



An evidence-based conceptual framework of healthy cooking

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ABSTRACT

Eating out of the home has been positively associated with body weight, obesity, and poor diet quality. While cooking at home has declined steadily over the last several decades, the benefits of home cooking have gained attention in recent years and many healthy cooking projects have emerged around the United States. The purpose of this study was to develop an evidence-based conceptual framework of healthy cooking behavior in relation to chronic disease prevention. A systematic review of the literature was undertaken using broad search terms. Studies analyzing the impact of cooking behaviors across a range of disciplines were included. Experts in the field reviewed the resulting constructs in a small focus group. The model was developed from the extant literature on the subject with 59 studies informing 5 individual constructs (frequency, techniques and methods, minimal usage, flavoring, and ingredient additions/replacements), further defined by a series of individual behaviors. Face validity of these constructs was supported by the focus group. A validated conceptual model is a significant step toward better understanding the relationship between cooking, disease and disease prevention and may serve as a base for future assessment tools and curricula.

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1. Introduction

Diet is a modifiable risk factor of particular concern for chronic disease prevention as the US faces an obesity epidemic and population adherence to national diet recommendations remains dismally low (Levi et al., 2013). Diet impacts risk for several major chronic diseases including cancer, heart disease, diabetes and obesity (Micha et al., 2012; Kushi et al., 2012). Cooking could influence disease risk through its effect on weight status and diet quality as well as carcinogen development during food preparation (WCRF / AICR, 2007). For example, cooking red meat at high temperatures or charcoal grilling facilitates the development of heterocyclic amines and polycyclic aromatic hydrocarbons (Kushi et al., 2012); exposure to these carcinogens may increase cancer risk (Zheng & Lee, 2009). Domestic (as opposed to industrial) cooking processes also impact the bioavailability of some antioxidants in fruits and vegetables (Harasym & Oledzki, 2014).

Eating out of home (OH) foods has been positively associated with body weight, obesity, and poor diet quality (Smith et al., 2013; Bezerra

et al., 2012; Lachat et al., 2012). An international review of 29 studies found those that consumed high amounts of OH foods also had higher percentages of calories from fat in the diet and lower intakes of iron, calcium and vitamin C (Lachat et al., 2012). Eating foods cooked at home from basic ingredients, however, has been linked to increased intake of fruits, vegetables, and whole grains, reduced BMI, and improved general health (Larson et al., 2006; Laska et al., 2012; McLaughlin et al., 2003). A study of young adults found those that cooked more frequently were more likely to achieve nutrition guideline goals for fat, calcium, whole grain, fruit and vegetable intake (Larson et al., 2006). Another study found cooking classes increased intake of fruit and vegetables and improved food safety behaviors (Brown & Hermann, 2005).

Cooking at home has declined steadily over the last 40 years, decreasing by almost a quarter (23%) from 1965 to 2008 (Smith et al., 2013). The benefits of home cooking have gained attention in recent years, however, and many health-promotion cooking projects have emerged. These include international programs such as Jamie Oliver's "Ministry of Food" in the UK and Australia and national programs such as First Lady Michelle Obama's "Let's Move: Chefs Move to Schools" (Let's Move: Chefs Move to Schools, n.d.) campaign and Share our Strength's "Cooking Matters" (Share Our Strength: Cooking Matters, 2013). Other US organizations, such as Slow Food (Slow Food USA,

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2000) and the National Farm to School Network (National Farm to School Network, n.d.) advocate for school gardening programs that incorporate cooking education elements.

In nutrition research, cooking components are often part of nutritional interventions and have been shown to potentially be more effective than nutrition education (knowledge-, attitude-, and awareness-centered approaches) alone in changing diet (Curtis et al., 2012). Two recent systematic reviews examined the impact of some of these interventions. Although the scope of these reviews differs from the work presented here, the noted limitations highlight the variability in this emerging field of research on cooking and health. One review, focusing on children, found cooking interventions that included hands-on food preparation showed promise as a strategy for improving psychosocial factors including food related preferences and attitudes, as well as food behaviors (Hersch et al., 2014). A review of adult intervention studies that consisted of cooking or food preparation as the primary aim found similarly promising results on a range of outcomes including improved diet, positive food choices and other health outcomes (Reicks et al., 2014). However, both reviews noted that significant variability in study curricula, non-rigorous study designs and the lack of standardized assessment tools hindered the replicability of the research (Hersch et al., 2014; Reicks et al., 2014). This may, in part, be explained by the complexity of defining cooking and lack of clear definitions in the literature (Engler-Stringer, 2010). The absence of a standardized definition of healthy cooking has led many authors to define healthy cooking individually and imprecisely (Engler-Stringer, 2010). Therefore, interventions are building cooking skill education into their curriculum, but failing to identify if the behaviors they teach are impacting dietary habits or health outcomes (Engler-Stringer, 2010).

The purpose of this study was to develop an evidence-based conceptual model outlining healthy cooking behaviors in relation to chronic disease prevention. This is the first conceptual framework of cooking behavior to our knowledge. A validated model is a significant step toward improved understanding of the relationship between cooking, disease and disease prevention and may serve to inform future assessment tools. A unified understanding of key cooking behaviors and ability to measure these behaviors in a reproducible way is critical for the development of quality interventions targeting healthy eating environments.

2. Developing the conceptual framework of healthy cooking.

A conceptual framework of healthy cooking behaviors (Fig. 1) was developed based on the results of a comprehensive literature search (Supplemental Fig. S1). Fifty-nine peer-reviewed, English language quantitative studies evaluating the relationships between cooking behaviors and health were examined. Both observational studies focusing on the associations between certain cooking practices and health, as well as experimental studies examining cooking interventions were included. Outcomes of interest included behavioral (diet quality including specific nutrient intake, cooking frequency/methodology, oil usage) and physiological (chronic disease risk including cancer, diabetes, obesity, and cardiovascular disease, as well as metabolic measures and mortality) factors. Studies focusing exclusively on psychosocial and attitudinal variables were not included as the primary focus of this paper was to build an evidence-based model of cooking behaviors. Key characteristics of 34 observational and 25 experimental studies were reviewed and used to inform the final model (Supplemental Tables S2–S3).

The proposed model represents the key cooking behaviors shown to impact health outcomes extracted from the literature. These cooking behaviors, gleaned from the included observational and experimental studies (Supplemental Tables S4–S5), were further organized into overarching themes, forming the broad constructs of the model. The initiating construct is the action of cooking, titled ‘Cooking Frequency’, followed by four constructs that occur during food preparation including ‘Techniques/Methods’, ‘Minimal Usage’, ‘Additions/Replacements’ and ‘Flavoring’. These broad constructs are further defined by individual behaviors (Table 1) and a detailed description of each construct is provided below. The directional relationship between these constructs and their potential impact on chronic disease including obesity, cardiovascular disease (CVD), diabetes and cancer is put forward.

2.1. Cooking frequency

‘Cooking Frequency’ is defined as the decision to cook at home, as opposed to going to a restaurant or ordering take-out. A sub-construct to cooking frequency is cooking from basic ingredients, sometimes referred to as “cooking from scratch”. The definition of the terms “basic ingredients” and “scratch” vary widely in the literature but

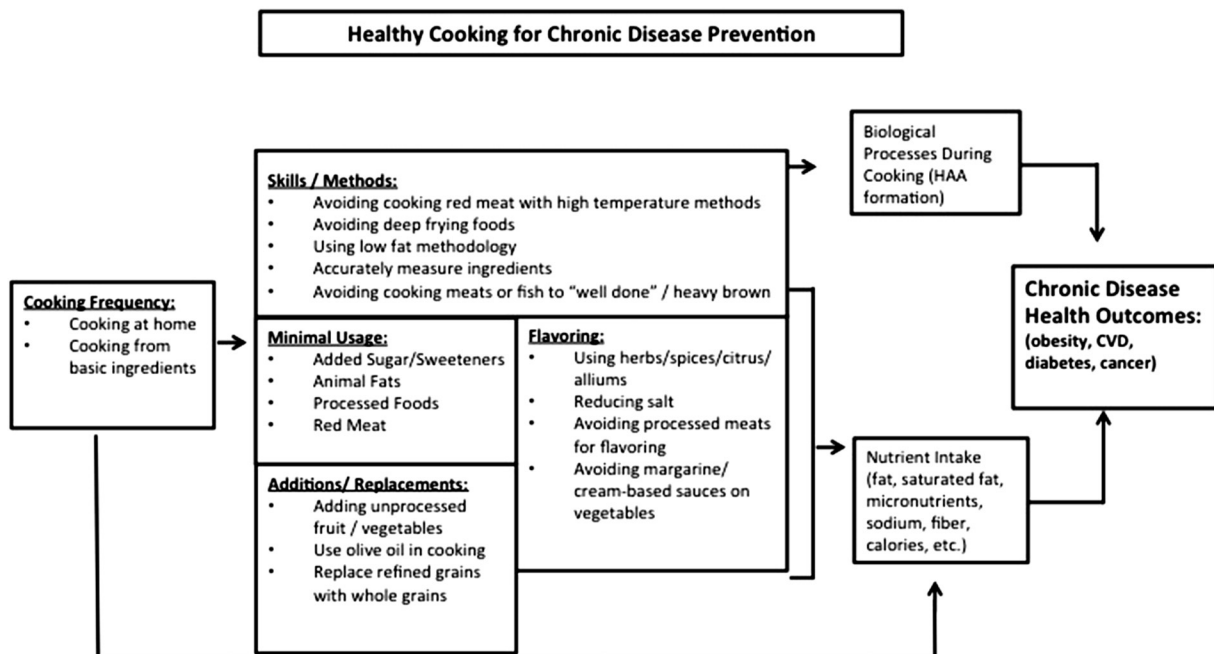


Fig. 1. Conceptual Model of Healthy Cooking: Scheme depicting the conceptual framework and the constructs that define healthy cooking in relation to chronic disease. This figure outlines the directionality of these constructs and how they inter-relate to influence dietary behaviors and health. Abbreviations: CVD: Cardiovascular disease; HAA: Heterocyclic aromatic amines.

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