Review Article

Nutrition education: linking research, theory, and practice

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The increase in obesity and chronic diseases-such as diabetes and heart disease worldwide reflects the complex interactions of biology, personal behaviour and environment. Consequently there has been a greater recognition of the importance of nutrition education. An analysis of the evidence from 300+ studies shows that nutrition education is more likely to be effective when it focuses on behaviour/ action (rather than knowledge only) and systematically links theory, research and practice. There are three essential components to nutrition education: 1. A motivational component, where the goal is to increase awareness and enhance motivation by addressing beliefs, attitudes through effective communication strategies. 2. An action component, where the goal is to facilitate people's ability to take action through goal setting and cognitive self-regulation skills. 3. An environmental component, where nutrition educators work with policymakers and others to promote environmental supports for action. Each component needs to be based on appropriate theory and research. The procedure for program design can use the logic model: *Inputs* are the resources needed as well as the needs analysis process. The *outputs* are the activities within the three components of nutrition education described above. Here the behavioural focus is selected and theory and research are used to design appropriate educational strategies to achieve the targeted behaviours. The *outcomes* are the short, medium or long-term impacts of the nutrition program. These are evaluated through the use of appropriate designs and instruments. Nutrition education programs that link research, theory, and practice are more likely to be effective.

Key Words: nutrition education, linking nutrition theory and practice, health promotion

INTRODUCTION

The increase in obesity and chronic diseases such as diabetes and heart disease worldwide reflects the complex interactions of biology, personal behavior and the environment. As shown in Figure 1, people's food choices are influenced by many factors:[1,2] (a) *Biologically determined behavioral predispositions* include humans' liking at birth for sweet and dislike for bitter and sour, hunger/ satiety mechanisms, and sensory specific satiety. (b) *Experience with food.* Humans have the capacity to learn to like foods through associative conditioning, both physiological and social. Young children overcome their fear of new foods (neophobia) through repeated experience with new foods, offered by the family and often reflecting cultural preferences, leading to familiarity. These two sets of influences are sensory-affective in nature and contribute greatly to people's food preferences. (c) *Personal factors*. Intra-person factors such as beliefs, attitudes, knowledge and skills and social norms, and inter-personal factors such as families and social networks also influence our food choices. (d) *Environmental factors* powerfully influence peoples' food-related behaviors as well. Food availability and accessibility as well as the social environment and cultural practices, material resources, and food marketing practices either facilitate or hinder individuals being able to act on their beliefs, attitudes, and knowledge about healthful eating. All of these influences interact with each other dynamically.

As can be seen from Figure 1, food-related knowledge and skills form only one category of influence on diet-related behaviours or practices among numerous others. It is not surprising, then, that nutrition education based solely or primarily on providing knowledge and skills has not been shown to be effective.

Defining nutrition education

Consequently, nutrition education needs to be a much more comprehensive enterprise than information dissemination in order to be effective. Nutrition education needs to address food preferences and sensory-affective factors; person-related factors such as perceptions, beliefs, attitudes, meanings, and social norms; and environmental factors. Nutrition education has been defined as "any combination of educational strategies, accompanied by environmental supports, designed to facilitate voluntary adoption of food choices and other food and nutrition- related behaviors conducive to health and well-being; nutrition education is

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delivered through multiple venues and involves activities at the individual, community, and policy levels."[1]

Using theory and research to increase nutrition education effectiveness

Nutrition education programs designed to facilitate personal dietary change and provide environmental supports can draw on the research and theory-building from such fields as social psychology, health education, anthropology, or economics, as well as from nutrition education and behavioural nutrition research. An analysis of the evidence from over 300 studies shows that nutrition education is more likely to be effective when it focuses on behaviour/ action (rather than knowledge only) and systematically links relevant theory, research and practice.[3-6]

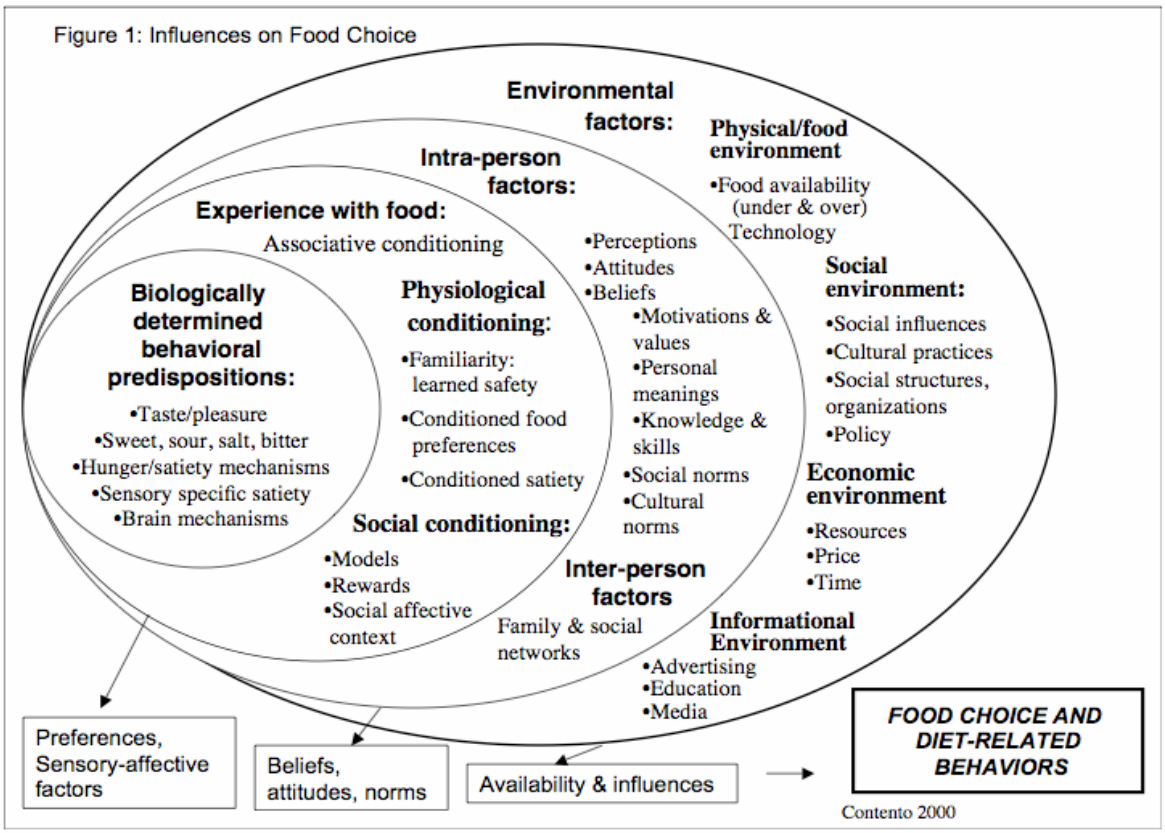
By theory we mean a conceptual map, derived from evidence, to help us understand how various influences on food-related behaviour are related to, or predict, behaviour or action or behaviour change. The term model is often used. *Research* determines influences on why people eat what they eat and which potential mediating variables lead to behaviour change. *Theory* organizes the mediating variables (which are called theory constructs) into a mental map. *Practice* uses these mental maps or theories to develop interventions that are more likely to be effective in changing behaviour and provides feedback to improve theory.

Most nutrition educators are familiar with the KAB model, which states that changes in knowledge (K) lead to changes in attitudes (A) which in turn lead to changes in behaviour (B). However, research has shown, and Figure 1 illustrates, that this is too simple a theory or model for guiding effective nutrition education. There is now consensus that more complex theories or models such as the one in shown in Figure 2 are more appropriate. This integrative model of health behaviour change based on research evidence, shows how the influences on behaviour are related to, or predict behaviour.[7-9] The model shows that a number of factors are important in motivating the intention to change and other factors are important in translating motivations and intentions into behaviour change or action. It also shows that the environment is important as either a facilitator or barrier to change. This model can provide a basis for designing nutrition education.

Components or phases of nutrition education

Nutrition education can be considered as having three essential phases or components. 1. A motivational phase, where the goal is to increase awareness and enhance motivation of the intended audience. Here the focus is on *why to* make changes. 2. An action phase, where the goal is to facilitate the ability to take action. Here the focus is on *how to* make changes. 3. An environmental component where nutrition educators work with policymakers and others to promote environmental supports for action. Each component needs to be based on appropriate theory and research.

The motivational phase focuses on increasing awareness and enhancing the motivation of the intended audience. Motivation can be enhanced when the intended audience recognizes the positive outcomes (benefits) to be experienced by taking action and comes to value these outcomes. Nutrition education can also point out the risks of not taking action, explore the barriers to taking action and suggest ways to overcome the barriers. An example is the Pick a Better Snack campaign in the United States.[10] A needs analysis found that people are very aware that



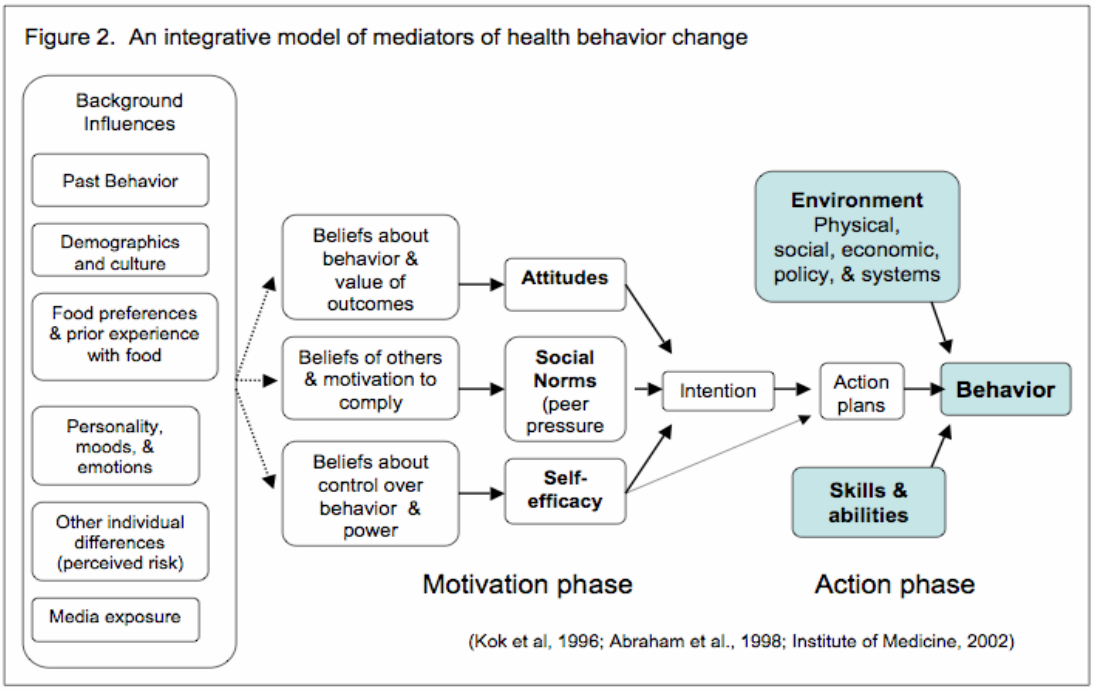
there are benefits to taking action – eating lots of fruits and vegetables – but believe that the barriers are high. So the campaign focuses on decreasing barriers with the simple message that eating fruits and vegetables is easy. A picture of a banana is accompanied by the message, "Peel. Eat. How easy is that!" The picture of an apple states, "Wash. Eat. How easy is that." The venues for the messages are posters, bill-boards, classroom activities, and newspaper articles. These messages are designed to change beliefs about barriers and hence improve attitudes. They also enhance people's sense of control, thus increasing their self-efficacy. Programs can also provide for opportunities for the audience to taste healthful foods prepared in delicious and tasty ways. Such experiences with foods will increase their beliefs about the positive outcomes of eating these foods. Interventions can also focus on social norms. For example, breast-feeding is very influenced by the attitudes of the culture, the woman's family, and the father of the infant. Nutrition education can help women recognize these influences and develop strategies for coping with family and culture. These motivational activities may help lead people to choose the intention to eating the foods, or carry out the practices that are the focus of the intervention.

The *action component* focuses on facilitating the ability of the intended audience to take action. Many people will make intentions to adopt healthful eating. However, acting on their intentions is very difficult. Action phase activities help people make bridge the "intention to action" gap and to actually make changes and maintain them over time. Research has shown that when people make specific action plans, they are more likely to take action. This process is often referred to as goal-setting. Here people make goals or action plans that are very specific, such as I will bring a fruit to work to eat at my morning break or I will replace my sweet dessert at dinner with fruit 3 times this week. An example is the EatFit program where middle school students choose one major goal to work on, such as increasing their fruit and vegetable intake or reducing their sugar intake.[11] They then set specific action plans for how they will do that. They must also learn self-regulation or self-management skills so that they can manage difficult situations and develop personal habits and policies that will help them maintain healthful eating. In addition, the intended audience needs to learn food and nutrition-related knowledge and skills so that they can act on their motivations.

The *environmental component* has become increasingly recognized as extremely important. Here nutrition educators work with policymakers and others to promote environmental supports for action. Thus nutrition educators work with relevant decision-makers at the community, regional and national level to increase the availability of healthful foods at affordable prices and accessibility at places where food is selected or eaten and improve social structures, food policy in institutions and communities (and even in the agricultural sector) in order to improve people's opportunities to take healthful actions. It has been said that the healthful action should be the easy action. The concept of the health promoting school being developed in many countries, and the implementation of school wellness policies in the United States are examples.

Procedural model for designing theory based nutrition education programs

Designing theory-based programs is made easier by following a specific procedure. One such model is provided by Contento.[1] It is based on a logic model in which nutrition educators plan the inputs, outputs and outcomes. *Inputs* are the people and resources needed as well as the needs analysis or assessment process. The *outputs* are the three components of nutrition education as described above. The *outcomes* are the impacts of the nutrition program on the behaviors or practices that are the focus of the program. Outcomes can be short, medium or long-term outcomes.



The first step of the procedural model involves analyzing the *inputs*. These include the resources and people available for the program as well the process whereby the health needs of the intended audience are identified and the individual behaviors and community practices that will likely improve health. The *outputs* or activities of the program are designed through a series of steps whereby the potential mediators of the targeted behavior change are identified, the theory or model linking mediators to behavior change for the intervention is specified, educational objectives are stated for these mediators, and theory-based strategies and activities are designed. The outcome evaluation must also be designed at this planning stage. The *outcomes* are the impacts of the program on the behaviors or practices targeted by the program. Evaluating such impacts is very important in both research and practice, so as to be able to judge whether a program was effective and also which components were effective and why. Several research designs can be used, including randomized control trials, quasi-experimental designs, monitoring activities and qualitative research methods.

Nutrition education is needed now more than ever; programs that link research, theory, and practice are more likely to be effective.

AUTHOR DISCLOSURES

Isobel R Contento, no conflicts of interest.

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