

CHILDCARE AS A PROTECTIVE FACTOR
FOR CHILDHOOD OBESITY

by

Brittany Anne Carnahan

A scholarly project submitted in partial fulfillment
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of

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in

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DEDICATION

The support of my family has contributed to successful completion of this project and degree. To my husband, Casey, for working harder than anyone I know to support us throughout these last three years so I could pursue this dream, I am forever thankful to have you in my life. To my children, Kennedy and Maximus, who I could always count on for laughs and fun when I was feeling overwhelmed, I couldn't ask for better kids. To my mom and dad, thank you for always cheering me on, I wouldn't be where I am today without your support.

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ABSTRACT

Childhood obesity is a major public health crisis. Obese children are at risk for developing chronic diseases and are more likely to become obese adults. Despite efforts to decrease the number of obese children, the rate has more than tripled since the 1980s. Since childhood obesity is multifactorial, any person involved in caring for a child outside of the home can have an impact on the child's life helping to minimize risk factors, such as poor nutrition, which is known to contribute to obesity. **Purpose:** The purpose of the project was to 1) assess ECE providers' understanding of national childhood nutrition guidelines in relation to whether or not they participate in the STARS to Quality program or the CACFP; 2) create and provide childhood nutrition education to ECE providers with the objective to reinforce or increase knowledge on childhood nutrition and the important role of the ECE provider to deliver sound nutrition; and 3) to evaluate the effectiveness and sustainability of the education tool in increasing ECE provider knowledge of national childhood nutrition guidelines. **Methods:** Licensed ECE programs in the State of Montana completed a demographic survey, pre-test, educational video viewing, and posttest regarding childhood nutrition recommendation guidelines. The project was developed using the National Dietary Guidelines for all Americans and the Child and Adult Care Food Program recommendations for reimbursable meals. Pre and posttest scores were compared and analyzed. **Evaluation:** Overall, there was an 11.5% improvement in correct answers from the pretest to the posttest indicating that viewing of the educational tool was successful in increasing knowledge. **Discussion:** The use of a guideline based educational tool for ECE programs has the potential to increase caregiver knowledge regarding childhood nutrition recommendations and contribute to prevention efforts concerning childhood obesity.

CHAPTER ONE

INTRODUCTION

Background

Childhood obesity is a major public health crisis worldwide that has become a priority for government and researchers (Ali, Ali, Suhail, Tikmani, & Bano, 2016). Obesity carries with it a burden that can last a lifetime including increased risk for cardiovascular disease, increased risk for developing type 2 diabetes mellitus (DM), respiratory conditions such as asthma or sleep apnea, and fatty liver disease (Ali et al., 2016; Center for Disease Control and Prevention [CDC], 2016). Childhood obesity is defined as a body mass index (BMI) at or above the 95th percentile for children of the same age and sex (CDC, 2016). The CDC and Health Resources and Services Administration (HRSA) characterize childhood obesity as a complex, multifactorial disease influenced by genetics, behavior, environment, and public policy decisions that have interfered with a person's ability to obtain safe and convenient functional fitness (CDC, 2016; HRSA, 2018). Researchers have attempted to identify causes of the childhood obesity epidemic and develop interventions to address this problem. Regardless of these efforts, the number of obese children continues to rise.

“It is easier and more effective to prevent overweight and obesity during early childhood than to reverse trends later in life” (Robert Wood Johnson Foundation [RWJF], 2018, para 2). The *State of Obesity* (2018) focuses on nine public policies, in place across the nation, intended to improve access to healthy food, increase physical activity in early

childhood education (ECE) settings, and prevent overweight and obesity (RWJF, 2018). Although these policies exist, not every state requires licensed ECE programs to follow every policy. In Montana, there are regulations requiring licensed ECE programs to allow or encourage onsite breastfeeding, make drinking water available to children, have healthy eating policies, and have time for daily physical activity (RWJF, 2018). Montana also has ECE licensing laws related to the Child and Adult Care Food Program (CACFP), which automatically update when the CACFP guidelines change (RWJF, 2018). However, providing meals and snacks that meet dietary guidelines, is not among the requirements for ECE programs in Montana to follow (RWJF, 2018).

In an attempt to continuously improve ECE in Montana, the Montana Department of Public Health and Human Services (DPHHS), has developed the Best Beginnings STARS to Quality Program (DPHHS, n.d.). This program is a voluntary quality rating improvement system “that aligns quality indicators with support and incentives for early childhood programs and early childhood professionals” (DPHHS, n.d., para. 2). There are five STAR levels (1-5) as well as a pre-STAR level for those just beginning participation in the program. Criteria at each level builds upon the previous level(s) and a program must demonstrate that they are meeting all criteria at any given level to achieve and maintain that level. As a member of the STARS to Quality Program, ECE programs are required to participate in the CACFP (DPHHS, n.d.). The CACFP is a federally funded program that assures the nutritional quality of meals and snacks served to children by following such requirements as: 1) offering a wide variety of nutritious foods, 2) using fresh and locally grown foods when possible, 3) serving meals that follow United States

Department of Agriculture (USDA) dietary guidelines, 4) serving meals family style, 5) serving milk with all meals for children one year of age or older, 6) supporting breastfeeding or the use of breast milk for infants, and 7) serving iron-fortified infant formula (DPHHS, n.d.). The STARS to Quality Program provides training and education to ECE providers on how to properly abide by and follow the CACFP guidelines (DPHHS, n.d.). Licensed ECE programs that are not members of the STARS to Quality Program or do not voluntarily participate in the CACFP, are encouraged, but not required to follow national dietary guidelines. When applying for a childcare license, the licensee receives a one-page summary of dietary recommendations but no additional training regarding childhood nutrition. This leaves the door open for any type, combination, and quantity of food to be served.

Significance of the Problem

Childhood obesity rates have more than tripled since the 1980's (CDC, 2016). In 2015-2016, the overall prevalence of obesity in children age two to 19 years was 18.5% (CDC, 2016). Decreasing childhood obesity rates is advantageous for many reasons. Obese children have a higher risk of developing chronic health problems such as hypertension, hyperlipidemia, impaired glucose tolerance/insulin resistance, asthma, fatty liver disease, gallstones, and or gastro-esophageal reflux during childhood (CDC, 2016). As these children age, their chronic health problems may take on more severe forms including cardiovascular disease, type 2 DM, sleep apnea, and cancer (CDC, 2016). Obese children have a significant impact on healthcare utilization including more visits to

general practitioners, inpatient stays, and mental health concerns (Doherty, Queally, Cullinan, & Gillespie, 2017). In fact, childhood obesity is estimated to cost the United States \$14 billion dollars annually in direct health expenses (RWJF, 2018). Decreasing childhood obesity rates may lead to a decreased adult obesity rate, less severe forms of chronic diseases, and reduced healthcare costs.

Although national obesity rates remain high, data from the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) “show a statistically significant decrease in obesity among 2- to 4-year-old children who were enrolled in WIC, from 15.9% in 2010 to 14.5% in 2014” (RWJF, 2018, para 2). In Montana, the rate of childhood obesity among WIC participants is 12.5% compared to 14.5% nationally (RWJF, 2018). However, the overall rate of childhood obesity in Montana increased from 11.1% in 2003 to 11.8% in 2007 and to 14.3% in 2011 (National Conference of State Legislatures [NCSL], 2014). The CACFP meal program, which follows the Dietary Guidelines for Americans and National Academy of Medicine recommendations, aligns with the WIC program guidelines for nutrition (United States Department of Agriculture [USDA], n.d.). WIC programs have successfully reduced the rate of childhood obesity across the nation, which offers support that the CACFP, if implemented properly by ECE programs, could have a similar effect on reduction of childhood obesity rates in non-WIC participants (Liping et al., 2016). Approximately 30% of licensed ECE providers across the state of Montana participate in the STARS to Quality program (L. Lee, personal communication, July 2, 2018). Through participation in the STARS to Quality program, childcare providers receive the support and training necessary to properly implement the

CACFP recommendations. By participating in this program, ECE programs are required to offer the same nutritional guidelines as WIC programs in which studies have shown a decrease in childhood obesity (Liping et al., 2016). Participation of Montana ECE programs in the STARS to Quality program has the potential to support childhood obesity rates remaining below the national average and continuing to decrease. Childhood obesity is multifactorial (CDC, 2016). Involving caregivers outside the home can impact a child's life and help to minimize risk factors known to be associated with childhood obesity, especially nutrition.

Problem and Purpose Statement

Enrollment in the voluntary Montana STARS to Quality program, which requires adherence to the national childhood nutrition guidelines, or participation in the CACFP has the potential to decrease the state's childhood obesity rates (Liping et al., 2016). Oversight of the STARS to Quality program participants by the State of Montana occurs at a minimum of every three years and the propensity for providers to always follow the nutrition recommendations and the provider's working knowledge of these recommendations is unknown (L. Lee, personal communication, July 2, 2018). Licensed ECE providers in Montana are not required to participate in the STARS to Quality program or in the CACFP and do not receive the additional nutrition education or benefits of more frequent state inspection. Some Montana ECE facilities are not inspected within five years of their previous inspection (Montana Legislative Audit Division, 2011). The purpose of this DNP scholarly project is to 1) assess ECE providers'

understanding of national childhood nutrition guidelines and whether or not they participate in the STARS to Quality program or the CACFP; 2) create and provide childhood nutrition education to ECE providers with the objective to reinforce or increase knowledge on childhood nutrition and the important role of the ECE provider to deliver sound nutrition; and 3) to evaluate the effectiveness and sustainability of the education tool in increasing ECE provider knowledge of national childhood nutrition guidelines.

CHAPTER TWO

REVIEW OF LITERATURE

Introduction

The literary search focused on childhood nutrition, the effect of teacher education on preventing childhood obesity, and the role of ECE programs in preventing childhood obesity. The body of evidence on childhood nutrition and specific guidelines on the importance of nutrition and its role in preventing childhood obesity is vast. Although limited, there is evidence to suggest a positive association between caregiver or teacher education and lower obesity rates. Finally, there is conflicting evidence regarding the role of ECE programs and whether or not they provide a protective effect against childhood obesity.

Search Methods

Databases

A comprehensive literature search was conducted by consulting multiple online research databases including CINAHL, Cochrane Library, UpToDate, PubMed, National Guideline Clearinghouse, and MedlinePlus. Limitations were set on the year of publication, restricting the search to research conducted within the last ten years. All articles were published in English. A total of 40 studies were evaluated and found to be relevant to the identified problem.

Search Terms

Key words used for the literature search included: childhood obesity; childhood overweight; childhood nutrition; daycare; childcare centers; preschool; childhood obesity prevention. After thorough investigation of these search terms, the search was expanded to include: teacher education and nutrition education.

Evidence Reviewed

Childhood Nutrition

Evidence suggests that healthy eating patterns, throughout all stages of life, can help people achieve and maintain good health with an added benefit of reducing the risk of developing chronic diseases (U.S. Department of Health and Human Services [HHS] & U.S. Department of Agriculture [USDA], 2015). Children in ECE programs do not have a choice as to what types of foods are prepared for them, therefore it is imperative that those individuals providing and serving food are knowledgeable in nutrition and follow national nutrition recommendations. The 8th edition of *Dietary Guidelines for Americans* developed by the HHS and the USDA outlines five guidelines by which all Americans should abide, including young children, to stay healthy and prevent the development of chronic diseases. The guidelines include 1) follow healthy eating pattern across the lifespan; 2) focus on variety, nutrient density, and amount; 3) limit calories from added sugars and saturated fats and reduce sodium intake; 4) shift to healthier food and beverage choices; and 5) support healthy eating patterns for all” (HHS & USDA, 2015, p. xii).

Adherence to the national guidelines is associated with a reduced risk of cardiovascular disease, type 2 diabetes, overweight, and obesity (HHS & USDA, 2015). As part of these guidelines, the HHS and USDA (2015) recommend increasing children's fruit and vegetable consumption; consuming whole grains, dairy, and protein; consuming but limiting healthy fat intake; as well as maintaining calorie balance to "support normal growth and development without promoting excess weight gain (p. 20). These elements of a healthy eating pattern are found in the CACFP guidelines and the recommendations made to ECE programs participating in the Montana STARS to Quality program.

Obesity surveillance among children and families participating in WIC has shown promising results in decreasing rates of obesity. Liping et al. (2016) studied obesity rates among WIC participants in 2000 (14.0%), 2004 (15.5%), 2010 (15.9%), and 2014 (14.9%) and discovered a statistically significant decline in obesity rates in 2014 after peaking in 2010. WIC programs provide nutrition education, for eligible participants, which aligns with the *Dietary Guidelines for Americans* and encourages fresh fruits and vegetables, whole grains, dairy, various forms of protein, and healthy fat options (Liping et al., 2016). Although the results of this study are promising, generalizability is lacking because the study only focuses on low income families participating in WIC. Furthermore, Liping et al. (2016) reports that other factors such as national obesity initiatives may also be contributing to the decline in childhood obesity.

Teacher Education in Preventing Childhood Obesity

A literature search regarding teacher knowledge and education concerning childhood nutrition and its effect on childhood obesity, in children five years of age and

younger, revealed four studies showing a positive relationship between teacher education and healthier nutrition environments (Molloy, Kearney, Hayes, Slattery, & Corish, 2013; Esquivel et al., 2016; Hodder et al., 2018; Natale, Lopez-Mitnik, Uhlhorn, Asfour & Messiah, 2014). A study conducted in full-day-care preschools showed a significant improvement ($p < 0.05$) in nutrition and health related practice after the delivery of a nutrition and health intervention to managers and staff (Molloy et al., 2013). Esquivel et al. (2016) examined the influence of teachers' personal health behaviors on childhood nutrition. Using a seven month long multi-component intervention consisting of policy changes to food served and service style, initiatives for employee wellness, classroom activities promoting physical activity and healthy eating, and training and technical assistance, teachers placed a higher priority on childhood nutrition, especially related to foods offered in the classroom, than they did before the intervention (Esquivel et al., 2016). A systematic Cochrane review revealed that multicomponent interventions including nutrition education and food environment changes, may lead to a small increase in child fruit and vegetable consumption (SMD 0.35, 95% CI 0.04 to 0.66), which is associated with a reduced risk of developing chronic diseases (Hodder et al., 2018). The evidence from this review is of low quality, future research is likely to change the conclusion, and more research and rigorous methods are needed to advance the field (Hodder et al., 2018). Finally, a study examining the effect of an early childhood obesity prevention program, which included nutrition education for ECE facility teachers, showed that children assigned to the intervention group had less BMI increase with 97% of children maintaining normal weight, and 4% of the children that were overweight at

baseline being normal weight twelve months post intervention (Natale et al., 2014). According to the authors, children in the intervention group ate more fresh fruits and vegetables, drank less juice and more milk, and ate less junk food than those children in the control group. Although the number of studies examining ECE teacher nutrition education and its effect on childhood obesity is limited, the positive effects demonstrated in these studies illustrate a promising area of early childhood obesity prevention research.

ECE Programs and Childhood Obesity

A literature search regarding childcare and the effect it has on childhood weight yielded mixed results. Four studies showed a positive association between childcare, regardless of type, and childhood obesity (Benjamin et al., 2009; Gubbels et al., 2010; Pearce et al., 2010; Scully et al., 2017). Four studies revealed a negative association between childcare and childhood obesity (Koleilat et al., 2012; Lumeng et al., 2015; Maher, Li, Carter, & Johnson 2008; Swyden, Sisson, Lora, Castle, & Copeland, 2017). There are inconsistencies across studies in terms of the type of childcare evaluated (i.e. center care, care by family or friend, informal care in someone else's home), how anthropometric data were gathered, as well as a lack of data regarding breastfeeding duration, smoking during pregnancy, physical activity, and other factors which are known to be related to obesity (Koleilat et al., 2012). Generalizability is lacking for two reasons. First, research samples included a disproportionate number of persons of Hispanic descent, mothers with high education levels, and persons with high family income (Koleilat et al., 2012; Gubbels et al., 2010; Benjamin, et al., 2009). Second, researchers investigating Head Start programs reported that participation in the study by each

program was voluntary therefore, facilities that elected to participate may have had a greater focus on health (Lumeng, et al., 2015).

Although weaknesses were identified in the reviewed studies, strengths were also identified. Each study had large sample sizes (n=273-43,748) and had specific inclusion and exclusion criteria (Benjamin et al., 2009; Gubbels et al., 2010; Koleilat et al., 2012; Lumeng et al., 2015; Maher et al., 2008; Scully et al., 2017; Swyden et al., 2017; Pearce et al., 2010;). Researchers from all eight studies reported that the results were consistent with previous findings. More research is needed on this topic as the current evidence does not definitively indicate that childcare does or does not affect childhood weight.

Theoretical Underpinning

Introduction

The development of a scholarly doctoral nursing project requires the integration and use of nursing theory along with past research and current clinical practice to guide the project (Bonnell & Smith, 2018). Certain criteria such as scope, context, and usefulness can be used to evaluate the appropriateness of nursing theories before choosing a suitable option (Bonnell & Smith, 2018). The desired outcome for this scholarly DNP project was to reinforce or increase ECE providers knowledge about childhood nutrition guidelines. With this end goal in mind and through the use of specific criteria assessing nursing theories, the Health Promotion Model (HPM) was selected for this project. The HPM, authored by Nola Pender in 1982, defines health as a positive dynamic state rather than just the absence of disease (Pender, Murdaugh & Parsons,

2015). The HPM aims to increase a patient's well-being while looking at the multidimensional nature of people as they interact with their environment (Pender et al., 2015).

Rationale

Numerous nursing theories were thoroughly examined using specific criteria before the appropriate theory was chosen. Initially, many theories were ruled out based on the fact that they did not include the concepts of the clinical project, therefore were not useful (Bonnel & Smith, 2018). Next, the scope was considered and a mid-range theory was selected as a mid-range theory has less abstraction, a more limited scope, and addresses specific concepts (Meleis, 2012). Finally, the context of nursing theories was examined to find one that was consistent with the health promotion focus of this project (Bonnel & Smith, 2018).

Chosen Theory Components

Pender believed that a person actively participating in health promoting behaviors should have improved health, enhanced functional ability, and a better quality of life through all developmental stages (Pender et al., 2015). A total of fourteen theoretical statements are derived from the HPM and although the majority of them could be directly apply to this project, two are emphasized for their relevancy to this scholarly project: 1) families, peers, and health care providers are important sources of interpersonal influence that can increase or decrease commitment to and engagement in health-promoting behavior and 2) situational influences in the external environment can increase or

decrease commitment to or participation in health-promoting behavior (Pender et al., 2015).

First, the assertion that families, peers, and health care providers are important sources of interpersonal influence that can increase or decrease commitment to and engagement in health-promoting behavior directly applies to this DNP project (Pender et al., 2015). According to the Organization for Economic Co-operation and Development (OECD), over 80% of 3- and 4-year-olds in developed countries attend ECE programs (Gerritsen, 2016). Children in these facilities spend a considerable portion of their daily time in this setting, making them an important place where nutrition education and healthy behaviors can be taught and modeled by their caregivers (Pender et al., 2015). According to Smaeroff (2009), children model the behavior exhibited by their interpersonal relationships. When childcare providers model health promoting behaviors, by adhering to national nutritional guidelines such as serving and consuming healthier foods, that behavior is viewed and modeled by the children in their care. In addition, children that see other children participating in these behaviors are likely to participate as well because children also model the behavior of their peers (Smaeroff, 2009). These actions by childcare providers can increase a child's engagement in health-promoting behaviors and in turn help to decrease childhood obesity rates.

The second theoretical assertion that situational influences in the external environment can increase or decrease commitment to or participation in health-promoting behavior applies to this project because according to Pender (2015), "situations may directly affect behaviors by presenting an environment 'loaded' with cues that trigger

action” (p. 39). The situational influence in the case of ECE facilities relates to the characteristics of the environment in which the behavior is to take place (Pender et al., 2015). For example, an ECE facility that portrays a healthy nutritional environment, through teachers promoting healthy food choices and offering healthy foods to the children, creates a demand for healthy nutrition behaviors by the teachers as well as the children. In addition, these situational influences “enforce commitment to health actions” (Pender et al., 2015, p. 39). Whether modeling behavior or through situational influences, teachers in ECE facilities have a significant influence on the behavior of the children in their care.

CHAPTER 3

IMPLEMENTATION PLAN

Introduction

As a doctorally prepared advanced practice registered nurse, a scholarly project affords the opportunity to address population health issues and improve public health for a population subset (Bonnell & Smith, 2018). Through collaboration with the State of Montana Department of Public Health and Human Services (DPHHS), this project addressed the growing problem of childhood obesity. This project assessed the current knowledge of ECE providers in the realm of childhood nutrition, provided education regarding childhood nutrition, and measured post intervention knowledge. The goal of this project was to educate ECE providers regarding recommended childhood nutrition guidelines as well as the important role they play in developing lifelong healthy nutrition habits for the children in their care, which in turn, may help to decrease the rate of childhood obesity.

Ethical Issues and Human Rights

Montana State University Institutional Review Board (IRB) was consulted on the ethical and human rights issues of this project. University IRB approval (Appendix A) was obtained along with permission to work with ECE facilities in Montana from Montana DPHHS. There was no access to any personal identifiable information. The data was collected via Qualtrics, an online research software program. After data analysis was

complete, it was exported from the program and will be stored by the author for 10 years after which time it will be deleted. Participation in the survey and intervention was voluntary. Participants were apprised of identifiable risks associated with this project which included sharing personal or professional information in a questionnaire.

Sample and Setting

A convenience sample was used for this project. Through communication with the CACFP program manager for the state of Montana, a subset of the state's more than 800 licensed ECE facilities were identified and invited to participate in the project. These 146 facilities were selected by the state agency because permanent agreements are in place requiring these facilities to participate in the CACFP.

Procedure

Identified licensed ECE facilities received an email regarding the project including a link to access the survey and educational intervention. Per the request of DPHHS, an email link to the project was sent to the CACFP program manager who forwarded the email on to the selected facilities. This approach was taken with the intent to foster a greater response from ECE providers because of the established relationship that DPHHS already has with these facilities.

Once the project was distributed via email, access to it was available to participants for four weeks. Two weeks after the initial email was sent, a reminder email was forwarded to all of the 146 facilities that received the initial invitation. After being

available for four weeks, the email link was no longer active, resulting in no more participants being able to access the project.

Instruments and Analysis

Instruments

Using the software program Qualtrics, a demographic survey, pretest, educational video, and posttest were developed. Informed consent was embedded into the project information and completion of this portion confirmed the participant's voluntary enrollment in the project and consent to participate. The demographic survey consisted of questions to better understand who was completing the project including: 1) how long the participant had been a childcare provider, 2) highest level of education completed, 3) age, 4) gender, 5) number of children cared for, 6) participation in the CACFP, 7) participation in the STARS to Quality program, and 8) current STAR level (Appendix B).

Following completion of the demographic survey, participants completed a 15-question pretest to assess their current knowledge of the National Dietary Guidelines and the CACFP recommendations for a reimbursable meal. These questions followed the recommended guidelines and included knowledge on calorie recommendations, meal components, serving sizes, appropriate meal substitutes, and best practice recommendations (Appendix C). Next, participants were directed to a 12-minute video, developed and produced by the author, which discussed the topics addressed in the pretest along with other recommendations from the guidelines and explored childhood obesity, nutrition, and the role the provider plays in a child's development. After viewing

the video, participants were asked to complete the posttest which consisted of the same 15 questions that were answered during the pretest. These questions reassessed the participant's knowledge so that the effect of the educational intervention could be measured. In order to evaluate the intervention's impact, participants were asked if the information was helpful and if the knowledge gained could be immediately applied to their job (Appendix D). Finally, participants were provided with links to access more information regarding the CACFP guidelines, the National Dietary guidelines, and the Best Beginnings STARS to Quality program (Appendix D). Completion of the project in its entirety was expected to take participants no more than 30 minutes.

Analysis

This DNP project used descriptive statistics and quantitative data and methods to meet the purpose of the project. The data was analyzed for trends and variability. This information was used to inform recommendations for practice and future evidence-based work on childhood obesity.

CHAPTER 4

EVALUATION OF IMPLEMENTATION PLAN

Sample Characteristics

A total of 51 participants consented to partake in the project resulting in a response rate of 34%. All participants were female with the exception of one male. The age of participants varied with 4% (n=2) being 18-24 years, 11.7% (n=6) being 25-34 years, 33.3% (n=17) being 35-44 years, 17.6% (n=9) being 45-54 years, and 33.3% (n=17) being 55 years or older. More than half of the participants (n=30) hold a bachelor's degree and 10 participants have a graduate degree. Two participants have a 2-year degree, five have attended some college, and three hold a high school diploma or GED as their highest level of education. Seventy-eight percent of respondents (n=40) have been providing care to children, in a capacity in which they are earning money, for five years or more, seven for 2-5 years (14%), two for 1-2 years (4%), and two for less than one year (4%). The number of children being cared for in the responding facilities ranges from less than six children (n=5), 7-12 children (n=2), or more than 13 children (n=44). The CACFP program is followed in 100% of the facilities that responded and 32 (62.7%) of them also participate in the STARS to Quality program (pre-star n=6, 1-star n=7, 2-star n=8, 3-star n=8, 4-star n=3, 5-star n=0).

Pre-test and Post-test Characteristics

Participants were not required to answer every question, nor were they required to complete the project in its entirety. Therefore, the number of respondents to each question varied from 41-48 responses during the pre-test and 34-36 responses during the posttest. The National Dietary Guidelines developed by the HHS and the USDA are considered the go-to source for nutrition advice. These guidelines are intended to help individuals improve and maintain overall health, reduce the risk of chronic disease, and prevent disease (HHS & USDA, 2015). For question number one, participants were asked, in an answer all that apply format, the intent of these guidelines. Table 1 presents the breakdown of correct responses. While the majority of respondents during the pre and posttest correctly answered that the guidelines are intended to help individuals improve and maintain overall health (n=47, n=36), fewer knew that they also reduce the risk of chronic disease (n=29, n=24) and even fewer still knew that they help prevent disease (n=22, n=19).

Table 1

Breakdown of respondent's answers to question 1

Response options	Pretest	Posttest
Help individuals improve and maintain overall health	47	36
Reduce the risk of chronic disease	29	24
Prevent disease	22	19
Treat disease	4	2

The remaining 14 questions were asked in a multiple choice or true/false format with only one correct answer. Table 2 displays the number of respondents, the number of respondents who answered correctly, and the percentage of correct answers for each question during the pre-test and posttest. In addition, the percentage difference, of correct answers between the pre and posttest, is presented.

Table 2

Breakdown of correct answers by question for questions 2-15

Question number	Pretest number of respondents	Pretest number correct	Percentage correct	Posttest number of respondents	Posttest number correct	Percentage correct	Percent difference
2	48	46	95.83	36	36	100.00	4.17
3	48	46	95.83	36	35	97.22	1.39
4	47	14	29.79	36	20	55.56	25.77
5	42	38	90.48	34	30	88.24	-2.24
6	41	12	29.27	35	27	77.14	47.87
7	41	36	87.80	34	33	97.06	9.26
8	42	19	45.24	35	18	51.43	6.19
9	42	26	61.90	34	27	79.41	17.51
10	42	34	80.95	35	30	85.71	4.76
11	42	25	59.52	35	21	60.00	0.48
12	42	16	38.10	35	22	62.86	24.76
13	41	38	92.68	34	34	100.00	7.32
14	41	29	70.73	34	29	85.29	14.56
15	41	41	100.00	34	34	100.00	0.00

Respondents had difficulty selecting the recommended calorie requirements for a moderately active two-year-old male (question 4) both before and after the educational intervention. The correct number of calories for this demographic is 1,000 calories. In the pretest, the majority of respondents (n=28, 59.6%) indicated that more calories, either 1,400 or 1,600 was the correct answer while five (10.6%) selected 500 calories as correct. After viewing the educational intervention, the majority of respondents (n=20, 55.56%)

were able to select the correct amount but fifteen people (41.67%) still thought the requirements were higher, selecting either 1,400 or 1,600 calories and one person indicated that 500 calories was correct.

A question regarding recommended serving sizes of fruits and vegetables (question 8) appeared to be the most difficult to answer even after viewing the educational tool. The CACFP guidelines indicate that $\frac{1}{4}$ cup of fruit and $\frac{1}{4}$ cup of vegetable must be served with lunch and supper. During the pretest, 22 respondents selected larger serving sizes of either $\frac{1}{2}$ cup of fruit and $\frac{1}{2}$ cup of vegetable (n=21, 50%) or 1 cup of fruit and 1 cup of vegetable (n=1, 2.4%) as being correct. Although the percentage of respondents that answered this question correctly during the posttests increased from 45.24% to 51.43% almost half (n=17, 48.57%) still thought the serving size was larger selecting $\frac{1}{2}$ cup fruit and $\frac{1}{2}$ cup vegetable as the correct answer.

Other questions that proved to be particularly difficult for respondents included the fact that whole grain-rich food should be served at every meal. During the pretest, 59.52% of respondents indicated this to be true while 60% indicated this during the posttest. The maximum amount of total sugar allowed for a 6-ounce serving of yogurt is 23 grams (question 12). The majority of respondents during the pretest selected fewer grams of sugar, either 11 grams (n=8) or 6 grams (n=18), than is recommended, as the correct answer. During the posttest, a higher percentage of respondents answered correctly (62.86%) but 13 (37.14%) still thought 11 grams (n=3) or six grams (n=10) was correct.

Question 5, regarding components to be served during breakfast, was answered correctly by more people during the pretest than during the posttest. All other questions were either answered equally correct or more correct during the posttest than during the pretest. One question in particular had a very large increase in correct answers from the pretest to the posttest with a 47.87% increase. This question had to do with the serving size of granola for breakfast. During the pretest, the majority of respondents indicated that the serving size is larger than the recommended 1/8 cup selecting 1/2 cup or 3/4 cup as the correct answer. However, after viewing the educational tool, 77.14% (n=27) correctly identified the serving size to be 1/8 cup, while only 17.14% (n=6) selected 1/2 cup and 5.71% (n=2) selected 3/4 cup.

Impact Questions Characteristics

Thirty-five respondents answered the impact questions regarding whether or not the information was helpful and if it could be immediately applied to their job. The majority (n=32, 91.4%) indicated that the information was helpful and three (8.6%) indicated that they did not find the information to be helpful. The majority of respondents (n=33, 94.3%) also signified that the knowledge gained from the education tool could be immediately applied to their current job while two (5.7%) did not find it to be applicable to their current job.

Summary

The average percentage of correct answers during the pretest was 69.87% ranging from a low of 29.27% to one question being answered correctly by 100% of respondents. This average percentage increased during the posttest to 81.42%. The lowest percentage of correct answers during the posttest was 51.43% and three questions were answered correctly by 100% of respondents.

CHAPTER 5

DISCUSSION AND IMPLICATIONS FOR PRACTICE

The use of a guideline based educational tool for ECE programs has the potential to increase caregiver knowledge regarding childhood nutrition recommendations and contribute to prevention efforts concerning childhood obesity. The participant's in this project are member facilities that have a permanent agreement in place with the State of Montana to continuously participate in the CACFP program. The variability in answers during the pretest directs a need for more education regarding childhood nutrition recommendations as required by the CACFP program. The increase in correct responses after viewing the educational tool, as evidenced by the posttest, indicates an increase in knowledge regarding the recommendations. Furthermore, respondents indicated that they found the information to be helpful and that they could immediately apply the knowledge that they gained to their current job. These outcomes demonstrate that the purpose of this project, to assess ECE providers' current knowledge of childhood nutrition recommendations and guidelines, provide education to reinforce or improve knowledge regarding this topic, and evaluate the effectiveness of the educational tool, was successful.

Comparison to the Literature

This project contributes to the literature examining the role of caregiver knowledge concerning childhood nutrition and its positive effect on childhood obesity

risk. Through proper knowledge and administration of the CACFP guidelines, elements of a healthy eating pattern including 1) consuming fruits, vegetables, whole grains, dairy, and protein while 2) maintaining calorie balance, supports growth and development without excess weight gain (HHS & USDA, 2015). Following these guidelines also supports the possibility of a decline in childhood obesity rates as observed by Liping et al. (2016) and in Montana, the possibility for childhood obesity rates to remain below the national average.

During the authors evaluation of this project, new evidence-based recommendations for parents, caregivers, health professionals and policymakers regarding what young kids should drink and avoid has been published. The RWJF funded Healthy Eating Research, an unprecedented collaboration of experts from the American Academy of Pediatrics, Academy of Nutrition and Dietetics, the American Heart Association, and the American Academy of Pediatric Dentistry (Story & Kauh, 2019). The recommended guidelines, designed for children from birth to age five, are intended to “help set children on the path of healthy growth and development” (Story & Kauh, 2019, para. 3). They include 1) 0-6 months: only breast milk or formula; 2) 6-12 months: in addition to breastmilk or formula, a small amount of drinking water (4-8oz per day) once solid foods are introduced; 3) 12-24 months: add whole milk (2-3 cups per day), continue with some plain drinking water (1-4 cups per day), and a small amount (4oz per day) of 100% fruit juice; 4) 2-3 years: 1-4 cups of water, plain fat free or low fat milk (2 cups per day), and 4oz of 100% fruit juice per day; 5) 4-5 years: 1.5-5 cups of water, plain fat free or low fat milk (2.5 cups per day), and 4-6oz of 100% juice per day.

Reducing the pattern of sugary drink consumption, the number one source of added sugar in a child's diet, by following the recommendations, may decrease the risk of obesity (Malik, Popkin, Bray, Despres, & Hu, 2010).

Recommendations for DNP Practice

Practicing healthy eating behaviors during childhood has the potential to reduce a person's risk for developing chronic disease, reduce health care costs, and reduce the risk of obesity. As a doctorally prepared advance practice nurse, it is important to use evidence to influence and support public policy decisions made regarding access to healthy food and preventing overweight and obesity. In Montana, ECE facilities have regulations requiring the use of a healthy eating policy, but providing meals and snacks that meet dietary guidelines is not part of that policy (RWJF, 2018). Furthermore, facilities are not inspected on a regular basis to make sure that these policies are being followed. Participation in the CACFP or Best Beginnings STARS to Quality by ECE facilities, two programs that provide guideline-based nutrition education and regular oversight, is voluntary. By requiring all licensed ECE facilities to participate in the CACFP, nutritional quality of food being served to children in ECE facilities could be more closely monitored, meet nutritional guidelines, and support a reduction in childhood obesity rates. Advocacy regarding ECE licensing requirements and support for the recommendation that all licensed ECE be required to participate in the CACFP provides evidence of the doctoral competency necessary for population health outcome improvement (Appendix E).

Strengths

There were numerous strengths of the project. First, individual responses before and after the educational video could be matched allowing for statistical analysis, regarding changes in responses after viewing the intervention, to be completed. By linking these two sources of information, future effort can be based on what knowledge was not known prior to the intervention and strategies to improve that knowledge.

The sustainability of this project for the Montana CACFP program is also a strength. As CACFP guidelines and National Dietary Guidelines change, the educational video can be updated to reflect those changes with minimal time required. As a student, the author had access to the software program Qualtrics, free of charge, which usually requires an annual fee to access. However, due to the video being created in *YouTube*, the demographic questions, and pre/posttest being created by the author, and all of the project elements being handed over to the Montana CACFP program manager, the project could be recreated with minimal effort in any online research platform available. A one-page primer emphasizing the areas that had the lowest scores was developed and supplied to the Montana CACFP program for use in the future as they see fit (Appendix E). This document can also be easily changed and updated as guidelines change.

Limitations

Several limitations may affect the validity of this project. First, the pre and posttest and educational video were developed by the author. Although the National Dietary Guidelines and CACFP recommendation were followed, there was no validity or

reliability testing of the tool. Furthermore, the sample was a convenience sample and not completely random as the participants that received the invitation have permanent agreements with the State of Montana to participate in the CACFP. There is also a risk for response bias as the link for the project came directly from the CACFP program manager. Finally, there is no way to tell if the person completing the project is involved in the meal planning and serving of food to children at the facility so whether or not their knowledge is being applied or not is uncertain.

Recommendations for Next Steps

This project assessed the current knowledge of ECE providers who have permanent agreements with the State of Montana to participate in the CACFP. Some of the facilities also participate in the Best Beginning STARS to Quality program which provides additional nutrition education. The variability in responses from this group indicates that the recommendations are not well understood or retained by everyone. Future evidence-based work should focus on a quality improvement effort to determine the reason for the variability in answers from groups who receive the same nutrition education as well as an assessment of childhood nutrition recommendation knowledge in non-CACFP or STARS to Quality participating facilities. An effort should be made to improve the knowledge of non-CACFP or STARS to Quality participating facilities as they do not receive the additional nutrition education that these programs offer and may be unsure of or unaware of the childhood nutrition recommendation guidelines.

A recommendation for the State of Montana to help facilitate ECE providers in providing the correct serving sizes to children, is to consider providing a standardized set of measuring utensils to all ECE facilities. These utensils could be color coded or labeled for each food group and used when preparing plates at meal time. This would take the guess work out of how much $\frac{1}{8}$ of a cup of granola is or what constitutes $\frac{1}{4}$ cup of fruit or vegetables as one scoop would indicate the correct serving size.

DNP Competencies

DNP prepared advanced practice nurses are expected to integrate nursing science and theory as well as psychosocial elements as a foundation for nursing practice. With this essential in mind, elements of the Health Promotion Model were used as a guide for the project including the effect of situational and personal influences on health behaviors. Furthermore, the DNP student was able to interpret and apply knowledge from informatics to evaluate outcomes as well as assess epidemiological, occupational, and organizational forces in the implementation and evaluation of population health. Finally, through collaboration with the State of Montana CACFP program, the DNP student demonstrated leadership and effective communication in intra-professional relationships, to improve outcomes for a specific population.

Practicing preventative primary health care provides direct benefits to individuals and the healthcare system as a whole. In 2017, the federal government spent \$3.5 trillion on healthcare and the average annual rate at which health expenditures are expected to grow is 5.5%, reaching \$6 trillion by 2027 (Centers for Medicare and Medicaid Services

[CMS], 2019). Health promotion, through weight management, is a prevention strategy that can lower a person's risk for developing weight related disease such as cardiovascular disease, diabetes, certain cancers, and hypertension, all diseases which are some of the most expensive diseases and health conditions to treat (CMS. 2019). Obese children are at higher risk for developing these conditions in childhood and carrying them forward into adulthood. By ensuring that children who attend ECE programs receive proper nutrition as recommended by the national dietary guidelines and CAFCP, their risk for obesity may be reduced, which in turn may impact healthcare spending. As a result of this project, the DNP student was able to influence health outcomes by providing advanced comprehensive health care services such as health promotion and disease prevention throughout the lifespan.

The purpose of this scholarly project was to assess the current knowledge of ECE providers in regards to childhood nutrition recommendations, provide a guideline-based educational intervention informing or reinforcing the recommendations, and evaluate post intervention knowledge of the participants. Throughout the process, the author was able to demonstrate the value of doctorally prepared scholarly effort to 1) integrate nursing science, theory and psychosocial elements as a foundation for practice; 2) interpret and apply knowledge from informatics to evaluate outcomes; 3) demonstrate leadership and effective communication in intra-professional relationships and; 4) influence health outcomes by providing health promotion services and disease prevention throughout the lifespan. The results of the project demonstrate the value of translating evidence to improve health outcomes for a specific population.

REFERENCES CITED

- Ali, S. A., Ali, S.A., Suhail, N., Tikmani, S. S., & Bano, G. (2016). Childhood obesity, a public health crisis: Narrative review of public health interventions for childhood obesity. *Journal of Universal Surgery*, 4(2), 1-6. ISSN 2254-6758.
- Benjamin, S. E., Rifas-Shiman, S. L., Taveras, E. M., Haines, J., Finkelstein, J., Kleinman, K., Gillman, M. W. (2009). Early child care and adiposity at ages 1 and 3 years. *Pediatrics*, 124(2), 555-562. doi: <https://doi.org/10.1542/peds.2008-2857>
- Bonnel, W. & Smith, K. V. (2018). *Proposal Writing for Clinical Nursing and DNP Projects* (2nd ed.). New York, NY: Springer Publishing Company.
- Centers for Disease Control and Prevention. (2016). *Childhood obesity causes & consequences*. Retrieved from <https://www.cdc.gov/obesity/childhood/causes.html>
- Centers for Medicare and Medicaid Services. (2019). *NHE fact sheet*. Retrieved from <https://www.cms.gov/research-statistics-data-and-systems/statistics-trends-and-reports/nationalhealthexpenddata/nhe-fact-sheet.html>
- Doherty, E., Queally, M., Cullinan, J., & Gillespie, P. (2017). The impact of childhood overweight and obesity on healthcare utilization. *Economics and Human Biology*, 27(A), 84-92. doi: <https://doi.org/10.1016/j.ehb.2017.05.002>
- Esquivel, M. K., Nigg, C. R., Fialkowski, M. K., Braun, K. L., Li, F., & Novotny, R. (2016). Influence of teachers' personal health behaviors on operationalizing obesity prevention policy in Head Start preschools: A project of the Children's Healthy Living Program (CHL). *Journal of Nutrition Education and Behavior*, 48(5), 318-325. doi: <https://doi.org/10.1016/j.jneb.2016.02.007>
- Gerritsen, S. (2016). Nutrition education for early childhood managers, teachers and nursery cooks: A prerequisite for effective obesity prevention. *Public Health*, 140, 56-58. doi: <https://doi.org/10.1016/j.puhe.2016.05.025>
- Gubbels, J. S., Kremers, S. P. J., Stafleu, A., Dagnelie, P. C., de Vries, N. K., van Buuren, S., & Thijs, C. (2010). Child-care use and the association with body mass index and overweight in children from 7 months to 2 years of age. *International Journal of Obesity*, 34, 1480+. doi: <https://doi.org/10.1038/ijo.2010.100>
- Heath Resources and Service Administration. (2018). *Hemmed-in kids hobbled by obesity*. Retrieved from https://www.hrsa.gov/enews/past-issues/2018/august-2/children-and-obesity.html?utm_campaign=enews08022018&utm_medium=email&utm_source=govdelivery

- Hodder, R. K., O'Brien, K. M., Stacey, F. G., Wyse, R. J., Clinton-McHarg, T., Tzelepis, F., ... Bartlem, K. M. (2018). Interventions for increasing fruit and vegetable consumption in children aged five years and under (Review). *Cochrane Database of Systematic Reviews* 2018(5). Art. No.: CD008552. doi: 10.1002/14651858.CD008552.pub5.
- Koleilat, M., Harrison, G. G., Whaley, S., McGregor, S., Jenks, E., & Afifi, A. (2012). Preschool enrollment is associated with lower odds of childhood obesity among WIC participants in LA county. *Maternal and Child Health Journal*, 16(3), 706-712. doi: 10.1007/s10995-011-0774-0.
- Liping, P., Freedman, D. S., Sharma, A. J., Castellanos-Brown, K., Sohyun, P., Smith, R. B., & Blanck, H. M. (2016). Trends in obesity among participants aged 2-4 years in the special supplemental nutrition program for women, infants, and children - United States, 2000-2014. *Morbidity and Mortality Weekly Report*, 65(45), 1256-1260. doi: <http://dx.doi.org/10.15585/mmwr.mm6545a2>
- Lumeng, J. C., Kaciroti, N., Sturza, J., Krusky, A. M., Miller, A. L., Peterson, K. E., Lipton, R., & Reischl, T. M. (2015). Changes in body mass index associated with Head Start participation. *Pediatrics*, 135(2), e449-e456. doi: <https://doi.org/10.1542/peds.2014-1725>
- Maher, E. J., Li, G., Carter, L., & Johnson, D. B. (2008). Preschool child care participation and obesity at the start of kindergarten. *Pediatrics*, 122(2), 322-330. doi: <http://dx.doi.org/10.1155/2010/360407>
- Malik, V. S., Popkin, B. M., Bray, G. A., Despres, J., & Hu, F. B. (2010). Sugar-sweetened beverages, obesity, type 2 diabetes mellitus, and cardiovascular disease risk. *Circulation*, 121(11), 1356-1364. doi: <https://doi.org/10.1161/CIRCULATIONAHA.109.876185>
- Meleis, A. (2012). *Theoretical nursing development and progress* (5th ed.). Philadelphia: Wolters Kluwer, Lippincott, Williams & Wilkins.
- Molloy, C. J., Kearney, J., Hayes, N., Slattery, C. G., & Corish, C. (2013). Pre-school manager training: A cost-effective tool to promote nutrition- and health-related practice improvements in the Irish full-day-care pre-school setting. *Public Health Nutrition*, 18(9), 1554-1564. doi: 10.1017/S1368980013002760.
- Montana Department of Public Health and Human Services. (n.d.). *Best beginnings STARS to quality*. Retrieved from <https://dphhs.mt.gov/hcsd/ChildCare/STARS>
- Montana Department of Public Health and Human Services. (n.d.). *Child and adult care food program*. Retrieved from <https://dphhs.mt.gov/hcsd/childcare/cacfp>

- Montana Legislative Audit Division. (2011). *Inspection and complaint activities for the child care licensing program*. Retrieved from <https://www.mtecpl.org/pdfs/Training/licensing%20report.pdf>
- Natale, R. A., Lopez-Mitnik, G., Uhlhorn, S. B., Asfour, L., & Messiah, S. E. (2014). Effect of a child care center-based obesity prevention program on body mass index and nutrition practices among preschool-aged children. *Health Promotion Practice, 15*(5), 695-705. doi: 10.1177/1524839914523429.
- National Conference of State Legislatures. (2014). *Childhood overweight and obesity trends*. Retrieved from <http://www.ncsl.org/research/health/childhood-obesity-trends-state-rates.aspx>
- National Institute of Health. (2013). *Eat play grow: Creative activities for a healthy start*. Retrieved from <https://www.nhlbi.nih.gov/health/educational/wecan/downloads/eatplaygrow.pdf>
- Pearce, A., Li, L., Abbas, J., Ferguson, B., Graham, H., & Law, C. (2010). Is childcare associated with the risk of overweight and obesity in the early years? Findings from the UK millennium cohort study. *International Journal of Obesity, 34*(7), 1160-1168. doi: 10.1038/ijo.2010.15.
- Pender, N. J., Murdaugh, C. L., & Parsons MA. (2015). *Health Promotion in Nursing Practice* (7th ed.). Boston, MA: Pearson.
- Robert Wood Johnson Foundation. (2018). *The state of obesity*. Retrieved from <https://stateofobesity.org/wic/>
- Sameroff, A. (2009). The transactional model. In A. Sameroff (Ed.), *The transactional model of development: How children and contexts shape each other* (pp. 3-21). Washington, DC, US: American Psychological Association.
- Scully, H., Alberdi, G., Segurado, R., McNamara, A., Lindsay, K., Horan, M.,...McAuliffe, F. (2017). Child care exposure influences childhood adiposity at 2 years: Analysis from the ROLO study. *Childhood Obesity, 13*(2), 93-101. doi: 10.1089/chi.2016.0127.
- Story, M. & Kauh, T. (2019). *Expert guidance on what young kids should drink and avoid*. Retrieved from https://www.rwjf.org/en/blog/2019/09/expert-guidance-on-what-young-kids-should-drink-and-avoid.html?rid=0034400001rlrVsAAI&et_cid=1838986

Swyden, K., Sisson, S. B., Lora, K., Castle, S., & Copeland, K. A. (2017). Association of childcare arrangement with overweight and obesity in preschool-aged children: A narrative review of literature. *International Journal of Obesity*, 41(1), 1-12. doi: 10.1038/ijo.2016.198.

United States Department of Agriculture. (2018). *WIC food packages - regulatory requirements for WIC-eligible foods*. Retrieved from <https://www.fns.usda.gov/wic/wic-food-packages-regulatory-requirements-wic-eligible-foods>

United States Department of Health and Human Services & United States Department of Agriculture. *2015 – 2020 Dietary guidelines for Americans*. (8th Ed.). December 2015. Retrieved from <https://health.gov/dietaryguidelines/2015/guidelines/>

APPENDICES

APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL LETTER



INSTITUTIONAL REVIEW BOARD
For the Protection of Human Subjects
FWA 00000165

2155 Analysis Drive
 c/o Microbiology & Immunology
 Montana State University
 Bozeman, MT 59718
 Telephone: 406-994-4706
 FAX: 406-994-4203
 E-mail: cheryl@montana.edu

Chair: Mark Quinn
 406-994-4707
 mquinn@montana.edu
 Administrator:
 Cheryl Johnson
 406-994-4706
 cheryl@montana.edu

MEMORANDUM

TO: Brittany Carnahan and Susan Raph
FROM: Mark Quinn *Mark Quinn*
 Chair, Institutional Review Board for the Protection of Human Subjects
DATE: March 5, 2019
RE: "Childcare as a Protective Factor for Childhood Obesity" [BC030519-EX]

The above research, described in your submission of March 5, 2018, is exempt from the requirement of review by the Institutional Review Board in accordance with the Code of Federal regulations, Part 46, section 101. The specific paragraph which applies to your research is:

- ☐ (b) (1) Research conducted in established or commonly accepted educational settings, involving normal educational practices such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.
- ☒ (b) (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation; and (iii) the information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by section 16.111(a)(7).
- ☐ (b) (3) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under paragraph (b)(2) of this section, if: (i) the human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.
- ☐ (b) (4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available, or if the information is recorded by the investigator in such a manner that the subjects cannot be identified, directly or through identifiers linked to the subjects.
- ☐ (b) (5) Research and demonstration projects, which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs.
- ☐ (b) (6) Taste and food quality evaluation and consumer acceptance studies, if: (i) wholesome foods without additives are consumed, or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the FDA, or approved by the EPA, or the Food Safety and Inspection Service of the USDA.

Although review by the Institutional Review Board is not required for the above research, the Committee will be glad to review it. If you wish a review and committee approval, please submit 3 copies of the usual application form and it will be processed by expedited review.

APPENDIX B

DEMOGRAPHIC SURVEY

Demographic Survey

- 1) How many years have you worked in early childhood education in a capacity in which money was earned?
 - a. Less than 1 year
 - b. 1-2 years
 - c. 2-5 years
 - d. 5+ years
- 2) What is your highest level of education completed?
 - a. Some high school, no diploma
 - b. High school graduate or GED
 - c. Some college, no degree
 - d. Associate degree
 - e. Bachelor degree
 - f. Graduate degree
- 3) What is your age?
 - a. <18 years
 - b. 18-24 years
 - c. 25-34 years
 - d. 35-44 years
 - e. 45-54 years
 - f. 55+
- 4) What is your gender?
 - a. Male
 - b. Female
 - c. Other
- 5) How many children do you regularly provide care for?
 - a. 6 or less
 - b. 7-12
 - c. 13 or more
- 6) Do you participate in the Child and Adult Care Food Program (CACFP)?
 - a. Yes
 - b. No
- 7) Do you participate in the Best Beginnings STARS to quality program?
 - a. Yes
 - b. No

- 8) If you participate in the Best Beginnings STARS to quality program, what STAR level are you currently at?
- a. Pre-STAR
 - b. 1
 - c. 2
 - d. 3
 - e. 4
 - f. 5

APPENDIX C

PRE AND POST TEST QUESTIONS

Pre and Post Test Questions

Question 1-4 are based on the National Dietary Guidelines for all Americans. The National Dietary Guidelines are developed by the U.S. Department of Health and Human Services and the U.S. Department of Agriculture and are considered the go-to source for nutrition advice.

- 1) What are the National Dietary Guidelines intended to do? (select all that apply)
 - a. Help individuals improve and maintain overall health
 - b. Reduce the risk of chronic disease
 - c. Prevent disease
 - d. Treat disease
 - i. Answer: a, b, c
- 2) Which group(s) of people should follow the National Dietary Guidelines?
 - a. Infants
 - b. Children
 - c. Adults
 - d. Elderly
 - e. All of the above
 - i. Answer: e
- 3) True or false: All people, regardless of age or sex, require the same amount of calories and nutrients in a day?
 - a. True
 - b. False
 - i. Answer: b
- 4) How many calories per day do the National Dietary Guidelines recommend for a moderately active 2-year-old male?
 - a. 500 calories
 - b. 1,000 calories
 - c. 1,400 calories
 - d. 1,600 calories
 - i. Answer: b

Question 5-12 are based on the Child and Adult Care Food Program (CACFP) guidelines for a reimbursable meal. The purpose of the CACFP guidelines is to improve the nutritional quality of meals served to children in early childhood education programs.

- 5) According to the CACFP guidelines, what three components should be present when serving breakfast?
 - a. Water, vegetable/fruit, grains
 - b. Milk, vegetable/fruit, grains
 - c. Milk, vegetable/fruit, protein
 - d. Water, vegetable/fruit, protein
 - i. Answer: b
- 6) According to the CACFP guidelines for ages 1-5, a serving size of granola for breakfast is:
 - a. 1 cup
 - b. $\frac{3}{4}$ cup
 - c. $\frac{1}{2}$ cup
 - d. $\frac{1}{8}$ cup
 - i. Answer: d
- 7) According to the CACFP guidelines for children ages 1-2, which of the following are appropriate substitutes for 1 ounce of meat when serving lunch or supper?
 - a. 1 ounce of Tofu
 - b. $\frac{1}{2}$ of a large egg
 - c. $\frac{1}{4}$ cup of cooked dry beans
 - d. 2 tbsp nut or seed butter
 - e. $\frac{1}{2}$ cup yogurt
 - f. All of the above
 - i. Answer: f
- 8) According to the CACFP guidelines for children age 3-5, a fruit **and** vegetable must be served with lunch and supper. What is the correct serving size for these foods?
 - a. $\frac{1}{2}$ cup fruit/vegetable
 - b. $\frac{1}{4}$ cup fruit/vegetable
 - c. $\frac{1}{8}$ cup fruit/vegetable
 - d. 1 cup fruit/vegetable
 - i. Answer: b
- 9) Can serving two different vegetables at lunch satisfy the entire fruit and vegetable requirement?
 - a. Yes
 - b. No
 - i. Answer: a

10) What type of milk satisfies the requirement when serving milk to children age 2-5?

- a. Unflavored whole milk
- b. Flavored 1% or skim milk
- c. Unflavored 1% or skim milk
- d. Unflavored 2% milk

i. Answer: c

11) True or false: At least one serving of whole grain-rich food should be served at every meal.

- a. True
- b. False

i. Answer: a

12) For children ages 3-5, what is the maximum amount of total sugar allowed for a 6-ounce serving of yogurt?

- a. 46 grams
- b. 23 grams
- c. 11 grams
- d. 6 grams

i. Answer: b

Questions 13-15 are based on the CACFP **recommended best practice** and are encouraged but not required for a reimbursable meal.

13) What is best practice for serving purchased, pre-fried foods?

- a. No more than once per week
- b. No more than twice per week
- c. No more than once per day
- d. No more than twice per day

i. Answer: a

14) True or false: Based on the CACFP **best practice recommendations**, all snacks should contain at least a fruit or vegetable.

- a. True
- b. False

i. Answer: a

15) According to the **best practice recommendations**, which of the following foods should be avoided?

- a. Jam
 - b. Syrup
 - c. Honey
 - d. Soda
 - e. Candy or cookie pieces
 - f. All of the above
- i. Answer: f

APPENDIX D

IMPACT QUESTIONS AND MORE INFORMATION

Impact Questions and More Information

- 1) Did you find this information to be helpful?
 - a. Yes
 - b. No
- 2) Will you be able to immediately apply the knowledge you gained from this project to your job?
 - a. Yes
 - b. No
- 3) If you would like more information on the CACFP guidelines, you can find that information here: <https://www.fns.usda.gov/cacfp/child-day-care-centers>
- 4) If you would like more information on the Best Beginnings STARS to Quality Program, you can find that information here: <https://dphhs.mt.gov/hcsd/childcare/stars>
- 5) If you would like more information on the National Dietary Guidelines, you can find that information here: <https://health.gov/dietaryguidelines/2015/>

APPENDIX E

ADVOCACY LETTER

Penny Job
Childcare Licensing Program Manager
2401 Colonial Drive, 2nd Floor
Helena MT 59620-2953

RE: Childcare Licensing Requirements

Dear Ms. Job:

As a licensed registered nurse and mother in Montana, I am writing you in regards to the public health crisis that is childhood obesity. I ask for the Quality Assurance Division's consideration in changing the childcare licensing policy requirements to include more specific education for childcare providers regarding childhood nutrition and to require all licensed childcare facilities in Montana to participate in the Child and Adult Care Food Program (CACFP).

According to the Centers for Disease Control and Prevention, childhood obesity rates have tripled since the 1980's and currently, 18.5% of 2-19-year old's in the United States are obese. Childhood obesity is a complex, multifactorial disease influenced by genetics, behavior, environment, and nutrition. Furthermore, obese children are more likely to become obese adults, carrying with them their already chronic health problems such as high blood pressure, high cholesterol, insulin resistance, and asthma. As these children age, their chronic health problems take on more severe forms including heart disease, type 2 diabetes, sleep apnea, and cancer. Finally, obese children have a significant impact on healthcare utilization including more visits to general practitioners, more inpatient stays, and more mental health concerns.

Data from a study conducted amongst children participating in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) shows a statistically significant decrease in obesity among 2- to 4-year-old children, from 15.9% in 2010 to 14.5% in 2014. The results of this study are promising for reducing childhood obesity rates in non-WIC participants that attend childcare facilities as WIC programs adhere to the CACFP guidelines. Consider the thousands of Montana children that spend the majority of their day in a childcare facility and potentially consume two of three meals as well as snacks and how this policy change could have a positive impact on their lives. By requiring all licensed childcare facilities to complete education regarding childhood nutrition and follow the CACFP guidelines, there is potential for childcare facilities to be a protective factor against childhood obesity.

As the program manager for the childcare licensing division, I ask that you bring awareness to childhood obesity and how childcare facilities can be a protective factor against this public health crisis. Through specific education regarding childhood nutrition and the licensing requirement of participating in the CACFP thousands of Montana children can learn healthy eating behaviors and establish healthy habits that can last a lifetime. Thank you for your time.

APPENDIX F

ONE PAGE INFORMATIONAL PRIMER

Childhood Nutrition Guideline Reminders

Total serving size of fruit or vegetable for breakfast for 1-2 year old's is 1/4 cup

vs.

Total serving size of fruit or vegetable for breakfast for 3-5 year old's is 1/2 cup

Only serve 1/8 cup of granola

6 ounces of yogurt should not have more than 23 grams of sugar

Serving two different vegetables can satisfy the entire fruit and vegetable requirement!

Provide at least one serving of whole grain-rich food at every meal

Estimated Calorie Needs per Day by Age, Sex, & Physical Activity Level

Males

Age	Sedentary	Moderately Active	Active
2	1,000	1,000	1,000
3	1,000	1,400	1,400
4	1,200	1,400	1,600
5	1,200	1,400	1,600
6	1,400	1,600	1,800
7	1,400	1,600	1,800
8	1,400	1,600	2,000

Females

Age	Sedentary	Moderately Active	Active
2	1,000	1,000	1,000
3	1,000	1,200	1,400
4	1,200	1,400	1,400
5	1,200	1,400	1,600
6	1,200	1,400	1,600
7	1,200	1,600	1,800
8	1,400	1,600	1,800

Adapted from "2015-2020 Dietary Guidelines for Americans by U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015. Retrieved from <https://health.gov/2015dietaryguidelines/2015guidelines/>