addition to contributing to food illiteracy, this system is at the root of a myriad of related issues centering on health, social justice, economic equality, and the

environment. In order to challenge these problems, people must first be made aware of them through a process of education or consciousness-raising—this is critical food knowledge (Sumner 2015).

Sumner (2015) describes how "critical food pedagogies" help people learn the knowledge and skills to question the status quo, which in the case of food is "the norms, rules, skills and values of the global market." Critical food knowledge means understanding the entire food system from farming through to consumption and food waste (Howard & Brichta 2013), including the implications behind alternative ways of growing and eating. It involves an understanding of the different dimensions of food—how eating is an agricultural, social, political, cultural, economic, and environmental act (Sumner 2015). This includes being able to "analyze discourses around the socio-political impacts of the food system (Goldstein 2014).

While food literacy is an individual attribute, critical food knowledge encourages collective action by encouraging people to consider the role they play in the food system and how they can influence change (Truman et al, 2017). This critical aspect is important because without conscious attention to it, food literacy programs may end up imparting only individualist skills and knowledge (Wever 2015, Goldstein 2014). While these types of skills may be useful, by treating participants as simply consumers and not citizens these programs do not challenge the framework set by the corporate food system (Wever 2015, Goldstein 2014, Sumner 2015). Critical food knowledge allows people to participate in the wider food system as citizens, making informed decisions that support not only their health, but their values.

Nutrition knowledge and critical knowledge comprise the main types of knowledge that make up food literacy. These are not necessarily mutually exclusive—for example, the "Health at Every Size" campaign nests the promotion of healthy eating inside a critical awareness of the social, economic, and political factors that affect nutritional health and body weight (Bacon 2018). Another important way in which food literacy expands upon nutrition-education is how it incorporates practical knowledge and skills as well. While knowledge allows one to make an informed decision about *what* to do, practical knowledge enables one to actually do something. Practical knowledge includes knowing how to safely prepare and store different types of food (food safety knowledge) (Howard & Brichta 2013, Desjardins & Alzevedo 2013, Doustmohammadian 2017, Health Canada 2015), meal planning, using a grocery list, and budgeting skills (Health Canada 2015).

Skills

The second main component of food literacy are food skills. While knowledge is usually listed as the first component of food literacy, the focus on skills is often described as what distinguishes food literacy from nutrition-based frameworks (Vidgen & Gallegos 2014). In their review of how food literacy is being defined, Krause & Sommerhalder (2016) found that "practical knowledge and skills to regulate food intake, including skills for planning meals, selecting, and preparing food" was a central part of all conceptual frameworks they found.

Some of the studies examined focused on measuring 'food skills' or 'cooking skills,' without using the term food literacy, but their insights can be incorporated into a wider food literacy framework.

Cooking skills

Common components of cooking skills include: basic skills such as chopping and measuring (Health Canada 2015, Call to Action 2017), and knowing how to use a variety of kitchen implements (Health

Canada 2015, Desjardins & Alzevedo 2013, Vidgen & Gallegos 2014), knowing how to follow a recipe (Call to Action, Desjardins & Alzevedo 2013, Health Canada 2015), and being able to select and prepare foods in a timely manner (Vidgen & Gallegos 2013).

Also important was 'food conceptualization,' or the ability to adapt recipes or make up a healthy and tasty meal using the ingredients available (Health Canada 2015, Vidgen & Gallegos 2014, Desjardins & Alzevedo 2013).

Attitude, Emotions, & Perceptions

The third commonly identified dimension of food literacy is the importance of positive attitudes, emotions, and perceptions (Truman et al 2017). This includes one's attitude towards food, and towards one's self in relation to food. Krause & Sommerhalder (2016) call this the "attitudes, awareness, motivation, or concrete behaviour to act on knowledge and skills."

Some researchers noted how this psycho-emotional aspect can function as a mechanism of food literacy, by determining one's motivation to develop food skills or knowledge (Cullerton, Vidgen, & Gallegos, 2012). However, a more positive attitude towards food is also an *outcome* of developing greater skills and knowledge. The relationship is one of mutual influence.

Capacities

The capacity of confidence is one component. Desjardins & Alzevedo (2013) in particular emphasize the psycho-social aspect of food literacy and argue that food literacy starts with feeling "capable and motivated" to select and prepare healthy food. Others call this a feeling of 'self-efficacy' (Doustmohammadian et al, 2017, Perry et al, 2017, Desjardins & Alzevedo 2013, Call to Action 2017).

Another capacity is creativity (Doustmohammadian et al, 2017)—this is the psychological capacity underlying the ability to conceptualize food, one of the skills noted above.

Positive emotions

A positive attitude is defined as the pleasure and satisfaction one takes from preparing food (Cullerton, Vidgen, & Gallegos 2012), including the pleasure of social connection that comes from cooking and sharing a meal with other people (Desjardins & Alzevedo 2013, Vidgen & Gallegos 2014). Researchers also noted the importance of having positive emotions towards healthy foods such as fruits and vegetables, and being open to trying new foods (Call to Action 2017). Recognizing the feelings of health and wellbeing that come from consuming nutritious food also contributes to a positive attitude (Desjardins & Alzevedo 2013, Call to Action 2017).

Ecological Factors

The majority of food literacy components are centered on the individual. A few researchers, however, noted the role of the external environment on an individual's food literacy (Desjardins & Alzevedo 2013, Perry et al 2017, Vidgen & Gallegos 2014, Howard & Brichta 2013). These factors may overlap with social determinants of health (Call to Action 2017, Perry et al 2017). Desjardins & Alzevedo (2013) and Perry et al (2017) both constructed two complementary conceptual models for food literacy—one for 'internal' and one for 'external' factors. Common external factors include: socio-cultural environment, learning environment,

and infrastructure and population-level determinants such as living conditions, availability of food, and cooking facilities (Desjardins & Alzevedo 2013, Perry et al 2017). Others described external factors such as these as a mediator or mechanism of food literacy, rather than a component in itself (Cullerton, Vidgen, & Gallegos 2012, Howard & Brichta 2013).

Many researchers described the external factors relating to food literacy in terms of food security, which is defined as the ability to conveniently access affordable, healthy, and culturally preferred food. While food skills belong to individuals, food security is a characteristic of a household or community (Cullen, Hatch, Martin et al 2015). In one case, Cullen, Hatch, Martin et al (2015) defined food literacy as the intersection between community food security and individual food skills. In the other papers, food literacy and food security were described as mutually influencing each other, with food security being described as an outcome as well as a determinant of food literacy. In the latter case, Perry et al (2017) describe the financial capacity to access foods as one of the wider ecologic, or "infrastructure and population-level determinants" of food literacy. One a more personal level, Desjardins & Azevedo (2013) describe household food security as one of the psycho-social dimensions of food literacy.

Most researchers focused on food security as an outcome of food literacy, by helping people to purchase and cook more nutritious meals on a lower budget (Dytnerski 2016). Food literacy could provide greater choice and control over foods and help those living in food insecure environments to be more resilient (Chenhall 2012, Vidgen & Gallegos 2014). While improving food skills has the potential to increase food security, it is important to note that food insecurity is not a *result* of lack of food skills (Huisken, Orr, & Tarasuk 2016). That is, it is not a result of internal factors (behavior) but rather the result of material deprivation (external factors). It has been found that lower-income households are more likely to cook food at home, suggesting that some people living in food insecure households may actually already possess higher food literacy skills in terms of knowing how to shop on a budget and prepare nutritious food cheaply (Desjardins & Azevedo 2013). Food security is one determinant of food literacy, and food literacy programs may be able to support community food security. However, one may be present without the other.

Conclusion

The main components of food literacy are (1) knowledge, which allows one to make informed choices when purchasing and consuming food; (2) practical knowledge and skills that allow one to select, store, and prepare healthy and enjoyable food; (3) attitudes, perceptions, and emotions that encourage one to engage in preparing and consuming healthy food. Ecological or external factors are influences on individual food literacy and are equally important to consider when designing interventions.

Canadian & Manitoban Context

The selection of papers provided only a small amount of information about the Canadian and Manitoba context. The main sources of information are Health Canada's Canadian Community Health Survey (2015) on food skills and the Conference Board of Canada's assessment of food literacy in Canada (2013), as well as Dytnerski's (2016) analysis of food literacy in Manitoba.

Canada

Health Canada (2015) implemented the Canadian Community Health Survey (CCHS) to assess Canadians' food skills. They found the majority of Canadian households already plan meals and make a grocery list before shopping, with higher income, post-secondary, non-immigrants more likely to do so. Children were more likely to be involved in meal preparation in lower-income and single-parent households, but adolescents only help out in the kitchen once or twice per week (Health Canada 2015). Women report higher food skills than men—they were more likely to be involved in preparing food, and had higher planning, planning, and food conceptualisation skills. Higher consumption of fruits and vegetables, and better perceived health, was found to associated with higher food skills and choosing foods based on nutrition labels (Health Canada 2015).

A survey from the Conference Board of Canada looked at Canadians' food literacy specifically (Howard & Brichta 2013). They found that Canadians do have adequate knowledge around food and nutrition, but do not always apply it. A main area where Canadians were inadequate was in numeracy skills, which are needed to understand food labels. Canadians could also improve on budgeting skills, and planning skills to reduce food waste. The Conference Board also found a discrepancy in between genders, with women, particularly those of higher income, having more nutrition knowledge (Howard & Brichta 2013).

Both the Conference Board and the CCHS survey found that time was most often reported as a barrier to cooking, including cooking as a family (Howard & Brichta 2013, Health Canada 2015).

The Conference Board found that there is evidence that food skills are not being transferred to children and youth, but that there is a need for more research on whether cooking skills are actually decreasing overall in Canada. There is also a need for more evidence on the link in between food literacy and eating behaviours (Howard & Brichta 2013).

Manitoba

Evidence from the CCHS collected in 2014 suggests that only 31.0% of Manitobans aged 12 and up consume five or more fruits and vegetables a day, lower than the average Canadian (Dyternerski 2016).

The Manitoba Youth Health Survey, conducted in 2012-13 by public school students in Grades 7 to 12, found only 38% of Manitoban youth are getting seven or more fruits and vegetables a day (Dytnerski 2016). Dytnerski (2016) conducted an assessment of the Manitoba school curriculum in terms of food literacy education, and found that while there is food literacy content in both elementary and high school classes, these courses need to be made mandatory in order to ensure students are benefiting from them. According to surveys conducted in downtown Winnipeg between 2012 and 2014 by Food Matters Manitoba, Manitobans are calling for greater access to food literacy education (Dytnerski 2016). Dytnerski also notes that further research is needed to understand the full context of food literacy in Manitoba.

Best Practices in Program Design

This section draws on studies of specific interventions, as well as reviews of multiple interventions, to learn about best practices in relation to design. The design of interventions depends in part on the context of the

program and the target population. Most interventions reviewed here took the form of basic cooking skills programs, held for schools or for the community in general.

Consumers (participants)

The most common consumers of programming are children and youth, and low-income participants. There is a certain amount of evidence for a loss of cooking skills among younger generations, potentially due to the increased availability of convenience foods and lack of cooking skills being passed on from parents (Chenhall 2012, Dytnerski 2016, Howard & Brichta 2013). Youth are commonly targeted because they have been identified as having poorer eating habits compared to other age groups (Vaitkeviciute, Ball, & Harris 2015). Young people are also a good target as learning more food literacy skills at a young age can have a greater impact on behaviour over the course of one's life (Dytnerski 2016).

Desjardins & Alzevedo (2013) also identified young people who have recently left home, or had children, as people who may be more likely to be interested in developing more food skills (Desjardins & Alzevedo 2013). There is a challenge with balancing attracting people who are interested with people who are in need—some people may be interested in the program because they already have cooking skills which they would like to develop further, rather than a pressing deficit (Herbert, Flego, & Gibbs 2014).

Low-income and at-risk populations were also commonly targeted (Cullerton, Vidgen, & Gallegos 2012). At-risk is defined as being vulnerable due to certain social, ethnic, or economic characteristics—the social determinants of health (Desjardins & Alzedo 2013). These groups are more vulnerable to food insecurity as well. However, while these groups may have more difficult accessing healthy food, studies have also shown that those in lower socioeconomic groups, including children, may have higher food literacy as they are more likely to prepare or help prepare meals from scratch (Chenhall 2012, Health Canada 2015). Another common target is new immigrants, who may be food literate in their own country, but lack the knowledge, access, or familiarity with food literacy in order to navigate their new country's food system (Howard & Brichta 2013).

Howard & Brichta (2013) suggest that in a Canadian context Aboriginal peoples may be a good target for food literacy programs. While information on food literacy in Aboriginal communities is lacking, in remote and northern Aboriginal communities there is evidence of a transition from more nutritious traditional foods to store-bought foods, with negative consequences for health. It would be useful to know more about food literacy and healthy eating among urban Aboriginal peoples (Howard & Brichta 2013). Also, while some programs target women specifically, a program aimed at boys and/or men may be equally worthwhile, particularly given that women have been shown to have superior food literacy skills compared to men (Chenhall 2012).

As mentioned before, it is important that the program be tailored to fit participants' specific needs (Howard & Brichta 2013). For example, interventions for older adolescents may include more critical thinking components than for younger (Brooks & Begley 2014). Adapting the program to target a specific gender may also be beneficial, however, more research is needed to know what that might look like (Brooks & Begley 2014). For programs targeting children, parental involvement may be beneficial for the child's engagement, and extend the impacts of the program into the broader household (Brooks & Begley 2014).

Content

Programs can employ theoretical methods to teach information about healthy eating (for example using Canada's Food Guide), food safety (Call to Action 2017), and lessons about the food system and how to negotiate it (Howard & Brichta 2013, Chenhall 2012). Successful interventions also included experiential learning, which was found to be particular effective for teaching practical skills (Ronto et al 2016). Examples of such skills include: how to identify fruits and vegetables (Jarpe-Ratner, Folkens, Sharma et al 2016), ingredient substitution, how to shop for healthy food (perhaps through a grocery store tour) (Call to Action 2017), and how to prepare basic foods with limited resources (Desjardins & Azevedo 2013). Hands-on teaching, in which participants are able to prepare and cook new food and try out new techniques, read a nutrition label, or plan a meal themselves can increase engagement, knowledge retention, and help instill confidence (Brooks & Begley 2014, Cullerton, Vidgen & Gallegos 2012, Call to Action 2017, Desjardins & Azevedo 2013, Chenhall, 2012). It is recommended to include both theoretical and experiential learning, with an emphasis on the latter (Desjardins & Azevedo, 2013).

Cooking lessons most often employ either the recipe or pantry method—Cullerton, Vidgen & Gallegos (2012) report in their review that the latter method was more popular among participants "as they learnt from peers, it was more realistic and it was good for low literacy/numeracy levels." Others found that for those who were not complete beginners, recipes worked well, but that generally, participants enjoyed improvising more (Desjardins & Azevedo, 2013**).** Providing a basic recipe with different options for ingredients is one way to create an opportunity for creativity (Brooks & Begley 2014).

Having participants teach each other can help reinforce lessons and model positive behaviour (Brooks & Begley, 2014). Desjardins & Azevedo (2013) suggest recruiting people to be peer leaders. Creating opportunities for the development of positive relationships among participants can support participant recruitment and retention (Cullerton, Vidgen, & Gallegos, 2012), and supporting social networks and a positive environment around food in general can help with all aspects of food literacy (Desjardins & Azevedo 2013, Ronto et al 2016). For interventions focused on children and youth, fostering parental involvement may help create this positive environment (Howard & Brichta 2013)—however Hersch, Perdue, Ambroz et al (2014) note that it is unclear whether this has a notable influence. A positive approach—that influences what participants *should* eat, rather than what they should not, is helpful (Howard & Brichta 2013).

Cullerton, Vidgen & Gallegos (2012) found that gardening-based programs incorporated more of their framework's food literacy mediators and mechanisms compared to other programs, including those related to the external challenges of food supply and food security, which many programs do not address. It was suggested that gardening programs have the potential to promote food security by providing participants with the skills to create and manage their own source of healthy foods—however, the actual outcomes and benefits found in these interventions were limited to an increase the likelihood of cooking and gardening in the future (Cullerton, Vidgen, & Gallegos, 2012), and as a good opportunity for hands-on learning (Brooks & Begley 2014). In other words, It seems there is little evidence of gardening significantly impacting food insecurity. In another study, Huisken, Orr, and Tarasuk also found that gardening was ineffective in reducing food insecurity, although they admit more research between different scales (home gardening versus community gardening) is needed (Huisken, Orr , & Tarasuk 2016).

Electronic media could be a useful resource for interventions (Brooks & Begley 2014). Possible applications include helping people curate and share information about food literacy through the internet, or use tracking apps to keep track of their food purchasing or consumption (Martinez-Maldonado et al 2016).

Location and Duration

Schools are an effective way to reach children and youth, a main target of food literacy interventions, particular when programs are incorporated into the curriculum (Brooks & Begley, 2014, Dytnerski 2016, Desjardins & Azevedo, 2013, Ronto et al 2016, Howard & Brichta 2013). For households that may be less food literate, schools are an avenue for students to positively influence their home environments. For other populations, community centres (such as "community cafes, adult education centres, child & family centres") (Cullerton, Vidgen, & Gallegos, 2012) provide a safe and familiar setting. It's important to consider the accessibility of centres relative to where target participants live, and what it might cost participants to attend—some programs provide bus tickets (Desjardins & Azevedo, 2013).

It is important that the facility is well-stocked with kitchen equipment for participants to use to prepare and store food safely (for example slow cookers, cookbooks, etc.) (Call to Action 2017, Desjardins & Azevedo, 2013). Depending on funds, interventions may also provide these types of tools for participants to have at home, to help them use their new skills in the long-term (Desjardins & Azevedo, 2013).

Programs of longer (minimum of four sessions) rather than shorter duration are recommended, with a minimum frequency of once a week to be effective (Brooks & Begle 2014, Chenhall 2014, Jarpe-Ratner, Folkens, Sharma et al, 2016). Longer programs can provide a broader range and depth of education, and "better incorporate a culture of wellness" into their specific setting (Hersch, Perdue, Ambroz et al, 2014). While consistency in terms of frequency is important, offering programs at flexible times was also considered helpful for participation (Cullerton, Vidgen, & Gallegos, 2012).

Incentives

Having participants eat the meals they prepare, either at the end of the class or later at home, is a good incentive and may also help to increase enjoyment of new foods (Desjardins & Azevedo, 2013, Whiteley & Matwiejczyk 2015, Jarpe-Ratner, Folkens, Sharma et al 2016). Offering other incentives is recommended as well, for example: awarding completion certificates (Brooks & Begley 2014), grocery gift cards (Call to Action 2017), or cooking equipment (Cullerton, Vidgen, & Gallegos 2012). For programs that are associated with a school, providing participants with an extra credit may encourage attendance (Cullerton, Vidgen, & Gallegos 2012). Depending on the demographics of participants, providing childcare may increase attendance (Cullerton, Vidgen, & Gallegos 2012).

Involvement

Program design should take into account the specific cultural and social context of participants in relation to food (Dytnerski 2016, Howard & Brichta 2013, Chenhall, 2012). Different groups may have different learning styles, face different challenges, and be interested in learning how to prepare different types of food or meals (Dytnerski 2016, Chenhall 2012). It is recommended to provide an opportunity for participants to identify their interests themselves (Desjardins & Azevedo 2013)—for example, to select

which recipe they would like to prepare (Brooks & Begley 2014). Including a range of cultural foods and dishes is recommended (Brooks & Begley 2014, Howard & Brichta 2013). ‘

Depending on the setting, involving a community worker in facilitation or program design may be one way to encourage a sense of community ownership (Cullerton, Vidgen, & Gallegos 2012). Whether the facilitator is from the community or not, it is important that they are trained and knowledgeable about the skills they are being asked to deliver (Howard & Brichta 2013). Interventions can also benefit from partnerships with a wide variety of stakeholders (Vidgen & Gallegos 2011) including the health region (Desjardins & Azevedo 2013), schools, local culinary professionals, or food producers (Dytnerski 2016).

Conclusion

Further research is still needed to provide more evidence on best practices in terms of program design (Hersch, Perdue, Ambroz et al 2014). However, commonly agreed upon practices included: tailoring programs to different target populations, focusing on experiential learning, ensuring the location is accessible, striving for longer and more frequent programs, and including A few papers also noted that beyond interventions, policy change is another strategy for supporting food literacy and related outcomes (Desjardins & Azevedo 2013, Call to Action 2017). Policy change may be the best way to influence the greatest number of people, by addressing systematic problems rather than individual behaviour (Dytnerski 2016). Policy is important for addressing the external determinants of food literacy such as food security (for example through poverty reducing measures such as basic income, affordable transportation and housing, childcare, or ensuring access to grocery stores in low-income neighbourhoods) (Chenhall 2012). Education is a policy area for addressing food literacy more directly (Chenhall 2012)—Dytnerski (2016) in particular presents a strong argument for increasing food literacy content within the Manitoba school curriculum.

Outcomes of Food Literacy Interventions

Nutrition education interventions have been successful at improving nutrition-related knowledge, but this has not always resulted in changes in dietary behaviour. As food literacy interventions address a wider variety of factors, they could be more successful in creating behaviour change (Vaitkeviciute, Ball, & Harris 2015). In addition to nutrition knowledge and dietary behaviour, common outcomes measured in these papers centred on increased cooking skills and increases in positive perceptions around food and cooking. In some cases, outcomes were small but sustained (Herbert, Flego, Gibbs et al 2014), while in others, it was impossible to know how sustainable changes were in the long-term (Hersch, Perdue, Ambroz et al 2014). While a program may succeed in creating the intention to change, it is important to distinguish this from actual changes in behaviour (Howard & Brichta 2013). In general, interventions have seen positive short-term and medium-term changes, but lack evaluative evidence on long-term.

Dietary behaviour outcomes

All interventions measured some outcome related to dietary behaviour, likely because this is seen as having the most direct bearing on physical health. Many interventions used fruit and vegetable consumption to assess dietary intake, with mixed results. Many found positive short-term results—Whiteley & Matwiejczyk (2015) found that children in their school-based intervention did eat more vegetables, and

Vaitkeviciute, Ball, & Harris (2015) found in their review that Caraher et al (2013)'s intervention increased vegetable consumption among 9-11 year-olds. However, in their review of the evidence for cooking programs and changes in food behaviour among children, Hersch, Perdue, Ambroz et al (2014) found that results were mixed in terms of fruit and vegetable consumption.

In terms of dietary behaviour more broadly, there is some evidence that improving food literacy may improve, or potentially improve, dietary behaviours among adolescents (Vaitkeviciute, Ball, & Harris, 2015, Desjardins & Alzevedo 2013). However, Brooks & Begley (2014) found in their review that the majority of studies did not measure for changes in dietary behaviour, and that significant dietary behavioural change resulting from interventions was limited.

Other more specific outcomes include spending less on fast food and more on fruits and vegetables (Herbert, Flego, Gibbs et al, 2014), preparing meals oneself more frequently (Desjardins & Alzevedo 2013), and increased eating at the dinner table or with others (Herbert, Flego, Gibbs et al, 2014).

Attitudes, Emotions, & Perceptions Outcomes

As noted before, one of the important characteristics of food literacy is how it includes attitudes and perceptions towards food. Thus, the second set of outcomes seen from food literacy interventions relate to positive changes in attitude. After a school-based cooking programme, for example, adolescents reported experiencing enjoyment from trying new foods, cooking new dishes and learning new cooking skills (Vaitkeviciute, Ball, & Harris 2015). While these may be short-term changes, these emotions may also be the starting point for more substantial behaviour change in the future. As another example, an increase in fruit and vegetable consumption may begin with the development of more positive emotions towards fruits and vegetables and an increased openness to trying new foods (Hersch, Perdue, Ambroz et al 2014, Cullerton, Vidgen, & Gallegos 2012). It is therefore important not to discount changes in emotions and perceptions as outcomes.

Researchers found that interventions resulted in an increase in confidence in cooking among adolescents (Vaitkeviciute, Ball, & Harris 2015), as well as a general increase in confidence and self-esteem among youth and children (Cullerton, Vidgen, & Gallegos 2012, Herbert, Flego, Gibbs et al 2014, Hersch, Perdue, Ambroz et al 2014). In a community-wide intervention, researchers found an increase in the number of people confident they could prepare a meal cheaply from basic ingredients (Herbert, Flego, Gibbs et al 2014).

Herbert, Flego, Gibbs et al (2014) noted no change in physical health as measured through self-reported BMI, but did note an increase in self-reported perceptions of general health (Herbert, Flego, Gibbs et al, 2014). Participants in Desjardins & Alzevedo's (2013) study about the meaning of food literacy suggested "feeling better, physically and mentally" and "improved response to change" as potential outcomes of increased food literacy.

The same participants also reported increased enjoyment of cooking and positive feelings of satisfaction from preparing a healthy meal for themselves or others (Desjardins & Alzevedo 2013, Herbert, Flego, Gibbs et al 2014, Cullerton, Vidgen, & Gallegos 2012). Participants also reported their new skills led them to take more pleasure in cooking for others (Herbert, Flego, Gibbs et al, 2014). The social

connections from cooking and sharing food with others were also positive emotional outcomes in their own right (Cullerton, Vidgen & Gallegos 2012, Desjardins & Alzevedo, 2013).

Knowledge & Skill Outcomes

Papers reported less on knowledge and skill-related outcomes (perhaps because of redundancy, given that these are the areas that can be directly taught). Hersch, Perdue, Ambroz et al (2014) report an increase in food preparation skills among children, and Vaitkeviciute, Ball, & Harris (2015) report an increase in more specific food skills among adolescents, including "cutting fruits and vegetables, following recipes, measuring ingredients and preparing foods." In terms of knowledge, Herbert, Flego, Gibbs et al (2014) found no significant change in knowledge around salt, sugar, and fat after their community cooking skills program. However, they did find a small increase in participants' knowledge that fruits and vegetables can be cheaper than unhealthy food, as well as an increase in the number of participants who believed they could prepare a healthy meal without spending too much money (Herbert, Flego, Gibbs et al, 2014). Whiteley & Matwiejczyk (2015) found that children had more knowledge about the different types of vegetables and could identify them more easily—the increase in vegetable consumption they found was perhaps associated with this knowledge (Whiteley & Matwiejczyk 2015).

Ecological outcomes

Outcomes related to the external component of food literacy are usually described as increasing food security. While this may be a key aspect in supporting long-term changes, researchers note that it is harder to produce significant outcomes in this area (Cullerton, Vidgen, & Gallegos 2012). Improved food security is defined as improving access to healthy and affordable food (Cullen, Hatch, Martin et al 2015).As was discussed in section one under critical food knowledge, there is some evidence for higher household food security being a potential outcome of food literacy (Dytnerski 2016, Desjardins & Alzevedo 2013). Food literacy may support food security by encouraging self-determination in terms of increasing options for what types of food people can access and prepare (Krause, Sommerhalder et al 2016). However, Vidgen & Gallegos (2014) describe food security as working separately from food literacy to support healthy eating behaviour, with the former relating to social and political contexts and the latter relating to individual knowledge and skills. In other words, they do not view the relationship between food literacy and food security as one of cause and effect, but describe them coming together to determine eating behaviours. In addition, a study of the correlation between food skills and food insecurity found no correlation in between lack of food skills and food insecurity, and found that supporting gardening projects did not improve food security (Huisken, Orr, & Tarasuk, 2016). The evidence for food security outcomes is therefore mixed.

Conclusion

Main outcomes from food literacy interventions can be grouped into changes in dietary behaviour, changes in perception and feelings towards food, and a potential increase in food security. More evidence is needed to measure whether outcomes can be sustained for the long term (Cullerton, Vidgen, & Gallegos 2012). However, there is evidence that adolescents maintain learned food skills and habits into later life (Vaitkeviciute, Ball, & Harris 2015).

Evaluating Food Literacy Interventions

Many programs are not adequately evaluated, despite the fact that being able to prove results can help in securing funding (Howard & Brichta 2013). This is mainly due to a lack of proven evaluation tools (Palumbo et al 2017). In their review, Cullerton, Vidgen, & Gallegos (2012) noted a lack of consistency among programs in terms of outcomes being measured as well as the measurement tools being used. There is a problem with programs not tracking quantifiable data (Howard & Brichta 2013). It is important that programs have clearly defined goals or objectives by which they can measure their effectiveness, and that they identify these early on in the design (Howard & Brichta 2013). As well as looking at outcomes, programs ought to include some kind of process evaluation (Cullerton, Vidgen, & Gallegos 2012). Broader effects, outcomes, and impacts can be internally or externally assessed (Brooks & Begley 2014). Better standardized tools and more consistent evaluation practices would enable researchers to compare programs and better understand what an effective intervention looks like (Howard & Brichta 2013, Health Canada 2015, Cullerton, Vidgen, & Gallegos 2012, Hersch, Perdue, Ambroz et al, 2014).

Recommendations

Many researchers offered recommendations for evaluating programs. The first was to use validated assessment tools (Brooks & Begley 2014, Cullerton, Vidgen, & Gallegos 2012). Doustmohammadian et al (2017) describe how they developed and validated a questionnaire to measure food and nutrition literacy in schoolchildren in Iran, resulting in a forty-six question scale of mostly likert question. Other recommendations include: use goals set by participants themselves for process and impact evaluations, and do not neglect to measure changes in dietary behaviour (Brooks & Begley 2014). More longitudinal evaluations are needed, for example six months after a program's end, as they are important for providing evidence of long-term impacts (Herbert, Flego, Gibbs et al 2014, Howard & Brichta 2013).

It was recommended to use the program's food literacy model to guide evaluation (see Cullerton, Vidgen, & Gallegos (2012) for an example of how their framework provides a template for process, impact, and outcome evaluations). Palumbo et al (2017) observed that most studies only measure one or two aspects of food literacy (most commonly food knowledge)—their assessment tool is based on a broad definition of food literacy and attempts to capture aspects of all three dimensions of knowledge, skills, and attitudes. Others suggest that different assessment tools should be developed for different aspects of food literacy, or different populations (Truman et al 2017). For example, quantitative questionnaires can be useful for assessing dietary intake and behaviour, while qualitative interviews may be better for assessing changes in perceptions and emotions towards food (Vaitkeviciute, Ball, & Harris 2015).

Evaluation Methods

In line with this, many studies used or recommended mixed methods (Howard & Brichta 2013), with questionnaires (before and after intervention) being the main quantitative method used (and main tool overall) (Palumbo et al 2017, Doustmohammadian et al 2017, Whiteley & Matwiejczyk 2015), and interviews, focus groups, or sometimes photo voice the main qualitative (Brooks & Begley 2014). While quantitative data is useful for providing data that is easy to communicate and compare, qualitative data is important given the diverse aspects of food literacy, as well as capturing the vast differences across contexts (Velardo 2015). Most evaluation methods rely on self-assessment, the accuracy of which is

subjective. However, there are few viable alternatives. Asking participants to assess their own behaviour may actually support behaviour change by providing an opportunity for critical reflection (Howard & Brichta 2013).

Conclusion

There is a significant need to develop consistent and validated evaluation tools for food literacy programs. The food literacy framework used may provide a good starting point. Different evaluation tools or frameworks can be used to assess different aspects of food literacy.

Conclusion

Food literacy is an emerging concept which is being defined as it is being implemented. This literature review analyzes a collection of papers from researchers working in public health, nutrition, and food studies. The main components of food literacy that emerged were knowledge, skills, and perceptions or emotions around food, with the latter two, as well as critical knowledge, being particularly important. It was emphasized that interventions should be designed to be experiential and hands-on, and that content and delivery should be tailored to different populations. Children and youth and low-income households were most commonly identified as groups that could benefit the most from food literacy education. However, the evidence is complicated in both cases. While convenience foods have become more accessible, and there is some evidence that food skills are not being transferred to children and youth, more studies are needed to confirm the extent of this loss in a Canadian context. And while low-income households have been found to be lower in certain areas of food literacy, in other areas (such as the involvement of children in cooking in the home) they are higher (Hartman, Dohle, Siegrist 2013). Thus, it is again important that interventions be tailored to specific populations.

There is a call for greater access in Manitoba to food literacy education, particularly through the school system. Food literacy interventions have been found to have short-term effects in terms of changes in perception and dietary behaviour, but more evidence is needed on whether these changes are sustained. There is need to develop better validated evaluation tools, but a good strategy is to base program evaluation on the food literacy framework used.

It is hoped this review will enable Food Matters to use the concept of food literacy to design programs that empower people to choose and prepare healthy foods according to their culture and values, and use food to bring pleasure, empowerment, and meaning to their lives.

Works Cited

Bacon, Linda. (2018). “Health at Every Size.” https://haescommunity.com/pledge/

Brooks, N., & Begley, A. (2014). “Adolescent food literacy programmes: A review of the literature.” *Nutrition and Dietetics*, 71(3): 158–171. https://doi.org/10.1111/1747-0080.12096

Chenhall, C. (2012). “Improving Cooking and Food Preparation Skills: A Synthesis of the Evidence to Inform Program and Policy Development.” *Healthy Living Issue Group (HLIG)* of the *Pan-Canadian Public Health Network*.

Cullerton, K., Vidgen, H. A., & Gallegos, D. (2012). “A review of food literacy interventions targeting disadvantaged young people.” Queensland University of Technology, 1–47.

Desjardins, & Azevedo. (2013). “Making something out of nothing: Food literacy among youth, young pregnant women, and young parents who are risk for poor health.” A Locally Driven Collaborative Project, funded by Public Health Ontario.

Doustmohammadian, A., Omidvar, N., et al. (2017). “Developing and validating a scale to measure Food and Nutrition Literacy (FNLIT) in elementary school children in Iran.” PLoS ONE, 12(6): 1–19. https://doi.org/10.1371/journal.pone.0179196

Dytnerski, A. (2016). “Improving the Food Skills and Food Literacy of Manitoba’s Children and Youth: A Population Health Approach.” Winnipeg Regional Health Authority & Food Matters Manitoba.

Engler-Stringer, R. (2010). “Food, cooking skills, and health: A literature review.” *Canadian Journal of Dietetic Practice and Research*, 71(3): 141–145. https://doi.org/10.3148/71.3.2010.141

Goldstein, S. (2014). “Advancing Youth Education on Food and Food Systems to Increase Food Literacy.” Faculty of Environmental Studies, York University.

Health Canada. (2015). “A look at food skills in Canada.” Pp. 1-6.

Herbert, J., Flego, A., Gibbs, L., Waters, E., Swinburn, B., Reynolds, J., & Moodie, M. (2014). “Wider impacts of a 10-week community cooking skills program--Jamie’s Ministry of Food, Australia.” BMC Public Health, 14: 1161. https://doi.org/10.1186/1471-2458-14-1161

Hersch, D., Perdue, L., Ambroz, T., & Boucher, J. L. (2014). “The Impact of Cooking Classes on Food-Related Preferences, Attitudes, and Behaviors of School-Aged Children: A Systematic Review of the Evidence, 2003–2014.” Preventing Chronic Disease, 11(2): 140267. https://doi.org/10.5888/pcd11.140267

Howard, A., & Brichta, J. (2013). “What’s to Eat? Improving Food Literacy in Canada,” (October): 70. Retrieved from http://www.conferenceboard.ca/cfic/research/2013/whatstoeat.aspx

Huisken, A., Orr, S. K., & Tarasuk, V. (2016). “Adults’ food skills and use of gardens are not associated with household food insecurity in Canada.” Canadian Journal of Public Health: 107(6): e526–e532. https://doi.org/10.17269/CJPH.107.5692

Jarpe-Ratner, E., Folkens, S., Sharma, S., Daro, D., & Edens, N. K. (2016). “An Experiential Cooking and Nutrition Education Program Increases Cooking Self-Efficacy and Vegetable Consumption in Children in Grades 3–8.” *Journal of Nutrition Education and Behavior*, 48(10), 697–705.e1. https://doi.org/10.1016/j.jneb.2016.07.021

Krause, C., Sommerhalder, K., Beer-Borst, S., & Abel, T. (2016). "Just a subtle difference? Findings from a systematic review on definitions of nutrition literacy and food literacy." *Health Promotion International*: pp. 1–12 doi: 10.1093/heapro/daw084

Martinez-Maldonado, R., Anderson, T., Shum, S. B., & Knight, S. (2016). Towards supporting awareness for content curation: The case of food literacy and behavioural change. CEUR Workshop Proceedings, 1596: 42–46.

Palumbo, R., Annarumma, C., Adinolfi, P., Vezzosi, S., Troiano, E., Catinello, G., & Manna, R. (2017). "Crafting and applying a tool to assess food literacy: Findings from a pilot study." *Trends in Food Science and Technology*, 67: 173–182. https://doi.org/10.1016/j.tifs.2017.07.002

Perry, E. A., Thomas, H., Samra, H. R., Edmonstone, S., Davidson, L., Faulkner, A., … Kirkpatrick, S. I. (2017). "Identifying attributes of food literacy: A scoping review." *Public Health Nutrition*,: 20(13), 2406–2415. https://doi.org/10.1017/S1368980017001276

Ronto, R., Ball, L., Pendergast, D., & Harris, N. (2016). "Adolescents' perspectives on food literacy and its impact on their dietary behaviours." *Appetite*, 107: 549–557. https://doi.org/10.1016/j.appet.2016.09.006

Sumner, J. (2015). "Learning to Eat with Attitude: Critical Food Pedagogies." *Critical Food Studies: Food Pedagogies*: 201–214.

Truman, E., Raine, K., Mrklas, K., Prowse, R., Den Hoed, R. C., Watson-Jarvis, K., … Elliott, C. (2017). "Promoting children's health: Toward a consensus statement on food literacy." *Canadian Journal of Public Health*: 108(2), e211–e213. https://doi.org/10.17269/CJPH.108.5909

Vaitkeviciute, R., Ball, L. E., & Harris, N. (2015). "The relationship between food literacy and dietary intake in adolescents: A systematic review." *Public Health Nutrition*: 18(4), 649–658. https://doi.org/10.1017/S1368980014000962

Velardo, S. (2015). "The Nuances of Health Literacy, Nutrition Literacy, and Food Literacy." *Journal of Nutrition Education and Behavior*, 47(4): 385–389. https://doi.org/10.1016/j.jneb.2015.04.328

Vidgen, H., & Gallegos, D. (2013). "What is food literacy and does it influence what we eat?" *Annals of Nutrition and Metabolism,* 63: 1742. https://doi.org/http://dx.doi.org/10.1159/000354245

Vidgen, H. A., & Gallegos, D. (2014). "Defining food literacy and its components." APPETITE, 76: 50–59. https://doi.org/10.1016/j.appet.2014.01.010

Wever, C. (2015). "Cultivating Critical Learning: Critical Food Pedagogy in FoodShare's School Grown Program." Faculty of Environmental Studies, York University. Retrieved from http://fes.yorku.ca/files/outstanding-papers/Cassie_Wever_FINAL_MRP.pdf

Whiteley, C., & Matwiejczyk, L. (2015). "Preschool program improves young children's food literacy and attitudes to vegetables." *Journal of Nutrition Education and Behavior*, 47(4)" 397–398.e1. https://doi.org/10.1016/j.jneb.2015.04.002