



Understanding fruit and vegetable intake of Native American children: A mixed methods study



Rachel C. Sinley^a, Julie A. Albrecht^{b, *}

^a Department of Nutrition and Health Sciences, 312 LEV, University of Nebraska-Lincoln, Lincoln, NE 68583-3727, USA

^b Department of Nutrition and Health Sciences, University of Nebraska-Lincoln, 119 LEV, Lincoln, NE 68583-0807, USA

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ABSTRACT

Native American children experience greater rates of obesity and risk for chronic diseases in comparison to their counterparts in other ethnic groups. Contributing to this risk may be inadequate consumption of fruits and vegetables. The objective of this study was to investigate the fruit and vegetable consumption of Native American children between the ages of 2 and 5 by using an exploratory sequential mixed methods research design. This study first collected qualitative data from caregivers of Native American children ($n = 45$) and stakeholders in Native American communities ($n = 10$) to gain perspectives of fruit and vegetable consumption. Data was then utilized to develop a fruit and vegetable survey which was administered with a fruit and vegetable food frequency questionnaire. These quantitative assessments were administered to caregivers of Native American children ($n = 92$) to gain an understanding of predictors of fruit and vegetable intake among this population. This study was guided by the Information-Motivation-Behavioral Skills (IMB) model of health behavior. Findings from the mixed methods analysis demonstrate that, while the IMB model may be a useful tool to utilize in explaining the complex relationship between factors that impact fruit and vegetable consumption among Native American children, a revised model may be appropriate to use in future intervention development.

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1. Introduction

Childhood overweight and obesity has been associated with numerous chronic health conditions, including some cancers, cardiovascular diseases, asthma, early onset of type 2 diabetes and premature death (Centers for Disease Control and Prevention, 2012; Pulgarón, 2013). The costs associated with these rising rates of obesity are numerous, and include direct and indirect medical costs as well as physical, mental and emotional burdens (World Health Organization, 2003).

Significant obesity disparities have been observed among children in different racial and ethnic groups. Between 1998 and 2011, among children aged 2 to 4, the overall obesity prevalence across all ethnic groups increased from 13.05% in 1998 to 15.21% in 2003, and then decreased slightly to 14.74% in 2011 (Pan, McGuire, Blanck, May-Murriel, & Grummer-Strawn, 2015). From 1998 to 2011, the obesity prevalence among Non-Hispanic white children increased

from 10.52% to 12.75%. Prevalence of obesity among non-Hispanic black children increased slightly from 11.10% to 11.85% and Hispanic children also experienced a slight increase from 18.13% to 18.70%. Experiencing a significantly greater increase in prevalence of obesity was American Indian and Alaskan Native children, whose rates increased from 16.32% to 21.11% (Pan et al., 2015), indicating a significant obesity disparity among this population.

While numerous factors are responsible for this disparity, a contributing factor may be inadequate fruit and vegetable consumption. Although insights into the dietary patterns of this population are limited, research has consistently indicated that inadequate fruit and vegetable consumption is an issue that requires public health attention (LaRowe et al., 2010; Story, Neumark-Sztainer, Resnick, & Blum, 1998; Stroehla, Malcoe, & Velie, 2005). Numerous studies indicate an inverse association between fruit and vegetable consumption and development of obesity (Panagiotakos, Chrysohoou, Pitsavos, & Stefanadis, 2006; Togo, Osler, Sorensen, & Heitmann, 2004; Wang, Ge, & Popkin, 2003), although the specific mechanism by which consumption of fruits and vegetables may prevent obesity has been subject to interpretation. A potential pathway is that, as energy intake is associated with weight gain,

* Corresponding author.

E-mail addresses: rsinley2@unl.edu (R.C. Sinley), jalbrecht1@unl.edu (J.A. Albrecht).

fruit and vegetable intake may impact obesity rates as a result of their high volume to energy ratio, whereby individuals may be cued to satiety prior to consuming large amounts of energy (Prentice & Jebb, 2003). Additionally, fruit and vegetable consumption may lead to a reduction in total caloric intake by an increase in total dietary fiber, which can cue satiety signals (Rasoamanana, Even, Darcel, Tomé, & Fromentin, 2013). Finally, increasing intake of fruits and vegetables may displace consumption of energy-dense foods, which may indirectly impact obesity prevalence.

Compared to other groups in the United States, relatively few interventions have been developed that specifically target improving the nutritional status of Native Americans (Fialkowski, Okoror, & Boushey, 2012). Critical to the success of a program targeted to address health behaviors is that the program is guided by a theory or guiding framework (DiClemente, Salazar, & Crosby, 2013). For programs geared toward Native Americans to be successful, community members need to be involved in the development and implementation of the program and researchers must employ more rigorous designs to develop and evaluate such programs (Baranowski, Anderson, & Carmack, 1998; Satterfield et al., 2003). Aspects of culture must also be taken into consideration during each and every part of program development and implementation, and it is especially critical that recommendations from community members be addressed during program development (Kautz & Longstaff, 2004; Roubideaux et al., 2000).

The purpose of this study was to conduct mixed methods formative research to guide the development of a fruit and vegetable-focused nutrition intervention for caregivers of Native American children. Qualitative inquiry explored perceptions held by caregivers and Native American children regarding fruits and vegetables. Results from this research indicated that peer support, food insecurities, cultural norms, self-efficacy and skills to prepare fruits and vegetables impact caregivers of Native American children's ability to provide fruits and vegetables. Participants in the qualitative phase also expressed a desire to increase knowledge regarding fruits and vegetables, including variety, benefits and recommendations for consumption. Findings from the qualitative phase informed the development of a quantitative survey which measured the constructs of the Information-Motivation-Behavioral Skills Model among caregivers as they relate to the fruit and vegetable consumption of Native American children. This quantitative research concluded that caregiver fruit and vegetable-related behavioral skills is significantly associated with child fruit and vegetable consumption, caregiver fruit and vegetable-related information is significantly associated with fruit and vegetable related motivation and caregiver fruit and vegetable-related motivation is significantly associated with behavioral skills. The extent to which findings from the quantitative phase converged or diverged with findings from the qualitative phase were evaluated in a final mixed methods phase.

2. Materials and methods

2.1. Study design

The study utilized a mixed methods study design, which Creswell and Plano Clark (Creswell & Plano Clark, 2007) describe as a type of research in which qualitative and quantitative data are collected, analyzed and integrated to better understand a research problem. Using these methods allows researchers to employ a variety of strategies to answer questions that cannot be addressed by qualitative or quantitative methods exclusively. Specifically, this research employed an exploratory sequential design.

An exploratory sequential design is deemed appropriate when relevant quantitative instruments are unavailable (Creswell & Plano

Clark, 2011), as is the case with the topic with predictors of fruit and vegetable consumption among Native American children. This three-phase approach begins with a qualitative investigation, follows with the use of those findings to develop a new quantitative instrument and then concludes with the administration of the assessment tool in the quantitative phase (Creswell & Plano Clark, 2011).

In employing a transformative exploratory sequential instrument design, this study began with the collection of qualitative data which then guided the development of a quantitative instrument. All of the data that was collected and analyzed was done within the framework of the Information-Motivation-Behavioral Skills model, with the ultimate goal of addressing health disparities within the Native American population. See Fig. 1 for a detailed description of study steps, procedures and products. All components of the study received University Institutional Review Board Approval (IRB# 20140314133EP, 20141214985EP) as well as approval from all required tribal officials.

2.2. Qualitative data collection and analysis

Six focus groups were held in community settings such as community colleges and Head Start centers. Each focus group had between three and twelve participants ($n = 45$) who self-identified as a primary caregiver of a Native American child between the ages of 2 and 5 years old. Participants specified which focus group they would participate in, which was typically dictated by location and convenience. Ten interviews with community stakeholders were held in locations selected by the interviewee and were typically private rooms in office buildings. Informed consent was reviewed and obtained in writing prior to initiating each focus group and interview. A trained interviewer conducted the focus groups and interviews. All focus group and interview sessions were digitally recorded and transcribed. Focus group sessions lasted between 35 and 75 min and interviews lasted between 20 and 60 min.

A written script was used to guide both the focus group and interview discussions. The questions were based on the IMB Model constructs to extract information about perceptions related to fruit and vegetable intake among Native American children and caregivers. These questions were reviewed by community stakeholders and revised accordingly. The focus group sessions followed standard focus group procedures (Krueger & Casey, 2000). To increase the trustworthiness of the findings (Krefting, 1991), at the conclusion of each focus group, the facilitator summarized the session and asked for confirmation and clarification of these statements. Interviews used open-ended guidelines suggested by Merriam (2009). Focus groups and interviews were conducted until it was determined that saturation was reached (Krueger & Casey, 2000). Audio recordings were transcribed verbatim and then entered into the QSR NVivo software package (NVivo version 9, QSR International, Melbourne, Australia, 2010) to aid in data analysis. Transcripts were analyzed using qualitative content analysis strategies (Krippendorff, 2003). A complete description of the qualitative data collection and analysis strategies utilized has been described elsewhere (Sinley & Albrecht, 2015a).

2.3. Quantitative instrument development

Data from the qualitative phase was utilized to develop an IMB model-based survey instrument. Each of the model's constructs (information, motivation and behavioral skills) comprised a subscale of the survey instrument. The survey utilized Likert-type responses to questions across all subscales, with higher subscale scores reflecting higher amounts of accurate information, total motivation and levels of behavioral skills. The survey was reviewed by an expert panel, including extension educators, community

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