

THE POTENTIAL IMPACT OF NUTRITION EDUCATION COURSES ACCEPTED BY
THE PARENT AWARE PROGRAM ON NUTRITIONAL AND PHYSICAL ACTIVITY-
RELATED KNOWLEDGE, ATTITUDE, AND BEHAVIOR AMONG CHILDCARE
PROVIDERS AND PRESCHOOLERS' PARENTS WHOM THESE CHILDCARE
PROVIDERS SERVE

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Rose Janet Prissel

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By

Rose Janet Prissel

The Supervisory Committee certifies that this *disquisition* complies with North Dakota State University's regulations and meets the accepted standards for the degree of

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SUPERVISORY COMMITTEE:

Dr. Yeong Rhee

Chair

Dr. Sherri Stastny

Dr. Elizabeth Blodgett-Salafia

Approved:

May 2, 2016

Date

Dr. Yeong Rhee

Department Chair

ABSTRACT

Recently Minnesota (MN) adopted Parent Aware, a childcare quality four star rating system. At the top-star rating, nutrition and childhood obesity prevention education is recommended. However, little is known of its impact on childhood obesity. The purpose of this study is to identify the impact of Parent Aware towards nutrition knowledge, behavior, and attitudes of childcare providers and the parents they serve. A quantitative analysis was conducted using a survey in 2015. Seven hundred and seven childcare providers responded to the questionnaire. The parent survey had 123 responders. There were no significant nutrition knowledge, attitude, or behavioral differences between childcare providers who were part of Parent Aware and those who were not part of Parent Aware. There was a significant difference in nutrition offerings to preschoolers between childcare providers and parents. This study highlights the impact childhood obesity education is providing to all childcare providers.

Keywords: Childcare Provider, Parent, Preschooler, Childhood Obesity

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CHAPTER 1. INTRODUCTION

In the United States, both parents are currently working in 60 percent of married-couple families (United States Department of Labor Bureau of Labor Statistics, 2015). This has resulted in over 60 percent of all U. S. children under five years of age, or approximately 12 million, (O'Donnell, 2008) spending an average of 36 hours a week in some form of childcare (Wood, Kendall, Klisz, & Sadi, 2013). More specifically, in Minnesota (MN) the hours spent in childcare is approximately 30 hours per week, slightly less than the national average (Minnesota Department of Human Services, 2009). Hence, parents and childcare providers share the responsibility for nurturing and educating children during important developmental years when the child is highly receptive to a variety of positive and negative environmental experiences (Geoffroy, Power, Touchette, Dubois, Boivin, Séguin, Côté, 2013; Mokdad, Ford, Bowman, Dietz, Vinicor, Bales, & Marks, 2003; Must, 1996). This allows for the childcare setting to be an opportunity to reach young children with obesity prevention efforts.

Being overweight and obese affects nearly one third of children two through five years of age in United States (Ogden, Carroll, Kit, & Flegal, 2014). Furthermore, childhood obesity is linked to obesity in adulthood: for obese children versus non-obese children, the risk of adult obesity is at least twice as high (Reilly, Armstrong, Dorosty, Emmett, Ness, Rogers, Sherriff, 2005). Obesity that begins at a young age and follows into adulthood not only increases health risks but also substantially increases health costs (Finkelstein, Graham, & Malhotra, 2014).

In essence being overweight or obese is the result of an energy imbalance. The imbalance occurs when too few calories are expended for the amount of calories consumed. However, this is not the only component contributing to the current obesity epidemic (CDC, 2014a). Causes of obesity are multifactorial. Yet minimal physical activity and excess consumption of energy dense

foods are the major individual lifestyle behaviors believed to be contributing to weight gain and likelihood of obesity in youth (CDC, 2014a). Shaping these individual behaviors is the political, environmental, social, and organizational influences that act as a foundation for their early development (Sallis, Owen, & Fisher, 2008). In addition individual factors such as genetics and epigenetics along with knowledge, attitudes and behavior related to diet and exercise will further influence the child to develop obesity or gain extra weight (CDC, 2014a).

It is difficult to reverse weight gain or obesity after kindergarten (Cunningham, Kramer, & Narayan, 2014). However, young children respond better to lifestyle interventions for weight management than young adolescents (Addressi, Galloway, Visalberghi, & Birch, 2005; Kudlová & Schneidrová, 2012; Nyberg, Sundblom, Norman, Bohman, Hagberg, & Elinder, 2015). Since dietary habits are readily shaped and formed early in life, it is very possible to modify them before age five (Scaglioni, Arrizza, Vecchi, & Tedeschi, 2011; Schwartz, Scholtens, Lalanne, Weenen, & Nicklaus, 2011). In addition, adults have several opportunities daily to directly influence a child's nutritional knowledge, attitudes, and behavior (Nicklas, Baranowski, Baranowski, Cullen, Rittenberry, & Olvera, 2001; Vereecken, Haerens, De Bourdeaudhuij, & Maes, 2010) through their food purchase and consumption choices, which are based on adult nutrition attitudes and beliefs (Campbell & Crawford, 2001; Wilson, Musham, & McLellan, 2004). Thus, childcare providers are in the position to influence preschoolers when they model, teach, and support wholesome nutritional habits (John, Wolfenstetter, & Wenig, 2012; Gubbels, Gerards, & Kremers, 2015). A healthy childcare environment will influence preschoolers even if parents do not carry or support the same views. One example of such a program is Hip Hop to Health Jr. (Fitzgibbon, Stolley, Schiffer, Van Horn, KauferChristoffel, 2005), which promotes healthy eating and physical activity habits in children ages three to five in childcare settings, and

engages parents in obesity interventions. This helps young children during the crucial early developmental years establish lifelong healthy eating and physical activity habits (Schwartz et al., 2011).

Childcare facilities may provide one-third to two-thirds of the preschooler's nutritional needs, based on the length of the child's participation for the day (Briley & McAllaster, 2011). A study evaluating meals served to preschoolers in 96 childcare centers in North Carolina found that they were not being served the recommended amount or type of beverages and were being served high-sugar and high-salt snack foods (Benjamin Neelon, Vaughn, Ball, McWilliams, & Ward, 2012). Even when preschoolers' have an excessive caloric intake, those extra calories are not fulfilling the preschoolers' diets for the recommended number of servings of fruits, vegetables, and milk (Robson, Khoury, Kalkwarf, & Copeland, 2015). On average the daily intake of vegetables and fruit is below the recommended intake, with dairy and protein close to the recommended intake and grains were at the recommendation for males and females ages four to eight. On average the percentage of the U.S. population ages one and older which have an excess intake of sugar, saturated fats and sodium is 70% or more. This dietary imbalance shows that many families are not eating healthy foods as noted by "What We Eat in America" (What we eat in America, 2014) and according to the Dietary Guidelines 2015-2020. Low exposure and availability for children to consume fruits, vegetables, and milk in the home environment, create a higher risk for excess caloric intake from foods high in solid fats and added sugar. It is of great importance that preschoolers are given the opportunity to develop healthy eating habits, which may persist into adulthood, and thus in turn reduce health care cost (Wright, Kenney, Giles, Long, Ward, Resch, Sacks, 2015). Therefore, childcare providers may influence the health of the preschooler due to their prominent role in the development of the preschooler's dietary habits

and their potential role in educating parents to adopt healthier habits at home (Sharma, Dortch, Byrd-Williams, Truxillio, Rahman, Bonsu, & Hoelscher, 2013; United States Department of Agriculture Food and Nutrition Service Office of Research and Analysis, 2014).

In light of this widespread need for education about nutritional choices for both parents and childcare providers, the Healthy Kids, Healthy Future Steering Committee was initiated in 2009. The committee was made up of experts in the area of obesity in children from birth through five years; its goal was to address how to reverse the number of obese preschoolers by dispersing policy, practice and research on national, state, and local levels (Centers for Disease Control and Prevention, 2008). The Centers for Disease Control and Prevention (CDC) co-leads the ongoing Healthy Kids, Healthy Future Steering Committee. The 2009 Healthy Kids, Healthy Future conference was the impetus for the CDC to focus on addressing obesity in the early childcare setting. The CDC put forth a framework specifically for caregivers for obesity prevention entitled “Spectrum of Opportunities for Obesity Prevention in the Early Care and Education Setting” which identifies how states can support childcare facilities to achieve best practices for obesity prevention (CDC, 2008). The national early childcare standards for obesity prevention “Caring for our Children: National Health and Safety Performance Standards” (CFOC) (American Academy of Pediatrics, 2012) supports the “Spectrum” report. These reports represent comprehensive evidence-based obesity prevention recommendations. Successful implementation of childhood obesity prevention recommendations occurs when childcare givers are provided a professional nutrition and obesity prevention training (Benjamin, Ammerman, Sommers, Dodds, Neelon, & Ward, 2007; Sigman-Grant, Christiansen, Fernandez, Fletcher, Johnson, Branen, & Price, 2011). Mounting evidence underscores the importance of developing

positive nutrition behaviors and practices for childcare providers, parents, and children to obtain and sustain a healthy weight status (French, Story, & Jeffery, 2001; Natale et al., 2014b).

Preventing obesity early in life is the ultimate goal of the Institute of Medicine (IOM). Knowing that obesity often begins in childhood, in 2002 Congress instructed the IOM to develop a prevention action plan for decreasing obesity among the nation's children. From this, the IOM created the report "Preventing Childhood Obesity: Health in the Balance" (Koplan, Liverman, & Kraak, 2005). The report, like other programs and recommendations from the government such as the Nutrition and Physical Activity Program to Prevent Obesity and Other Chronic Diseases (NAPO) established in 1999 by the CDC and authorized by the US Congress (Yee, Williams-Piehota, Sorensen, Roussel, Hersey, & Hamre, 2006) and the Surgeon General's "Call to Action to Prevent and Decrease Overweight and Obesity" in 2001, recognized the need to support and promote healthy weight initiatives amongst several segments of society. These were far reaching efforts including federal, state, and local governments, industry, media, healthcare providers, community, nonprofit groups, schools, and families. Hence prevention requires that all stakeholders understand the dynamic interrelations of numerous factors, personal and environmental, that contribute to childhood obesity. The government used the health behavior Social-Ecological Model (SEM) (SEM, Figure 1) an adaptation of the research by Urie Bronfenbrenner to conceptualize the issues of overweight and obesity.

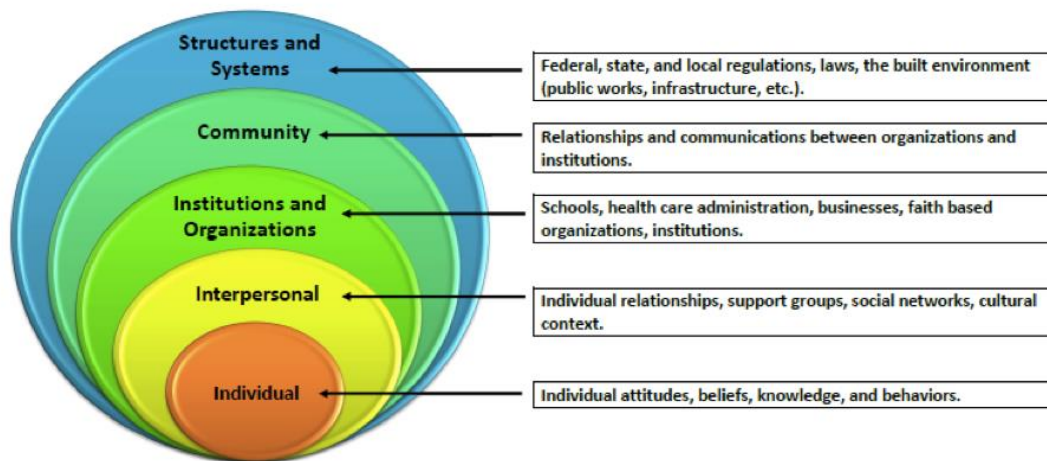


Figure 1. Social-Ecological Model. (Centers of Disease Control and Prevention, 2013)

The SEM also aids in understanding the potential effects of prevention strategies (CDC, 2013). The SEM reveals that there are many interconnected opportunities for communities, childcare providers, and parents to support the prevention and intervention efforts to reduce childhood obesity (Ward, Benjamin, Ammerman, Ball, Neelon, & Bangdiwala, 2008). For sustainability in obesity prevention efforts, the SEM suggests it is best to act across multiple levels of the model at the same time versus a single intervention (Sallis, et al., 2008). Therefore changes need to be made at all levels within the community in a sustainable and economical way. Government resources help to promote and endorse sweeping culture changes that are needed to reduce childhood obesity. Neither childcare providers nor families can do it alone.

A current example of how the SEM is put into practice is the national childhood anti-obesity initiative called “Let’s Move!” (Wojcicki & Heyman, 2010). The “Let’s Move!” initiative is based on five pillars: “1) Creating a healthy start for children, 2) Empowering parents and caregivers, 3) Providing healthy food in schools, 4) Improving access to healthy, affordable foods; 5) Increasing physical activity” (First Lady Michelle Obama - Let's Move!, 2010). The aim of the “Let’s Move!” action plan is to have the obesity rate of children, aged two through

five, reduced to five percent by 2030 (CDC, 2014b). According to the National Health and Nutrition Examination Survey (NHANES), obesity rates among two through five-year-old children have decreased from 13.9 percent in 2003-2004 to 8.4 percent in 2011-2012 (CDC, 2011; IOM, 2011; Ogden, et al., 2014) The most recent data show that the obesity rate between 2011-2012 and 2013-2014 has not changed (Ogden & Flegal, 2015). Minnesota's obesity rates among two through four-year-olds have decreased from 13.4 percent in 2008 to 12.6 percent in 2011 (CDC, 2013b). Furthermore, the CDC reported a decrease in obesity among preschoolers enrolled in federal health and nutrition programs in 2013. The CDC stated that the national policies that helped contribute to the reduced obesity were the (1) improved recommended healthy food and beverage updates to the food package for the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) (IOM, 2011), (2) the new nutrition and physical activity standards for early childcare programs (Nemours. Children's Health System, 2016; United States Department of Agriculture Food and Nutrition Service, 2016a), and (3) additional support for breastfeeding mothers (Barnes, 2010; CDC, 2016a).

“Let’s Move! Child Care” (LMCC) is part of the “Let’s Move!” initiative. It supports and empowers childcare providers to make positive changes. It summons childcare providers to meet five goals: “1) Increase physical activity, 2) Reduce screen time, 3) Improve food choices, 4) Provide healthy beverages, and 5) Support breastfeeding” (Nemours, 2016). “Let’s Move! Child Care,” provides nutrition education opportunities for childcare providers who meet the nutrition education criteria for Parent Aware. In addition, nutrition education courses through the Child and Adult Care Food Program (CACFP), along with other nutrition programs offered by the Minnesota Department of Health (Parent Aware, 2015) also meet the qualification for Parent Aware nutrition education. Minnesota created a Quality Rating and Improvement System (QRIS)

known as Parent Aware to help families find high quality childcare. Parent Aware uses a four-star rating service that measures how well a childcare facility has implemented best practices. Parent Aware was designed to establish kindergarten readiness, although it now also includes nutrition and physical activity standards into its course (Tout, Starr, Isner, Cleveland, Albertson-Junkans, Soli, & Quinn, 2011). The nutrition and physical activity standards were initiated with the development of “The Minnesota Plan to Reduce Obesity and Obesity-Related Chronic Diseases” (Minnesota Department of Health, 2008). This plan is a guide for all MN stakeholders and sectors for supporting healthy behaviors from infancy to end of life. The plan’s focus is on nutritious food consumption, sufficient physical movement and sustaining a healthy weight. “The Minnesota Plan to Reduce Obesity and Obesity-Related Chronic Diseases” was used as a guide in the development of the State Health Improvement Systems (SHIP). Initiating from health care reform legislation, the SHIP was passed in the MN Legislature in 2008. The SHIP initiative provides grants to community health stakeholders to implement evidence-based strategies to reduce the number of overweight and obese Minnesotans.

Also, MN was awarded a federal Race to the Top-Early Learning Challenge Grant in December 2011 to improve learning and development opportunities for high needs children from birth to age five. One of the MN state goals for the grant was to implement a program by which quality early care and education programs could be recognized. The Race to the Top focuses on five key areas of reform: 1) Creating effective state systems, 2) Defining high-quality, accountable programs, 3) Supporting early learning and development outcomes for children, 4) Backing the early childhood education workforce, 5) Measuring outcomes and progress” (U.S. Department of Health and Human Services, 2015). Then in 2012, MN the voluntary Parent

Aware program, a QRIS (Minnesota Department of Human Services, 2015; Parent Aware, 2012).

Starting in 2012, both Race to the Top-Early Learning Challenge and SHIP grants have been utilized to help reduce the number of overweight and obese children in MN through educating early childcare providers. The initiatives were, and still are, to provide education that represents comprehensive evidence-based obesity prevention recommendations that address behavior change to support healthy eating and physical activity at the individual, community, and system levels. There has been no evidence of evaluation of childcare providers' nutritional knowledge, attitudes, and behaviors or impact on preschoolers' nutrition and physical activity despite that Parent Aware has been in place for three years.

Statement of the Problem

Obesity is a leading cause of preventable morbidity and mortality in the United States and worldwide (CDC, 2013n). Of great concern is the increased proportion of overweight or obese two to five year olds from 13.9% to 26.7% during the past ten years (CDC, 2014b). Early interventions may prevent the development of obesity (IOM, 2011; Mikkelsen, Husby, Skov, & Perez-Cueto, 2014) in an estimated 38,400 pre-school age children and 1,816,000 school age children nationally (Gortmaker, Wang, Long, Giles, Ward, Barrett, Resch, 2015). Eighty two percent of MN's children age three to five are attending some type of childcare arrangement at least once a week, and of those children 76 percent are attending a center base care facility (Minnesota Department of Human Services, 2009); therefore, childcare settings provide an ideal focus for obesity intervention efforts. Furthermore, programs need to support health behavior changes and provide nutrition and physical activity education opportunities for parents and

childcare providers in order to increase effectiveness (Gibson, Kreichauf, Wildgruber, Vögele, Summerbell, Nixon, Manios, 2012).

Thus, efforts to reduce child obesity will need a comprehensive response by building upon the SEM and the IOM “Preventing Childhood Obesity” prevention guidelines (McGuire, 2012). These interventions need to be assessed to identify if they are effective interventions. One method to evaluate whether or not the childcare provider is applying these recommendations is to establish a childcare QRIS.

Parent Aware is a MN voluntary 4-star quality rating system for childcare providers and early learning programs, funded by a federal government grant. Unlike many other states, MN’s ranking system with Parent Aware is not measuring health outcomes (Tout et al., 2011).

Therefore, identifying if the nutrition education has a positive impact on childcare providers’ nutrition attitude, behavior, and knowledge and improves unhealthy weights of preschoolers and childcare providers, is needed to help support the government’s effort to reduce childhood obesity.

Purpose of the Study

The purpose of this study was: 1) to identify the potential impact of the nutrition education courses adopted by MN’s Parent Aware on nutrition-related knowledge, attitudes, and behaviors amongst childcare providers and the parents of preschoolers’ who are served by the childcare provider (will be referenced as preschooler’s parents) and 2) to identify if there are differences in body mass index (BMI) of childcare providers who are members of Parent Aware and have had three hours or more of nutrition and/or obesity education the past two years and the child care providers who did not participate in Parent Aware.

Research Questions

The following research questions were developed for this study. Is there a significant difference in the:

1. Nutritional knowledge, attitude and behavior; dietary intake, and physical activity between the childcare providers who participated in Parent Aware and had three hours of nutrition and/or obesity education the past two years and the childcare providers who did not participate in Parent Aware?
2. Dietary offering and physical activity opportunities that were provided to preschoolers by the childcare providers who participated in Parent Aware and had three hours of nutrition and/or obesity education the past two years and the childcare providers who did not participate in Parent Aware?
3. BMI between the childcare providers who participated in Parent Aware and had three hours of nutrition and/or obesity education the past two years and the childcare providers who did not participate in Parent Aware?
4. Nutritional knowledge, attitude and behavior; dietary intake and PA between the childcare providers and the preschoolers' parents?
5. Dietary offering and physical activity opportunities that were provided to preschooler by the childcare provider and parent?

Childcare providers participating in the Parent Aware program are accountable for providing up to two-thirds of the preschoolers' nutrition. In addition the childcare providers are also responsible for away from-home preschoolers' nutrition education. Understanding how the nutrition education courses adopted by Parent Aware had a positive outcome to improve overall

wellbeing and reduce obesity in children, parents, and childcare providers was essential in evaluating the program's effectiveness.

Limitations

Limitations of the study include collecting self-reported anthropometric data from the childcare providers and parents although instructions to improve accuracy in anthropometric measurements were provided. Furthermore, a second limitation is that the results found in the state of MN may not be generalizable to other areas or populations. In addition, using e-mail limits the sample size and creates bias by recruiting only providers and parents with e-mail. The fourth limitation is that those who agreed to participate may have had self-selection bias towards a greater focus on nutrition, physical activity, and obesity than those who declined participation. This may not be an accurate representation of MN licensed childcare providers. And lastly, even though the survey was validated for use among low-income, minority children at the fourth-grade reading level (Penkilo, George, & Hoelscher, 2008) it was not validated in the childcare provider population.

Definition of Terms

Body mass index (BMI) – is used to screen for weight classifications that may lead to health issues. It is obtained from a formula using a person's height and weight. It provides a reliable gauge of body fat for a majority of adults (Kuczmarski, Ogden, Flegal, Guo, Wei, Johnson, 2000) and obese children (CDC, 2015a). BMI is calculated the same way for children and adults and the CDC growth charts for children are used to determine and interpret the corresponding BMI-for-age and sex percentile (CDC, 2014a).

The following definitions are used to classify weight status for children between two and 20 years of age (Krebs, Himes, Jacobson, Nicklas, Guilday, & Styne, 2007):

Underweight – BMI <5th percentile for age and sex

Normal weight – BMI between the 5th and <85th percentile for age and sex

Overweight – BMI between >85th and 95th percentile for age and sex

Obese – BMI ≥95th percentile for age and sex

Severe obesity – BMI ≥120 percent for the 95th percentile values or a BMI ≥ 35 kg/m²

The following definitions are used to classify weight status for adults (World Health Organization, 2000):

Underweight – BMI <18.50 kg/m²

Normal or healthy weight – BMI 18.50-24.99 kg/m²

Overweight – BMI ≥25.00

Pre-obese – 25.00-29.99 kg/m²

Obese – BMI ≥30.00 kg/m²

Obese class I – BMI 30.00-34.99 kg/m²

Obese class II – BMI 35.00-39.99 kg/m²

Obese class III – BMI ≥40.00 kg/m²

BMI z-scores - is a function of the standard deviation of the BMI distribution for that age and sex after it has been converted to a normal distribution. They are used to compare group means and to create longitudinally comparative weight trajectories to accurately assess change in adiposity (Flegal & Ogden, 2011; Must & Anderson, 2006).

Built environments - depicts the environments' elements constructed by human beings such as: land use patterns, transportation system (road, sidewalks, bike paths), the distribution across space of activities (grocery stores, fast food restaurants), the planning and look of the physical area in a community setting (CDC, 2015d).

Child and Adult Care Food Program (CACFP) - is a federally funded nutrition education and meal reimbursement program that provides guidelines for healthy meals and snacks (United States Department of Agriculture Food and Nutrition Service, 2014).

Healthy, Hunger-Free Kids Act of 2010 (HHFKA) - is a federal law signed by President Barack Obama on December 13, 2010. The bill is part of the reauthorization of funding for child nutrition programs such as the CACFP and free and reduced lunch programs in schools. In addition, it backs First Lady Michelle Obama in her fight against childhood obesity as part of her Let's Move! Initiative (United States Department of Agriculture Food and Nutrition Service, 2013).

Non-parental Care – childcare service that is not from the mother, father, or guardian such as childcare centers, care inside or outside of the home by a relative or non-relative, nursery schools, and /or preschools (Childcare, 2013).

Social-Ecological Model (SEM) – is a theoretical structure for understanding various elements that impact health and wellness at various levels surrounding individuals, groups and populations. Interventions to fight obesity disparities may take place at all levels of the SEM (CDC, 2008).

CHAPTER 2. REVIEW OF LITERATURE

Childhood Obesity

Childhood obesity is a major focus of public health professionals in the United States. For an obese preschooler, there is a strong trajectory of weight gain and obesity throughout adolescence and into adulthood (Wells, Evans, Beavis, & Ong, 2010; Biro & Wien, 2010; Nader, O'Brien, Houts, Bradley, Belsky, Crosnoe, Susman, 2006; Singh, Mulder, Twisk, Van Mechelen, & Chinapaw, 2008), which is associated with greater medical cost than a normal weight preschooler (Finkelstein et al., 2014). Therefore, obese preschoolers are at the highest risk for developing the spectrum of co-morbidities that are associated with overweight and obesity. Two short-and long-term health consequences are hypertension and hyperlipidemia, which are risk factors for cardiovascular disease (CVD). In Freedman et al.'s study (2009), 70% of obese children had at least one CVD risk factor and 39% had two or more (e.g. elevated triglycerides, LDL cholesterol, cholesterol, plasma insulin, and blood pressure and low HDL cholesterol). These children are also at an increased risk of developing hyperglycemia and type 2 diabetes, (Whitlock, Williams, Gold, Smith, & Shipman, 2005), sleep apnea and asthma, (Han, Lawlor, & Kimm, 2010; Shore & Johnston, 2006), joint troubles, musculoskeletal discomfort (Han et al., 2010; Taylor et al., 2006), nonalcoholic fatty liver disease, gallstones and gastro-esophageal reflux (Han et al., 2010; Whitlock et al., 2005). The obesity severity is likely more severe in obese children who become obese adults than adults who become obese in adulthood (Freedman, Khan, Dietz, Srinivasan, & Berenson, 2001). These health issues can be prevented, making obesity interventions essential. A screening tool, which is used to identify the need for overweight and obesity early intervention, is tracking children's BMI (Freedman & Sherry, 2009). Health professionals consider BMI an inexpensive, noninvasive, and simple measure of

body fatness, which correlates to more expensive tests such as underwater weighing, and dual energy x-ray absorptiometry used to measure or assess body composition. BMI is a measure of weight adjusted for height; therefore, it does not differentiate between fat, muscle or bone mass, sexual maturation or the distribution of fat. Further, the accuracy varies according to a child's degree of adiposity. With overweight children, BMI is less accurate for indicating excess body fat; however, it is a good indicator for obese children. Also, because children's body composition varies as they age and varies between boys and girls, a child's weight status is determined using an age and sex specific percentile for BMI or BMI z-score (CDC, 2015a).

Childcare

Considering the ill health and economic effects of overweight and obesity on an individual and societal level, developing and supporting healthy eating habits among children is endorsed as one action to prevent overweight and obesity in future generations. Currently there is underrepresentation of interventions and research on obesity prevention for preschoolers (Waters et al., 2011). Of the research that has occurred for this age range, it has taken place in preschool settings or childcare facilities. Epidemiologic studies (Lumeng, Gannon, Appugliese, Cabral, & Zuckerman, 2005; Maher, Li, Carter, & Johnson, 2008) suggest preschool childcare exposure may have a significant impact on weight status in childhood. Identifying early intervention strategies in supporting childcare providers, such as implementing nutrition education and tools to learn and then teach healthy dietary behaviors and attitudes, could affect a quarter of all preschoolers (Wood et al., 2013). Studies evaluating the nutritional quality of foods and beverages served in childcare settings are limited but has identified that the quality is poor (Korenman, Abner, Kaestner, & Gordon, 2013; Monsivais, Kirkpatrick, & Johnson, 2011). In addition, reports from What We Eat in America uses the NHANES, a nationally standardized,

valid, and reliable nutrition assessment instrument developed by the National Center for Health Statistics (NCHS) and CDC. The most recent report from WWEIA using data from the 2009-2010 NHANES, showed that the daily percent of calories eaten away from home by two to five years old males and females was 27% and 29%, respectively. Hence, there is an opportunity to identify how meaningfully childcare providers impact preschoolers' nutrition and therefore their health; at this time it is unknown (Korenman et al., 2013).

The principal source for childcare best practices is *Caring for Our Children, National Health and Safety Performance Standards: Guidelines for Out-of-Home Child Care Programs* (CFOC). This is a joint collaboration of the American Academy of Pediatrics (AAP), the American Public Health Association, and the National Resources Center for Health and Safety in Child Care, supported by the Maternal and Child Health Bureau of the Health and Human Services Administration (HRSA), which is part of the federal department of Health and Human Services. The recommendation for child nutrition, breastfeeding, physical activity, and screen-time that are listed in the CFOC, have been specifically selected and compiled by the authors of the CFOC into "Preventing Childhood Obesity in Early Care and Education Programs" for use by the states as they regulate early childcare programs. Other sources of nutrition standards and best practices, which have been discussed, include CACFP, Nemours: Let's Move Child Care, IOM Preventing Childhood Obesity, and the AAP position papers on nutrition for young children.

In 2010, the National Resource Center for Health and Safety in Child Care and Early Education (NRC) was funded by the Maternal and Child Health Bureau (MCHB) to conduct an assessment of obesity prevention content in all states' licensing regulations for child care centers, large or group family child care homes, and small family child care homes (National Resource

Center for Health and Safety in Child Care and Early Education, 2014). The state of MN was assessed in 2010 and 2012. There was a slight positive improvement in the regulatory setting. This improvement was due to the CACFP and the Office of Child Care and the National Center on Child Care Quality Improvement encouraging state-initiated changes that regulate adherence by licensed childcare to the CACFP guidance (National Center on Child Care Quality Improvement, 2012). The two changes made in regulation to support healthy weight practices were to offer low-fat milk for children older than 2 and to make water available. Since 2012 MN has not had new regulatory content related to healthy weight practices; therefore, it has not had an updated rating since 2012 (National Resource Center for Health and Safety in Child Care and Early Education, 2014).

Childcare centers are generally licensed by the state, and licensing regulations vary from state to state for family childcare centers. For example, in MN, the county is responsible to license a family childcare provider (Minnesota Department of Human Services, 2016). However, regulations are not consistent between childcare centers and family childcare. A center is responsible for larger groups of children in a facility outside a private home. If regulations were consistent to ensure a healthy food environment, a greater number of young children could be affected. Head Start mandates nutritional and health service, adequate time and space for active play, and parental involvement along with ongoing staff training and development (Office of Head Start, 2015). These requirements are used as a model for policies for other childcare facilities (Gupta, Pascoe, Blanchard, Langkamp, Duncan, Gorski, & Southward, 2009). Also, Head Start providers have greater compliance with the position of the Academy of Nutrition and Dietetics' (AND) Benchmarks for Nutrition in Child Care (Dev & McBride, 2014) for feeding practices and nutrition guidelines in early childhood to prevent obesity. The difference was due

to Head Start nutrition performance criteria and better nutrition education opportunities for Head Start staff (Dev & McBride, 2014). Yet the majority of states have weak regulations regarding nutrition and physical activity for childcare providers (Larson, Ward, Neelon, & Story, 2011; National Resource Center for Health and Safety in Child Care and Early Education, 2015).

To support optimal growth and development in children, it is critical for them to have support throughout their day in learning and practicing healthy eating behaviors (Hagan & Duncan, 2008). Parent Aware nutrition education and training needs to identify if it is successfully preparing the childcare provider in a way that promotes a positive attitude, helps ensure healthier food environments, and improves dietary behavior change to reduce childhood obesity. Such elements could have an immense effect on the current and future well being of the state's residents.

The report, "Supporting Healthy Food and Activity Environments in Child Care Settings: A Report to MN Early Child Care and Education Stakeholders" (2011) is from a larger bi-state cross sectional study in MN and Wisconsin (WI), which was seeking information to understand the challenges that early childcare and education providers may face trying to implement nutrition and physical activity best-practices in childcare. The study was a 109-question survey that was completed by paper, the Internet, or telephone. The results from the survey of 468 MN childcare providers who were working in a childcare center, a family childcare, pre-school age program, or school readiness/pre-Kindergarten prompted the advisement for providers to set higher nutrition and physical activity standards, obtain nutrition and physical activity training, and seek support from parents and policymakers for help in implementing nutrition and physical activity recommendations. In addition, the majority of providers requested help with: ways to effectively engage parents, fun and easy nutrition education curricula, and recommendations for

economical ways to serve healthy foods that kids enjoy (Bishop, Taylor, Bishop, Franken, Rehorst, Gaichas, Lytle, 2007). The resources that were available to childcare providers at that time for nutrition education and fun and easy meal plans were Learning About Nutrition through Activity (LANA) (Bishop, et al., 2007), “Eager to Learn” (www.eagertolearn.com), and the MN Center for Professional Development (www.mncpd.org), which featured programs such as “Moovin’ and Groovin’” and “I Am Moving, I Am Learning.” It also provided classes for how to improve parent participation. Based on this research the following actions were implemented: incorporation of nutrition and physical activity into the state QIRS, increased nutrition and physical activity training for childcare providers supported through SHIP grants. In addition, it was recommended that policymakers needed to add, as a priority, healthy eating and physical activity to early childcare needs (Nanney & LaRowe 2011). Currently, few regulations concerning nutrition and/or physical activity exist; there are no rules governing breastfeeding or screen time for licensed childcare providers in MN.

Specific response results from the study for the top 5 most challenging nutrition practices out of possible 15 include: 1) serving low sodium foods, 2) serving only whole grains, 3) attending yearly trainings, 4) implementing policies, and 5) sitting and eating with the children. The first four were reported as most difficult for both center and family childcare providers; they reported the last one (sitting and eating with the children), but it was not in their top five. However, because it was rated so high by family childcare providers, it was pushed into the top five overall.

The top food related barriers in applying the recommended nutrition policies were 1) cost for the center and family providers, 2) lack of time, 3) children not responding well for the family provider, and 4) lack of space and control for the center’s caregivers. Providers reported

that parents rarely or never ask about their child’s eating and activity. Many providers were “somewhat” or “not very happy” with the amount of communication with parents related to food, nutrition, and activity, and 41% of the providers felt that learning how to effectively engage parents was needed. Approximately one-third felt nutrition and physical activity training and education were needed even though the majority had not attended such training in the past year. To decrease the gap in research and provide a foundation for future professional development efforts, this study aims to examine the effect of current nutrition education courses accepted by Parent Aware on nutrition-related knowledge, attitudes, and dietary behaviors amongst preschoolers’ parents and childcare providers.

Dietary Intake Measurement

It is a challenge to obtain accurate dietary intake measurements of adults and children. Even though it is not accurate, a usual approach for dietary intake assessment is a 24-hour recall, which relies on self-reports (Buzzard et al., 1996). Observations are a better alternative; however, observations overestimate consumption (Shankar et al., 2001) and changes are difficult to detect (Kirks & Wolff, 1985). Measuring the pre-and post-weight of a participant’s plate i.e. plate waste, is the best method for dietary intake assessment; this is labor intensive and is seldom used. A reasonable tool to use that is not as labor intensive is the School and Physical Activity Nutrition (SPAN) survey. It is a self-reported dietary intake and physical activity survey, which has been validated and evaluated for reproducibility (Penkilo et al., 2008; Thiagarajah, Fly, Hoelscher, Bai, Lo, Leone, & Shertzer, 2008).

Children learn healthy eating habits best by example from those they are around most frequently (Natale, 2014b). Childcare providers and parents have multiple opportunities at meal and snack times to model appropriate nutrition behavior. Children learn healthy eating habits

when they are provided nutritious food, allowed to decide how much food they will consume at a meal or snack, and allowed to feed themselves. These habits help them to maintain a healthy weight (Nicklas, Yang, Baranowski, Zakeri, & Berenson, 2003).

Parent Aware

Parent Aware was piloted during 2007-2011 and from 2012-2015 disseminated throughout the state of MN. Parent Aware has recently released its evaluation report. The report assessed preschoolers' health by using BMI percentile as a screening tool for weight categories that may lead to health problems. From this assessment it was discovered that low-income children were more likely to be obese or under weight than higher-income children (Tout, Starr, Isner, Cleveland, Albertson-Junkans, Soli, & Quinn, 2016).

The Parent Aware categorizes childcare programs on a four-star rating. Childcare providers are taught and evaluated on 20 items in four criteria groups: teaching and relationships, assessment, teacher training, and physical health and wellbeing. Not until childcare providers are at the three- and four-star rating can they take nutrition and obesity prevention classes. A three-star rating is earned when a childcare provider participates in three or more hours of approved training on child nutrition and provides families with copies of written guidelines regarding the importance of offering healthy meals and copies of sample menus or are participating in the updated CACFP. Currently the CACFP regulations state that the menu should be available to all parents and guardians. Childcare providers can complete additional training on obesity prevention at the four-star rating that includes age-appropriate physical activities (Parent Aware, 2015). The childcare provider needs to be re-certified for the star rating every two years (Tout et al., 2011). Childcare providers who have completed the nutrition training at the three-star level and the obesity prevention training at the four-star level should have the information to help

address the childhood obesity epidemic. According to a final report by the MN Early Learning Foundation about Parent Aware, 63 percent of programs were automatically rated with four stars, and most programs received a three- or four-star rating in the pilot (Cleveland, Starr, Friese, Sosinsky, Li, Beckett, & Tout, 2015).

Training and development are offered in group settings or online through several different types of programs (Parent Aware, 2015). One such program is Let's Move! Childcare (LMCC), an initiative of the Let's Move! for early care and education (Let's Move Child Care, 2014). Penn State University and the CDC have partnered to create six free LMCC training modules, which cover background information for childhood obesity prevention and the five best practice goals that include environmental modifications: 1) Physical activity one to two hours daily; 2) No screen time for children two or younger, children older than two limit to 30 minutes per week during childcare, and limit children to two hours or less per day as per recommendations from the American Academy of Pediatrics; 3) Provide access to water during the day and at meals, for two years of age and older serve low-fat or skim milk and limit 100% juice to four to six ounces per day; 4) Serve healthy food by offering fruits and vegetables at every meal, implement family-style meals whenever possible, and avoid fried foods; and 5) Support infant breast-feeding. Studies have shown that childcare providers can successfully implement childhood obesity prevention recommendations when there is a professional training.

The Child and Adult Care Food Program (CACFP)

The CACFP is a federally funded program that provides aid to licensed child (age 12 years or younger) and older adult care institutions, as well as income eligible family or childcare facilities for the provision of nutritious foods (United States Department of Agriculture Food and Nutrition Service, 2014). The United States Department of Agriculture (USDA) Food and

Nutrition Service (FNS) administer the program through grants to each state through the State Department of Education, as is the case in MN, or through another agency designated by the State. When a childcare facility participates in the CACFP, it is reviewed onsite three times per year, assuring meals match the menu and the menus follow recommendations, along with offering general support in answering questions about the program and its requirements. The menus must meet and follow the Dietary Guidelines for Americans (United States Department of Agriculture Food and Nutrition Service, 2013). The childcare meal pattern lists the food components and portions to be served to the children of participating childcare facilities in CACFP (see Appendix E Childcare Meal Pattern).

Childcare providers who comply with CACFP serve more nutritious diets than those who do not (Birch, Parker, & Burns, 2011). In addition, the Society of Behavioral Medicine position statement recommends, early care and education policies can impact obesity prevention among preschool-aged children and to support and improve regulations that help to prevent childhood obesity (Buscemi, Kanwischer, Becker, Ward, Fitzgibbon, 2014). Korenman et al. (2013) evaluated both the nutritional related outcomes of childcare centers that participated in CACFP, as well as non-participating centers. Their findings showed that: 1) participating centers were more likely to be Head Start programs and 2) among low-income children, a moderately increased consumption of milk and vegetables may reduce the prevalence of overweight and underweight preschoolers. Of interest, CACFP allows childcare givers to provide foods that are not recommended as long as they do not seek reimbursement but instead pay for the items from their own budget. For example, they can offer more than six ounces of 100% juice per day, grain-based desserts, cereals that do not align with WIC cereal standards, flavored milk, and/or yogurts with 30 g sugar per six ounces. It is recommended in the report “Caring for Our

Children” that all childcare givers provide preschoolers with foods and beverages that fulfill CACFP standards regardless of funding (American Academy of Pediatrics, 2012). The new changes to the nutrition standards to the meal pattern requirements for the CACFP better represent the 2010 Dietary Guidelines for Americans as required by the Healthy, Hunger-Free Kids Act of 2010 (HHFKA) (Department of Agriculture Food and Nutrition Service, 2015) (see Appendix F “Current and Proposed 3-5 years CACFP Meal Patterns”), such as meals and snacks will include a greater variety of vegetables and fruit, whole grains, fewer added sugars and saturated fat, and it encourages breastfeeding. Childcare providers who participate in CACFP will need to comply with the new nutrition standards by October 1, 2017. This implementation could further improve the nutritional quality of the meals and the dietary habits of children whose provider participates in the CACFP (United States Department of Agriculture Food and Nutrition Service, 2016).

School Physical Activity and Nutrition Survey (SPAN)

The SPAN has been validated for use among low-income, minority children at the fourth-grade reading level (Penkilo et al., 2008). Questions assessing physical activity and nutrition have acceptable to good level of reproducibility (Penkilo et al., 2008; Thiagarajah et al., 2008) and food consumption questions have an acceptable level of correlation with a 24-hour dietary recall (Hoelscher, Day, Kelder, & Ward, 2003). SPAN was developed to identify and track trends that may contribute to obesity in fourth, eighth and 11th grade students in Texas (The University of Texas Health Science Center at Houston School of Public Health, 2012). Dietary behavior is assessed by using a semi-quantitative food recall, which asks about the frequency of assorted foods consumed on the former day. The survey asks about typical meal activities for breakfast, lunch, and dinner, amount of time doing physical and sedentary activity, and dieting

practices. Last, it asks for height, weight, participation in CACFP, nutrition education, utilization of Parent Aware, and demographic characteristics such as age, gender, and ethnicity. In a recent study using data from the 2009-2011 SPAN survey of fourth grade children, it has been suggested that modifying behaviors at home, such as having healthy foods available while restricting unhealthy foods, turning the TV off when eating, and limiting the frequency of eating out, were associated with healthier weight status, independent of social economic differences. In any socioeconomic status, parents did not report that access to healthy food was a concern (Ranjit, Wilkinson, Lytle, Evans, Saxton, & Hoelscher, 2015).

Knowledge, attitude, and practice surveys are broadly used to gather evidence about commonly known health treatment and prevention practices (Launiala, 2009). The information that comes from these surveys may support and help provide recommendations for further childhood obesity intervention strategies to better suit the childcare providers. Knowledge, attitude, and practice questions are generally developed to reveal characteristic traits in a participant's health knowledge, attitude, and behavior and expose such knowledge that may be a source of a participant's misunderstanding and/or misinformation, representing obstacles to behavior change (Cotugna, Subar, Heimendinger, & Kahle, 1992). The nutritional belief questions were based on the health belief model, which suggests that people's ideas about health issues explain commitment (or lack of commitment) in health-supporting behaviors (Janz & Becker, 1984; Sharifirad, Tol, Mohebi, Matlabi, Shahnazi, & Shahsiah, 2013).

At the problematic levels, it is important for all concerned that stakeholders recognize the impact childcare providers have on the development of lifelong health behaviors, such as dietary intake, nutrition and physical activity knowledge, and attitude about food. This recognition will aid educators and policymakers as they attempt to provide excellent development training for

childcare providers in obesity prevention and management. The efficacy of professional development is enhanced when built on a well-founded understanding of existing perceptions and behaviors. However, little is known about the effect of the current Parent Aware education related to nutrition and physical activity amongst childcare providers.

Both context and content of literature from 2007 through spring, 2016 were included in this review of the literature relevant to the topic of childhood obesity. The year 2007 was chosen due to the fact that MN's pilot QRIS – Parent Aware – was launched in July 2007. Primary electronic search engines utilized include PubMed, CINAHL, and Google Scholar. Key search terms included “obesity” and “overweight,” in combination with other keywords such as “childcare provider,” “parent,” “Parent Aware,” “QRIS,” “attitude,” “behavior,” “knowledge,” “CACFP,” and “Let's Move.” Federal databases were consulted, including American Fact Finder for US Census Bureau, Centers for Disease Control, Catalog of US Government Publications, Institute of Education Sciences, US Department of Education, United Department of Agriculture Food and Nutrition Services, United Department of Agriculture Food and Nutrition Services Office of Research and Analysis, United States Department of Labor Bureau of Labor Statistics, National Center for Education Statistics, National Center for Education Statistics, National Conference of State Legislatures, and US Department of Health and Human Services.

CHAPTER 3. METHODS

Experimental Design

This is a cross sectional, causal-comparative study. The North Dakota State University Institutional Review Board approved the study.

An e-mail (see Appendix A) was sent to all licensed childcare providers in the state of MN to introduce the investigator, briefly describe the study and its purpose, and ask the childcare provider to consider participating in the study. The email contained three links: one link was the survey for the childcare provider, a second link was to the parent survey (see Appendix B for survey), and a third link was to the informed consent form for the childcare provider and the parent (see Appendix C for Informed Consent). The participating childcare providers were asked to forward the e-mail to all parents of preschoolers (age three to five) in their care. The same questionnaire was sent again in 6-months to all childcare providers and parents to increase sample size.

The childcare provider and parent questionnaires were analyzed. The parents reported the height and weight measurements of their preschooler. A link to the CDC providing instructions for how to accurately measure height and weight was provided in the survey for the parent (see Appendix D Anthropometric Measurements).

Reported heights and weights were converted from inches and pounds to centimeters and kilograms. Childcare providers' and parents' BMI were calculated from self-reported height and weight as body weight (in kilograms)/height (in meters²). Research from Craig and Adams, shows significant agreement between self-reported and measured height and weight in adult US women (2009).

Subjects

The subjects were MN licensed childcare providers for preschoolers ages three to five and had a listed e-mail address with the Childcare Aware® of MN, in addition to the parents of preschoolers who the childcare provider served, and these parents' preschoolers who were in the care of the childcare provider. Because of the short deadline for completing the study, convenience sampling was used. Also, the subjects were asked to volunteer in completing the anonymous survey without remunerations. Minnesota licensed childcare providers may work in a center, family childcare setting, pre-school age program, or school readiness/pre-Kindergarten.

A total of 707-childcare providers started the survey. The intervention group consisted of 169 childcare providers who were members of Parent Aware and reported having three hours of nutrition education in the past two years and/ or participated in the CACFP. The control group consisted of 244 childcare providers who were not members of Parent Aware or who were members but reported not having three hours or more hours of education in the past two years and were not participating in the CACFP.

Of the 707 childcare providers who responded to the survey, approximately 26% did not complete the majority of the survey's questions. Fifty childcare providers completed the survey twice. Therefore, the second survey of the childcare providers who completed it twice was omitted, bringing the total to 477 childcare providers who started the questionnaire. Of these 477 childcare providers, 245 answered the majority of the initial childcare provider survey questions and approximately 232 childcare providers answered the majority of the 6-month survey questions.

Of the 123 parents who responded to the survey approximately 42% did not complete the majority of the survey's questions. Twenty-eight parents from the initial survey and 44 parents

from the 6-month survey answered the majority of the survey's questions. Of the parents who responded, 44 answered the questions pertaining to their preschooler's demographics.

Procedure and Intervention

A pilot was completed to identify if the survey questions and directions were clear, the amount of time it took to complete the survey was an appropriate length, and the survey was easy to forward to parents. Three childcare providers were initially contacted by telephone, asking if they would complete the survey and provide comments about the clarity of the questions, what they perceived about the length of the survey and the ease of forwarding it to parents. Based on their comments, minor adjustments were made for clarity of the questions such as highlighting headings and correcting a spelling error.

The distribution list of all childcare providers in the state of MN was obtained from the State of MN Public Health Department. Removal of duplicate e-mails and e-mails that bounced reduced the list from approximately 13,000 to 8,186. The e-mail letter (Appendix A) was created and distributed to MN licensed childcare providers. Upon receiving the e-mail, the childcare provider had to decide to participate or to defer. Those who agreed to participate were asked to forward the e-mail to parents who had a preschool child in their care and to click on the informed consent form link, which brought them to the NDSU website to electronically sign it. Participants were notified that choosing to complete the online survey meant that they had read and understood the informed consent, had their questions answered, and had freely decided to participate in the study. Next, they clicked on the survey link, which brought them to the NDSU Qualtrics web-survey site. The childcare provider proceeded to complete the survey "SPAN Childcare Provider" (Appendix B). Those who deferred participation were asked to delete the e-mail.

Once the parents of the preschoolers received the email, they decided to participate or to defer participation. Those who agreed to participate completed the following steps: they clicked on the informed consent link, which brought them to the NDSU web site to electronically sign the informed consent. Participants were informed that choosing to complete the online survey meant that they had read and understood the informed consent, had their questions answered, and had freely decided to participate in the study. Next, they had to click on the survey link, which brought them to the NDSU Qualtrics web-survey site. Once at the web-survey site they completed the survey “SPAN Parent” (Appendix C), and recorded the height and weight of their preschooler, answering the anthropometric data question on the survey. Those who deferred participation were asked to delete the e-mail.

The six-month distribution list was created from the initial distribution list that was used for the initial survey removal of all bounced e-mails and childcare providers who requested their names to be removed was completed. Then the 6-month e-mail letter was distributed October 19, 2015 using an adjusted distribution list. All participants had the option of continuing participation or deferring at the 6-month follow-up e-mail letter.

Data analysis occurred, after surveys had been received, over the next several months. It included comparing the control and intervention group. By identifying similar demographic characteristics of the initial and 6-month questionnaires the childcare providers who completed the questionnaire twice were identified. The identifying characteristics used were the IP address, zip code, ethnicity, sex, and the following were given a range from the initial questionnaire to the 6-month questionnaire: 1) age greater than one year, 2) weight, allowing a difference of plus or minus 25 pounds and 3) height, allowing a range of plus or minus two inches. Reviewing the results of the analysis occurred over the next 3-4 weeks.

Data Collection

Questionnaires were distributed through e-mail and self-administered twice, with the second administration occurring six-months after the first administration. This was used to keep the cost of the study at a minimum and to increase the speed of the data dissemination and collection process. The initial distribution of the questionnaires occurred during the spring of 2015 and the second distribution occurred during the fall of 2015. The surveys were set-up using a web-based survey software Qualtrics (Qualtrics, 2013, Provo, UT).

Questionnaires

The study probed for the following: dietary behavior, nutrition knowledge, and attitude, and physical activity of childcare providers and the parents of preschoolers, by using 75-item or 86-item questionnaires, respectively. The questionnaire was been adapted from the SPAN (University of Texas Health Science Center at Houston School of Public Health, 2012).

The questionnaire was administered to MN licensed preschool childcare providers with an e-mail address and to the parents of preschoolers who agreed to participate by clicking an informed consent link.

Demographic measures

Information about gender, age, and race/ethnicity was collected on the questionnaire.

Anthropometric measures

The childcare providers' and parents' BMI were divided into four categories according to the World Health Organization, 2000: underweight ($<18.50 \text{ kg/m}^2$), normal weight ($18.50\text{-}24.99 \text{ kg/m}^2$), overweight ($25.00\text{-}29.99 \text{ kg/m}^2$), and obese ($>30.00 \text{ kg/m}^2$). Preschoolers' BMI scores were converted to z-scores based on normative data for age and sex (CDC Control and Prevention, 2011). Height and weight measurements of the preschoolers were obtained by the

parents/guardians according to CDC guidelines for measuring children's height and weight accurately at home (CDC, 2014a). BMI was calculated based on the questionnaire's answer, and then converted to age-and sex-adjusted BMI percentiles and z-scores using age- and gender-specific norms from the CDC growth charts (CDC, 2011).

Childcare providers and parents of preschoolers provided their best-estimated guess for height in inches and most recent weight in pounds.

Dietary behavior measures

The nutrition questions regarding the dietary intake for the prior day's consumption were measured on a continuous scale (from none to 5 or more times) and were chosen to reflect the guidelines and policy statements from the Dietary Guidelines for Americans 2010 and the Healthy, Hunger-Free Kids act of 2010. The focus was for a nutrient-dense diet, vegetables (red, green, and other) and fruit intake versus juice and whole grains, protein sources (beans, nut butters, lean protein), low-fat or non-fat milk and dairy, limited intake of sugar-sweetened beverages, and modest fat content consumption. Inquiry regarding fast food consumption was listed due to the fact that fast food meals, compared to meals at home, on average are larger in portion size, greater in total calories, and are of poorer nutrient quality (Bowman, Gortmaker, Ebbeling, Pereira, & Ludwig, 2004; Whitlock, O'Connor, Williams, Beil, & Lutz, 2010). A second set of nutrition questions addressed the nutrition offerings to the preschoolers for the past 7 days (never, 1 to 2 times, 3 to 4 times, 5 to 6 times, 7 times and more than 7 times), seeking offerings of vegetables, fruits, non-fat milk, whole grains, and sweetened cereal or beverage (see Appendix B for questionnaires).

Physical activity

The childcare providers and the parents of the preschoolers were asked to report their frequency (0 day to 7 days) of moderate physical activity (defined as 60-minute light sweating, a slight to moderate increase in breathing or heart rate, and strength activities) during the past week, and the number of hours per day that they watched TV, watched or played video games, and used a computer during the day was reported. A study found that limiting screen time for children improves their academic performances, behavior, and sleep, which also result in lower risk of obesity (Gentile, Reimer, Nathanson, Walsh, & Eisenmann, 2014). The parents reported if they were active alone and/or with their preschoolers. These questions were chosen to reflect the guidelines and policy statements of the CDC (CDC Control and Prevention, 2015a), and Physical Activity Guidelines for Americans (PAG) 2008 (Office of Disease Prevention and Health Promotion, 2008).

Knowledge

Childcare providers' and parents' understanding of current nutrition guidelines, including reference to ChooseMyPlate and its recommendations of the number of servings from each food group were evaluated. Questions reflected the nutrition training for a Parent Aware 3-star rating (Parent Aware, 2015).

Nutritional Attitude

It is thought that nutritional attitudes are developed over time through experiences. These experiences serve as a basis for evaluating whether or not to engage in the behavior on future occasions (Hagger & Chatzisarantis, 2014). Childcare providers and parents were asked 1) if diet impacts chronic diseases, 2) how willing they were to try new foods, 3) if their current diet was healthy, 4) if skipping meals affected their ability to do well through the day, and 5) if learning

about the relationship between food and health and between physical activity and health is important.

Nutritional Belief

Nutritional beliefs were measured by the following questions: healthy foods taste good (yes, all of the time, yes, most of the time, yes, some of the time, never) (Dennison, Erb, & Jenkins, 2001); people who are overweight are more likely to have a higher risk of health problems like cancer or heart disease than people who are not overweight; and people who are underweight are more likely to have a higher risk of health problems than people who are underweight (true, false, or don't know).

Mealtime

To identify if there was an opportunity to model healthy eating behaviors, the childcare providers and the parents of the preschoolers were asked to report where and if they usually ate or drank something for breakfast, lunch, and evening meal. When adults model and encourage healthy eating, children are more likely to accept a new food (Hendy, 1999). Overall, mealtime structure is an important influence on children's eating patterns (Patrick & Nicklas, 2005).

Weight Behavior

The childcare providers and parents were asked if they were trying to modify their weight and to compare their weight to an adult of their age and height. A previous study noted childcare providers who are trying to lose weight and are concerned about a preschooler's weight may transfer the practice of restricting food intake to the preschooler of concern which could have negative sequels (Dev, McBride, Speirs, Donovan, & Cho, 2014).

Data Analysis

Data were analyzed using SAS software (version 14.1, Cary, NC). Two data sets were created. The first data set was childcare providers who completed the initial and 6-month survey, called the paired group. The second data set was all parents of preschoolers and childcare providers from the initial and 6-month survey omitting the 6-month survey of the childcare providers who completed the survey twice (initial and 6-month survey).

Quetelet's index was used to calculate BMI from self-reported height and weight (Garrow, & Webster, 1984). A paired t-test was conducted to compare the BMI of the childcare providers and parents of the preschoolers (Lanigan, 2012). Descriptive statistics were performed to complete characteristic data. Chi-square was used to analyze categorical data and to test for significant changes/differences in nutritional attitude, knowledge, and belief, dietary intake, and physical activity between groups (childcare providers and parents of preschoolers). Chi-square was also used to determine frequencies and differences in responses per variable. Categories were aggregated for selected variables to avoid problems with underlying assumptions of the chi-square tests of independence (Gravetter & Wallnau, 2006). Not all respondents answered all the survey questions, resulting in varying number of responses for each question. Thus, differences in the sample sizes of the data occurred.

Two-way frequency tables were used for the statistical evaluation between childcare providers who participated in the nutrition and obesity education section of Parent Aware, and childcare providers who did not participate in Parent Aware along with applying Chi-square tests to the change tables to identify if interpretation of the cell frequencies was required. The criterion for statistical significance was set at 0.05 for all data to reduce the likelihood of committing a type II error.

**CHAPTER 4. THE IMPACT OF NUTRITION EDUCATION COURSES ACCEPTED BY
THE PARENT AWARE PROGRAM ON NUTRITIONAL AND PHYSICAL ACTIVITY-
RELATED KNOWLEDGE, ATTITUDE, AND BEHAVIOR AMONG MINNESOTA
LICENSED CHILDCARE PROVIDERS**

Abstract

Recently Minnesota (MN) adopted Parent Aware, a childcare quality four-star rating system. At the three- and four-star rating, nutrition and childhood obesity prevention education is recommended. However, little is known of its impact on childhood obesity. The purpose of this study is to identify the impact of nutrition education courses that qualify for Parent Aware rating in terms of nutrition knowledge, behavior, and attitudes of childcare providers. A cross sectional, causal-comparative study was conducted using a questionnaire. The intervention group was made up of childcare providers who participated in Parent Aware and responded “yes” to having three hours of nutrition education in the past two years (n= 169) and the control group was made up of all the other childcare providers (n= 244). Between the control and intervention group there were no significant differences in nutrition knowledge; the majority did not correctly answer five of the six nutrition questions.

There was a significant difference between the control and intervention group in their weight status. The control group had a higher percentage of normal weight childcare providers (39.4%) and a lower percentage of obese childcare providers (28.1%) than the intervention group (30.6% and 40.2%, respectively, $p=0.039$). A high percentage in both groups (64.8%, 75.0%) reported they were trying to reduce their weight and felt they weighed too much. Overall the nutrition attitude was positive for both groups, with one exception: the control group had more childcare providers responding favorably (83.1%) to the statement “healthy food tastes good”

than the intervention group (76.9%, $p=0.05$). This study highlights that the childcare providers who responded to this survey value nutrition education and need support in weight management. Further investigation is needed to understand why the majority did not correctly answer the nutrition related questions. **Keywords:** Childcare Providers, Childhood Obesity, Attitude, Behavior, Physical Activity.

Introduction

Approximately 12 million United States children under five years of age are spending an average of 36 hours a week in some form of childcare (Wood et al., 2013). Parents rely on childcare providers to fulfill their preschoolers' nutritional, physical, and educational needs while the preschoolers are in the childcare providers' care. This allows for the childcare setting to be an opportunity to reach young children with obesity prevention efforts.

Minnesota was awarded a federal Race to the Top-Early Learning Challenge Grant in December 2011 to improve learning and development opportunities for high needs children from birth to age five. One of the MN state goals for the grant was to implement a program by which quality early care and education programs could be recognized. Then in 2012, MN created a Quality Rating and Improvement System (QRIS) known as Parent Aware to help families find high quality childcare (Minnesota Department of Human Services, 2013).

Parent Aware uses a four star rating service that measures if a childcare facility has implemented best practices (Minnesota Department of Human Services, 2015; Parent Aware, 2012). It was designed to establish kindergarten readiness, although it now also includes nutrition and physical activity standards into its course (Tout et al., 2011). The nutrition and physical activity standards were initiated with the development of "The Minnesota Plan to Reduce Obesity and Obesity-Related Chronic Diseases" (Minnesota Department of Health,

2008). This plan is a guide for all MN stakeholders and sectors to support healthy behaviors from infancy throughout the lifecycle. The plan's focus is on nutritious food consumption, sufficient physical movement and sustaining a healthy weight.

“The MN Plan to Reduce Obesity and Obesity-Related Chronic Diseases” was used as a guide in the development of the State Health Improvement Systems (SHIP). Inspired by health care reform legislation, the State Health Improvement Systems was passed by the MN Legislature in 2008. The SHIP initiative provides grants to community health stakeholders for implementing evidence-based strategies to reduce the number of overweight and obese Minnesotans.

Starting in 2012, both grants: Race to the Top-Early Learning Challenge and SHIP, have been utilized to help reduce the number of overweight and obese children in MN through educating early childcare providers. The initiatives were, and still are, to provide education that represents comprehensive evidence-based obesity prevention recommendations that address behavior change to support healthy eating and physical activity at the individual, community, and system levels. There has been no evidence that licensed MN childcare providers have had their nutritional knowledge, attitudes, and behaviors evaluated. We also don't know the impact on preschoolers' nutrition and physical activity since Parent Aware has been introduced. Therefore, identifying how the nutrition education of the childcare providers has made an impact on their attitudes, behaviors, and knowledge of nutrition, and how it improves unhealthy weights of preschoolers and childcare providers, will help support the government's effort to reduce childhood obesity.

Methods

Experimental Design

This is a voluntary, cross-sectional, causal comparative study to investigate the impact of Parent Aware's accepted nutrition education courses on childcare providers' nutritional knowledge, attitudes, and behaviors. The North Dakota State University Institutional Review Board approved the study.

Subjects

The subjects were childcare providers who were responsible for preschoolers ages three to five and had a listed e-mail address with the Childcare Aware® of Minnesota. A convenience sampling was used. Also, the subjects were asked to volunteer to complete the anonymous survey without remunerations.

Procedure and Intervention

The distribution list of all childcare providers in the state of MN was obtained from the State of Minnesota Public Health Department. Licensed childcare providers in the state of MN were approached through e-mail to consider participating in the study. The identical questionnaire was sent again 6-months later to the same childcare providers increase participants.

Data Collection

Questionnaires were distributed through e-mail, self-administered twice, with the second administration occurring six-months after the first administration. The surveys were set-up using a web-based survey software Qualtrics (Qualtrics, 2013, Provo, UT).

Questionnaires

The study assessed the following: dietary behavior, nutrition knowledge and attitude, and physical activity of childcare providers and nutritional offerings to preschoolers in their care, by

using a 75-item questionnaire. The questionnaire has been adapted from the School Physical Activity and Nutrition Survey (SPAN) (The University of Texas Health Science Center at Houston School of Public Health, 2012).

Data Analysis

Data were analyzed using SAS software (version 14.1. Cary, NC). Quetelet's index was used to calculate BMI from self-reported height and weight (Garrow & Webster, 1984). The childcare providers' BMI were divided into four categories according to the Centers for Disease Control and Prevention: underweight ($<18.5 \text{ kg/m}^2$), normal weight ($18.6\text{-}24.9 \text{ kg/m}^2$), overweight ($25\text{-}29.9 \text{ kg/m}^2$), and obese ($>30 \text{ kg/m}^2$).

Descriptive statistics were performed to complete characteristic data. Chi-square was used to analyze categorical data, and to test for significant changes/differences in nutritional attitude, knowledge, and belief, dietary intake, and physical activity between groups (the intervention group were the childcare providers who were members of Parent Aware and had three or more hours of nutrition education the past two years and the control group was all other childcare providers). Frequency tables were used for the statistical evaluation between Parent Aware childcare providers who participate in the nutrition and obesity education, and all other childcare providers. Chi-square test was applied to the change tables to show the direction and magnitude of change. The criterion for statistical significance was set at 0.05 for all data to reduce the likelihood of committing a type II error. Not all respondents completed all the survey questions, resulting in varying number of responses for each question. Thus, differences in the sample sizes of the data occurred.

Results

Demographics

Questionnaires were sent by e-mail to a total of 8,186 MN licensed childcare providers. A total of 707 MN licensed childcare providers (0.08%) responded. Fifty childcare providers completed the initial and the second questionnaire that was sent six-months later. The six-month questionnaires, from these 50 childcare providers, were excluded from analysis to reduce bias, leaving 657 questionnaires for analysis.

Of the 657 childcare providers who participated in this study, a total of 413 childcare providers answered the following three questions: 1) “Do you participate in the Child and Adult Care Food Program (CACFP)?” 2) “Have you had in the past 2 years a total of 3 hours or more of nutrition education through a workshop, in-service nutrition, school course, and/or on-line courses?” and 3) “Have you used the Parent Aware rating to seek child-care ratings?” From the 413 childcare providers who answered (yes, no, I do not know) to these three questions, two groups were formed. The intervention group was made up of childcare providers who participated in Parent Aware and responded “yes” to having three hours of nutrition education in the past two years (n= 169) and the control group was made up of all the other childcare providers (n= 244).

Based on the demographics of licensed childcare providers in MN, on average, 94% are Caucasian, 44 years old, and female, (Minnesota Department of Human Services, 2015) matching the participants in this study. The demographics for the childcare providers from the intervention and control groups are listed in Table 1. Most of the childcare providers identified themselves as Caucasian (92.2%, 92.2%), age 45.0 SD \pm 10.1 years old, 46.6 SD \pm 10.4 years old, female (98.8%, 97.1%). It was found that the intervention group’s mean BMI was 29.5 (\pm

8.4) kg/m² and the control group's was 25.0 (\pm 4.3) kg/m². Specifically, 28.1% and 39.4% of the childcare providers who participated in the intervention and control groups of this study are of normal weight (BMI 18.50-24.99 kg/m²), 31.1% and 26.7% are overweight (BMI 25.00-29.99 kg/m²), and 40.2% and 30.6% are obese (BMI \geq 30 kg/m²). Of the 34% whose BMI is within the obese category, 26.8% and 19.5% were Obese Class I (BMI 30.00-34.99 kg/m²), 5.5% and 6.4% were Obese Class II (BMI 35.00-39.99 kg/m²) and 7.9% and 4.7% Obese Class III (BMI >40.00 kg/m²). Also, the majority (80.9%, 77.9%) participated in Child and Adult Care Food Program (CACFP) and had three hours or more of nutrition education in the past two years (87.0%, 90.4%).

Table 4.1

Demographic Characteristics of Minnesota Licensed Childcare Providers of the Intervention and Control Groups

Characteristics	Response % (n ^a)		p
	Intervention	Control	
Sex			0.250
Male	1.2 (2)	2.9 (7)	
Female	98.8 (166)	97.1 (236)	
Age (y)			
20-29	4.5 (8)	4.9 (12)	
30-39	32.0 (57)	22.7 (56)	
40-49	28.7 (51)	29.1 (72)	
50-59	24.7 (44)	31.6 (78)	
60-69	10.1 (18)	10.9 (27)	
70-79	0.0 (0)	0.8 (2)	
Race/ethnicity			0.435
Black or African American	0.0 (0)	1.2 (3)	
Mexican-American Latino or Hispanic	1.2 (2)	0.8 (2)	
White, Caucasian or Anglo	92.2 (153)	92.2 (224)	
Chinese	0.0 (0)	0.4 (1)	
American Indian or Alaska Native	4.8 (8)	4.9 (12)	
Other	1.8 (3)	0.4 (1)	
Weight status (kg/m ²)			0.039*
Underweight (BMI <18.50)	0.61 (1)	3.4 (8)	
Normal weight (BMI - 18.50-24.99)	28.1(46)	39.4 (93)	
Overweight (BMI >25.00)	31.1 (51)	26.7 (63)	
Obese (BMI≥30)	40.2 (66)	30.6 (72)	
Obese Class I (BMI 30.00-34.99)	26.8 (44)	19.5 (46)	
Obese Class II (BMI 35.00-39.99)	5.5 (9)	6.4 (15)	
Obese Class III (BMI ≥40)	7.9 (13)	4.7 (11)	
Participated in Child and Adult Care Food Program (CACFP)			
Yes	80.9 (144)	77.9 (194)	
No	18.0 (32)	20.9 (52)	
≥3 hours of nutrition education past 2 years			
Yes	87.0 (155)	90.4 (226)	
No	11.8 (21)	8.8 (22)	

Note. BMI=body mass index

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

*p=0.05

Dietary Intake

Overall, there was no significant difference between the two groups for the food consumption questions. Approximately half (45.6%, 51.9%) did not report consuming red meat the previous day. A slightly higher percentage of childcare providers from the intervention group reported not consuming nut or nut butters the previous day compared to the control group (45.2%, 32.0). Approximately a third (36.7%, 32.8%) did not drink milk the previous day. Only a third reported consuming cereal the previous day from both groups (39.8%, 37.3%). The majority (72.5%, 71.9%) reported not consuming French Fries or chips the previous day. Over two-thirds (68.9%, 73.2%) reported eating vegetables and three-quarters reported consuming fruit (90.4%, 89.3%) the previous day. Concerning beverages, the majority from both groups did not consume fruit juice (81.0%, 80.7%), or fruit flavored beverages (97.6%, 95.9%) and did consume two or more times a bottle or glass of water the previous day (86.7%, 88.9%).

About two-thirds of providers in the control and intervention groups did not consume candy (61.9, 64.7%) or consumed food from a restaurant (76.2%, 81.1%) the day prior. The majority also reported consuming one or two snacks and two or more meals the day prior (Table 4.2).

Table 4.2

Dietary Intake-Nutrition Behavior of Minnesota Licensed Childcare Providers of the Intervention and Control Groups

Question	Group	Response % (n ^a)			p
		0	1	≥2	
Yesterday, how many times did you consume-					
High fat red meat	I	45.6 (76)	45.6 (75)	10.1 (17)	0.241
	C	52.9 (126)	35.4 (86)	12.8 (31)	
Nut or nut butter	I	45.2 (76)	42.3 (71)	12.5 (2)	0.068
	C	32.0 (78)	52.5 (128)	15.6 (5)	
Milk (any kind)	I	36.7 (62)	27.8 (47)	35.5 (60)	0.705
	C	32.8 (80)	35.3 (86)	32.0 (78)	
Cereal (hot or cold)	I	60.2 (100)	38.6 (64)	1.2 (2)	0.634
	C	62.7 (148)	36.4 (86)	0.8 (2)	
French fries or chips	I	72.5 (121)	24.6 (41)	3.0 (5)	0.226
	C	71.9 (174)	25.2 (61)	2.9 (7)	
Vegetables	I	31.1 (52)	46.7 (78)	22.2 (37)	0.309
	C	26.8(65)	41.1 (100)	32.1 (78)	
Fruit	I	9.6 (16)	37.7 (63)	52.7 (88)	0.470
	C	10.7 (26)	28.3 (69)	61.1 (149)	
Fruit juice	I	0-1 81.0 (136)	2-4 17.9 (30)	≥5 1.2 (2)	0.795
	C	80.7 (196)	17.3 (42)	2.1 (5)	
Fruit-flavored drinks	I	97.6 (163)	2.4 (4)	0.0 (0)	0.430
	C	95.9 (232)	3.3 (8)	0.8 (2)	
Water	I	4.8 (8)	8.4 (14)	86.7 (145)	0.596
	C	6.2 (15)	5.0 (12)	88.9 (217)	
Candy	I	0 61.9 (104)	1 29.2 (49)	≥2 8.9 (15)	0.516
	C	64.7(156)	27.0 (65)	8.3 (20)	
Restaurant food	I	76.2 (128)	22.6 (38)	1.2 (2)	0.388
	C	81.1 (197)	17.3 (42)	1.7 (4)	
Snack	I	31.7 (52)	38.4 (63)	30.0 (49)	0.610
	C	29.4 (70)	43.7 (104)	21.9 (64)	
Meal	I	0-1 1.2 (2)	2 10.7 (18)	≥3 88.1 (148)	0.288
	C	2.5 (6)	7.0 (17)	90.5 (219)	

Note. I=Intervention group made up of childcare providers who are members of Parent Aware with three or more hours of nutrition education in the past two years. C=Control group made up of all other childcare providers.

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

Nutrition and Physical Activity Knowledge

The majority did not correctly answer five of the six nutrition questions. The question that was answered correctly by the majority was “From which food group should you consume the fewest servings each day?” In addition, the majority answered two of the three physical activity questions correctly and half stated they used ChooseMyPlate (52.1%, 42.6) (Table 4.3). The majority incorrectly answered the following physical activity question: “Experts recommend that children should engage in no more than how many hours of media-related activities, per day?” (79.9%, 74.5%) (Table 4.3).

Nutrition-related Attitudes and Weight-related Behavior

The majority in both groups reported positive responses to all ten-attitude questions. To the question “Healthy food tastes good,” 76.9% of the intervention group and 83.1% of the control group responded yes all or most of the time ($p < 0.050$). Almost all reported they were willing to try new foods almost always or sometimes (96.4%, 97.9%). Fewer reported underweight people (59.8%, 61.1%) versus overweight people (90.5%, 93.4%) are at a higher risk of health problems than people who are not underweight or overweight respectively. Table 4.4 illustrates the many positive attitudes of childcare providers.

Of those caregivers who participated in this study, a little over half (56%, 65%) stated that in the past year they had tried to lose weight, and also stated they are currently trying to lose weight (59%, 54%). In addition, approximately half (67%, 47%) believed they weigh too much compared to other adults their age and height (Table 4.5).

Table 4.3

Nutrition and Physical Activity Knowledge of Minnesota Licensed Childcare Providers of the Intervention and Control Groups

Question	Group	Response % (n ^a)			p
		Correct	Incorrect	Do Not Know	
Nutrition & Physical Activity Knowledge					
How many total cups of- fruits should you eat each day? (≥ 2)	I	54.8 (92)	38.1 (64)	7.2 (12)	0.948
	C	53.1 (129)	41. (100)	5.8 (14)	
veggies should you eat each day? (≥ 2)	I	29.8 (50)	63.7 (107)	6.6 (11)	0.607
	C	29.1 (71)	66.0 (161)	4.9 (12)	
Which contains the most calories? (1 g fat)	I	50.3 (84)	31.1 (52)	18.6 (31)	0.058
	C	38.0 (92)	35.1 (85)	26.9 (65)	
From which food group should you eat the-					
most servings each day? (e.g. bread, cereal, rice)	I	15.7 (26)	83.1 (138)	1.2 (2)	0.065
	C	9.5 (23)	86.8 (211)	3.7 (9)	
fewest servings each day? (fats, oil, sweets)	I	81.7 (138)	17.8 (30)	0.6 (1)	0.341
	C	85.7 (209)	14.3 (35)	0.0 (0)	
What is the recommended amount of calories from fat? (35%)	I	4.2 (7)	95.8 (161)	-	0.163
	C	1.7 (4)	98.3 (237)	-	
Experts recommend that children should-					
be physically active for at least how many minutes per day? (60 minutes)	I	65.7 (111)	33.1 (56)	1.2 (2)	0.233
	C	66.3 (161)	30.5 (74)	3.3 (8)	
engage in no more than how many hours of media-related activities, per day? (1 hour)	I	17.8 (30)	79.9 (135)	2.4 (4)	0.598
	C	22.6 (55)	74.5 (316)	2.9 (7)	
be physically active on how many days per week? (7 days)	I	91.1 (154)	8.3 (14)	0.6 (1)	0.093
	C	90.2 (220)	8.2 (20)	1.6 (4)	
Do you use ChooseMyPlate?		Yes	No	Do Not Know	
	I	52.1 (88)	41.4 (70)	6.5 (11)	0.150
C	42.6 (104)	50.8 (124)	5.6 (16)		

Note. I=Intervention group made up of childcare providers who are members of Parent Aware with three or more hours of nutrition education in the past two years. C=Control group made up of all other childcare providers.

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

Table 4.4

Nutrition-Related Attitudes of Minnesota Licensed Childcare Providers of the Intervention and Control Groups

Question	Group	Response % (n ^a)			p
		Agree	Disagree/ False	Neither/ Do Not Know	
Skipping meals affects my ability to do well through the day.	I	88.8 (150)	6.5 (11)	4.7 (8)	0.242
	C	87.7 (214)	9.8 (24)	2.5 (6)	
Learning about the relationship between food and health is important for me to know.	I	96.5 (162)	3.0 (5)	0.6 (1)	0.357
	C	95.5 (233)	4.5 (11)	0.0 (0)	
I am willing to try new foods.	I	Almost Always 64.5 (109)	Sometimes 32.0 (54)	Almost Never 3.6 (6)	0.636
	C	6.4 (162)	31.6 (77)	2.1 (5)	
What you eat can make a difference in your chances of getting heart disease.	I	True 97.0 (164)	False 1.8 (3)	Do Not Know 1.2 (2)	0.379
	C	98.4 (240)	0.4 (1)	1.2 (3)	
If I am overweight I am more likely to have more health problems.	I	97.6 (161)	1.8 (3)	0.6 (1)	0.418
	C	95.1 (232)	3.7 (9)	1.2 (3)	
Overweight people are at a higher risk of health problems than people who are not overweight.	I	90.5 (153)	6.5 (11)	3.0 (5)	0.392
	C	93.4 (228)	5.3 (13)	1.2 (3)	
Underweight people are at a higher risk of health problems than people who are not underweight.	I	59.8 (101)	16.6 (28)	23.7 (40)	0.406
	C	61.1 (149)	20.1 (49)	18.9 (46)	
Foods I usually eat/drink are healthy, there is no reason for me to make changes	I	Yes All/Most of the Time 55.6 (94)	Yes Some of the Time 42.6 (72)	Never 1.2 (3)	0.477
	C	57.4 (140)	38.5 (94)	4.1 (10)	
Healthy food tastes good.	I	76.9 (130)	22.5 (38)	0.6 (1)	0.050
	C	83.1 (202)	16.9 (41)	0.0 (0)	

Note. I=Intervention group made up of childcare providers who are a member of Parent Aware with three or more hours of nutrition education in the past two years. C=Control group made up of all other childcare providers.

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question

Meal Time Behavior and Physical Activity

Approximately half (52.7%, 57.0%) reported usually eating breakfast with the children and over two-thirds (65.7%, 67.2%) reported usually eating lunch with the children. Most reported eating homemade or processed evening meals at home.

Table 4.5

Weight-Related Behaviors of Minnesota Licensed Childcare Providers of the Intervention and Control Groups

Question	Group	Response % (n ^a)			p
		No	Yes		
Weight-related Behaviors					
In the past 12 months, have you tried to lose weight?	I	27.8 (47)	72.2 (122)		0.414
	C	31.6 (77)	68.4 (167)		
		Lose Weight	Stay Same /Nothing	Gain Weight	
Which of the following are you trying to do about your weight?	I	75.0 (126)	25.0 (42)	0.0 (0)	0.081
	C	64.8 (158)	33.6 (82)	15.6 (38)	
		Too Much	The Right Amount	Too Little	
Compared to other adults your age, who are as tall as you, do you think you weigh:	I	70.4 (119)	27.8 (47)	1.8 (3)	0.174
	C	61.9 (151)	34.8 (85)	3.3 (8)	

Note. I=Intervention group made up of childcare providers who are members of Parent Aware with three or more hours of nutrition education in the past two years. C=Control group made up of all other childcare providers.

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

Thirty-four percent of the intervention group and 35% of the control group reported never watching TV while eating an evening meal. On average, they reported consuming one to four meals in a restaurant (78.7%, 78.3%) in the past seven days (Table 4.6).

Approximately a quarter (26.6%, 28.7%) of the childcare providers reported that they had been active a total of 60 minutes on two days or fewer in the last seven days and more than two-thirds reported participating in strengthening exercises on two days or fewer for the past seven days. Seventy percent and 67.6% of childcare providers reported one to three hours of casual TV time per day. Significantly more childcare providers from the intervention group (42.6%, 39.8%, p=0.023) reported spending less than one hour per day on a computer. Two thirds (63.9%,

9.4%) have a TV in their bedrooms (Table 4.6).

Table 4.6

Meal Time and Physical Activity Behaviors of Minnesota Licensed Childcare Providers of the Intervention and Control Groups

Question	Group	Response % (n ^a)			p
		With the Children	Away From the Children	I Do Not Usually Eat	
Meal Time Behavior					
Where do you usually eat or drink breakfast?	I	52.7 (89)	35.5 (60)	11.8 (20)	0.683
	C	57.0 (139)	32.0 (78)	11.0 (27)	
lunch?	I	65.7 (111)	32.0 (54)	2.4 (4)	0.432
	C	67.2 (164)	32.0 (78)	0.8 (2)	
		Yes, Homemade or Processed	Yes, Fast Food or Sit-Down Restaurant	No, I Do Not Eat an Evening Meal	
Do you usually eat an evening meal?	I	94.1 (159)	4.1 (7)	1.8 (3)	0.966
	C	95.1 (231)	3.3 (8)	1.7 (4)	
		0	1-4	≥5	
During the past 7 days frequency of watching TV during evening meal?	I	34.2 (58)	65.1 (110)	0.6 (1)	0.798
	C	35.3 (86)	63.5 (155)	1.2 (3)	
frequency sit-down or fast food restaurant?	I	21.3 (36)	78.7 (133)	0.0 (0)	0.858
	C	20.9 (51)	78.3 (191)	0.8 (2)	
Physical Activity (PA) Behavior					
During the past 7 days frequency of PA for 60 minutes/day?	I	26.6 (45)	36.1 (61)	37.3 (63)	0.524
	C	28.7 (115)	34.8 (85)	36.5 (89)	
frequency of strengthening PA?	I	71.6 (121)	16.0 (27)	12.4 (21)	0.971
	C	68.9 (289)	18.0 (44)	13.1 (32)	
		<1	1-3	≥4	
How many hours per day do you watch TV, DVDs, or movies?	I	24.9 (42)	70.4 (119)	4.7 (8)	0.168
	C	21.1 (52)	67.6 (165)	11.1 (27)	
spend on a computer?	I	42.6 (72)	55.0 (93)	2.4 (4)	0.023*
	C	39.8 (97)	54.9 (134)	5.4 (13)	
		Yes	No		
Do you have a TV in your bedroom?	I	63.9 (108)	36.1 (61)		0.358
	C	59.4 (145)	40.6 (99)		

Note. I=Intervention group made up of childcare providers who are a members of Parent Aware with three or more hours of nutrition education in the past two years. C=Control group made up of all other childcare providers.

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

*Indicates significance at p<0.05

Nutrition Offerings to Preschoolers

In response to questions that assessed nutritional offerings to preschoolers by childcare providers over the past seven days, the majority reported five or more times serving vegetables at a meal or a snack (59.8%, 54.9%). They served fruit (59.0%, 60.5%), skim milk (68.6% and 60.0%), and whole grain bread or tortillas (38.7%, 39.3%). Ninety percent from both groups reported never offering sweetened cereal, over the past 7 days. Only 1.2% and 0.6% of the childcare providers reported serving sugar-sweetened drinks two or fewer times in the past seven days to the preschoolers. The majority of childcare providers offered the preschoolers fruits, vegetables, low-fat dairy at a meal or snack once a day. They also limited the sugar-sweetened drinks and cereals to once a week or less (Table 7.7).

Table 4.7

Nutrition Offerings to Preschoolers of Minnesota Licensed Childcare Providers of the Intervention and Control Groups

Question	Group	Response % (n ^a)			p
		0-2	3-4	5-7	
During the past 7 days, how many times to your preschooler					
were fresh/frozen vegetables served at meals or snacks?	I	7.7 (13)	32.6 (55)	59.8 (101)	0.375
	C	9.0 (22)	36.07 (88)	54.9 (134)	
were fresh/frozen fruits served at meals or snacks?	I	7.7 (13)	33.3 (56)	59.0 (99)	0.633
	C	8.2 (20)	31.3 (76)	60.5 (147)	
was skim or non-fat milk served at meals or snacks?	I	15.4 (26)	16.0 (27)	68.6 (116)	0.576
	C	19.7 (48)	20.5 (50)	60.0 (146)	
was 100% whole-wheat or whole-grain bread or tortillas served at meals or snacks?	I	23.2 (39)	38.1 (64)	38.7 (65)	0.104
	C	19.0 (46)	41.7 (101)	39.3 (95)	
was sugar-sweetened cereals (Frosted Flakes, Fruit Loops, etc.) served at breakfast?	I	92.9 (157)	5.9 (10)	1.2 (2)	0.795
	C	92.6 (226)	6.2 (15)	1.3 (3)	
were sugar-sweetened drinks served?	I	99.4 (167)	0.6 (1)	0.0 (0)	0.786
	C	98.8 (240)	0.8 (2)	0.4 (1)	

Note. I=Intervention group made up of childcare providers who are a members of Parent Aware with three or more hours of nutrition education in the past two years. C=Control group made up of all other childcare providers.

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

Discussion

Overall this study examined the effect of current nutrition education courses accepted by Parent Aware on nutritional-related knowledge, attitudes, and dietary behaviors amongst preschoolers' childcare providers. We found that 90.4% of childcare providers in the control group who participated in this study reported having three hours or more of nutrition education in the past two years and 77.9% participating in the CACFP. This may reflect the value childcare providers place on nutrition education even without strong regulation. This may also explain why there was little difference in the nutrition knowledge, attitude, behavior and physical activity knowledge and behavior between the two childcare provider groups: 1) intervention group, childcare providers who are members of Parent Aware with three hours of nutrition education and 2) the control group, those who were members of Parent Aware with no education or are not members of Parent Aware.

Even though the majority of childcare providers reported having nutrition education, data from this study indicates that childcare providers need additional nutrition education. The majority of providers only answered one of the six nutrition knowledge questions correctly. Childcare providers reported using ChooseMyPlate or MyPyramid. This suggests childcare providers may be using these tools as part of their nutrition education. However, the majority of providers incorrectly listed "vegetables" as the food group from which one should have the most servings from every day. It would seem that they are hearing the message "fill half your plate with vegetables," so clarifying the difference between portions and servings is necessary. This could also reflect the childcare providers focus on weight loss, which was reported by about half of the childcare providers.

In addition, the majority also reported three or more days per week of 60 minutes of physical activity. This exceeds the Dietary Guidelines' recommendation of 150 to 300 minutes each week of moderate-intensity aerobic physical activity. Further health benefits such as weight loss when combined with low calorie diet, are obtained with reaching the highest number of recommended minutes per week. It is well established in the literature that adults who are physically active are healthier and at lower risk of developing many chronic diseases than adults who are not active.

Providing childcare employees with nutrition education for weight management may be beneficial. Childcare providers who calorically restrict for weight management may also change how they feed a child whom they have weight concerns about (Dev et al., 2014), and that could be harmful for the preschooler. Hence, childcare providers may need support attending to their health problems. The expert consensus on priorities for obesity prevention research in a childcare setting emphasized the need to address staff's own health challenges (Ward, Vaughn, & Story, 2013).

In addition, 78% of the childcare providers reported similar frequency to the national average for eating food away from home in the past day (McCrary, Fuss, Hays, Vinken, Greenberg, & Roberts, 1999), which is twice a week. A recent analysis of the 2007-2008 NHANES data discovered that one-third of adults consumed foods and/or beverages away from home during the past 24 hours (Powell, Nguyen, & Han, 2012). Meals consumed away from home tend to have a lower nutritional quality and higher caloric content compared to foods that are eaten at home (Guenther, Casavale, Reedy, Kirkpatrick, Hiza, Kuczynski, & Krebs-Smith, 2013; Powell & Nguyen, 2013; Seguin, Aggarwal, Vermeulen, & Drewnowski, 2016). Moreover, several studies found an association between higher BMI and increased frequency of

eating away from home (Bowman & Vinyard, 2004; Larson, Neumark-Sztainer, Laska, & Story, 2011). In this study, there was a significant difference ($p=0.039$) of the two groups in their BMI. Forty percent of the childcare providers in the intervention group were obese, above the state average of 32.2% for 45-65 year old adults in MN (Foundation, 2016). Thirty percent of childcare providers in the control group were obese. It is possible that the reported food consumed the previous day was under reported and the intensity and/or duration of physical activity was over reported (Lichtman., Pisarska, Berman, Pestone, Dowling, Offenbacher, Heymsfield, 1992).

The majority of childcare providers reported positive attitudes towards nutrition. However, the control group had more childcare providers responding favorably (83.1%) to the statement “healthy food tastes good” than the intervention group (76.9%, $p=0.05$). This could partially explain the weight difference between the two groups if they prefer and therefore consume foods containing larger amounts of fat and sugar . Another possibility is that the intervention group has had low exposure to healthy foods and are reluctant to taste healthy foods for they may anticipate a bad taste. Since adults have an impact on children’s food preference, eating behavior, attitudes and food acceptance, it is important for childcare providers to model positive attitudes towards healthy foods (Birch & Fisher, 1998). There is a need to provide information to childcare providers that healthy food tastes good, and to provide opportunities for them to sample healthy food. Creating positive experiences will reduce their reluctance to offer and try healthy foods with the preschoolers.

There is a strong tendency for the intervention group to spend less time than the control group on a computer ($p=0.023$). It is challenging to understand why we see this difference when the two groups’ responses to nutrition knowledge, physical activity, nutritional intake in the past

24 hours and frequency of eating out were very similar. There is not a significant age difference between the groups to explain this discrepancy either. However, the control group could be using the computer for work and to communicate with parents via e-mail, Facebook or by other electronic means.

For this study, approximately two-thirds of the childcare providers correctly answered the physical activity recommendations for preschoolers. Most answered the question regarding media and screen time recommendations for preschoolers incorrectly; the most common response was less than an hour per day. The question was for the full day; therefore, the correct answer as states by the American Academy of Pediatrics is two hours or less per day. However, the Let's Move Childcare lists best practices for childcare providers. Let's Move Childcare recommends that caregivers limit screen time to 30 minutes a week or less for preschoolers (Nemours, 2016). These responses back the notion that those childcare providers understand they should regulate daily physical activity for a child (Sharma et al., 2013). However knowledge does not imply that this is the practice of the childcare providers. For example, several studies reported low levels of physical activity in childcare facilities (Hinkley, Crawford, Salmon, Okely, & Hesketh, 2008; Pate, McIver, Dowda, Brown, & Addy, 2008; Sallis, Patterson, McKenzie, & Nader, 1988; Trost, Sirard, Dowda, Pfeiffer, & Pate, 2003). Some providers have challenges providing active play because of limited space and equipment. Several studies reported that built environments can either support or inhibit the physical activity of a young child (Davison & Lawson, 2006; Glanz & Sallis, 2006; Gordon-Larsen, Nelson, Page, & Popkin, 2006). Children who are physically active are at a lower risk of excessive weight gain (Hesketh & Campbell, 2010; Waters, Silva-Sanigorski, Burford, Brown, Campbell, Gao, & Summerbell 2014). Therefore, the preschooler's play environment and the childcare provider's physical

activity policy will be important areas to study further regarding the impact on physical activity preschoolers obtain when they are at the childcare facility. Furthermore, good nutritional status (Rampersaud, Pereira, Girard, Adams, & Metz, 2005) and adequate physical activity (Chomitz, Slining, McGowan, Mitchell, Dawson, & Hacker, 2009) have positive benefits on academic performance.

Since 2008, most states, including MN, required childcare facilities to have water freely available to children at all times (Benjamin, Cradock, Walker, Slining, & Gillman, 2008). Since the implementation of this policy, there has been an increase in water being served with meals and snacks. Consequently, there has also been an increase in having self-serve water available indoors (Ritchie, Sharma, Gildengorin, Yoshida, Braff-Guajardo, & Crawford, 2015). However, this policy has not been consistently enforced. One California study revealed that water was not freely available during physical activity, but was available in the classroom of most childcare centers (Ritchie, Boyle, Samuels, Whaley, Hecht, Abascal, James, 2008; Middleton, Henderson, & Schwartz, 2013). In this study, the majority of childcare providers reported drinking two or more bottles of water, a little less than half reported drinking skim or non-fat milk, and lastly, most did not report drinking juice or sweetened fruit flavored beverages in the previous day. Modeling choosing the a healthy beverage and having water readily available will further support children's recommended fluid consumption.

We found few significant differences in nutrition related knowledge, attitude, and behavior between the childcare providers who are members of Parent Aware with education and those who are members of Parent Aware without nutrition education, or those who are not a member of Parent Aware at all. One reason may be simply the number of participants was not adequate to measure the difference. Another reason, as previously mentioned, could be that the

majority of childcare providers have had nutrition education. A third reason may be that a cultural shift in overall awareness of health practices within the community has taken place.

Limitations of the study include collecting self-reported anthropometric data from the childcare provider. However, research from Craig and Adams show significant agreement between self-reported and measured height and weight in adult US women (2009). In addition, the results found in the state of MN may not be generalizable to other areas or populations. Also using e-mail limits the sample size, and creates bias by recruiting only providers with e-mail. Of those who agreed to participate, they may have had self-selection bias towards a greater focus on nutrition, physical activity and obesity than those who declined participation. This study may not accurately represent MN licensed childcare providers and/or exaggerate particular findings in the study. Last, even though the survey was validated for use among low-income, minority children at the fourth-grade reading level (Penkilo et al., 2008), it was not validated in the childcare provider population.

In summary, the majority of childcare providers reported what they offered to the preschoolers to follow the CACFP meal guidelines, and correctly answered questions about the physical activity and screen time recommendations for preschoolers. The majority of childcare providers are overweight or obese and actively trying to reduce their weight. The semi quantitative food recall (Table 4.2) represented all food groups. The survey results reflected what the majority consumed the past day: fresh fruit over juice, vegetables, a dairy source, milk, and little sweets or sweetened beverages and approximately half are physically active for 60 minutes or more per week. This may reflect their actions to reduce their weight.

There is evidence that childcare providers need to improve their 1) health behaviors and 2) nutrition knowledge. Further research identifying effective interventions that help develop

healthy eating and activity behaviors, and nutrition knowledge is needed to reduce the number of children who are classified as obese. In addition, understanding the preschooler's play environment and the childcare provider's physical activity policy will be important areas to study further, regarding how they impact physical activity preschoolers obtain when they are at a childcare facility.

CHAPTER 5. MINNESOTA LICENSED CHILDCARE PROVIDERS' NUTRITION KNOWLEDGE, ATTITUDES, AND BEHAVIORS

Abstract

Childcare providers are responsible for offering children up to two-thirds of their nutritional consumption, still, little is known about providers' nutrition knowledge, attitudes, and/or behaviors. The purpose of this study is to evaluate the self-reported nutrition knowledge, behaviors, and attitudes of licensed MN childcare providers. A cross-sectional, descriptive analysis was conducted. Six hundred and fifty seven childcare providers responded to the survey. The majority of childcare providers described themselves between the ages of 23-71, Caucasian (92%) females (98%); 31% were overweight and 33% obese. Data from this study indicates that childcare providers need additional education in nutrition. The majority of childcare providers (79%) only answered two of the six nutrition knowledge questions correctly. This study highlights the need for providing nutrition education and weight management opportunities to childcare providers to empower them to teach nutrition education to preschoolers and parents to support improving their health.

Keywords: Childcare Providers, Nutrition Knowledge, Attitude, Behavior, Physical Activity

Introduction

Nearly one third of children two through five years of age in United States are affected by obesity and being overweight (Ogden et al., 2014). Furthermore, problems with weight are linked to obesity in adulthood: for obese children versus non-obese children, the risk of adult obesity is at least twice as high (Reilly et al., 2005). It is difficult to reverse overweight and obesity once established before kindergarten (Cunningham et al., 2014). However, young children respond better to lifestyle interventions for weight management than young adolescents (Addressi et al., 2005; Kudlová & Schneidrová, 2012; Nyberg et al., 2015). Thus, the people who care for preschoolers (parents and childcare providers) need to know and implement healthy weight control behaviors to prevent childhood obesity. Such efforts will support the next generation in maintaining a healthy weight. Hence, childcare providers are in the position to influence preschoolers by modeling, teaching, and supporting wholesome nutritional habits (John et al., 2012; Gubbels et al., 2015).

In light of a widespread need for education about nutritional choices for preschoolers and the childcare providers, the Healthy Kids, Healthy Future Steering Committee was initiated in 2009, putting forth a framework specifically for caregivers to focus on obesity prevention entitled “Spectrum of Opportunities for Obesity Prevention in the Early Care and Education Setting” (CDC, 2008). The “Spectrum” report identifies how states can support childcare facilities to achieve best practices for obesity prevention (CDC, 2008). The national early childcare standards for obesity prevention “Caring for our Children: National Health and Safety Performance Standards” (CFOC) (American Academy of Pediatrics, 2012) supports the “Spectrum” report. These reports represent comprehensive evidence-based obesity prevention recommendations. Understanding if childcare providers can positively impact preschoolers’ still

developing nutritional habits, since approximately one-third of American preschoolers are overweight or obese, (Ogden, et al., 2014), is necessary to study and evaluate.

Methods

This is a descriptive cross sectional study. The North Dakota State University Institutional Review Board approved the study.

Survey

The self-reported questionnaire was e-mailed to 8,186 MN licensed childcare providers who had an e-mail address listed with the Childcare Aware® of Minnesota. The childcare providers who cared for preschoolers ages three to five were asked to participate in the study. Convenience sampling was used. The study assessed the following: dietary behavior, nutrition knowledge, and attitude, and physical activity of childcare providers by using a questionnaire. The questionnaire has been adapted from the School Physical Activity and Nutrition Survey (SPAN) (The University of Texas Health Science Center at Houston School of Public Health, 2012).

Data Analysis

Data were analyzed using SAS software (version 14.1. Cary, NC). Descriptive statistics were performed to complete characteristic data. The US Centers for Disease Control and Prevention was used to classify the body mass index and the World Health Organization subdivision of obesity into Class I, II, and III. The criterion for statistical significance was set at 0.05 for all data.

Results

Questionnaires were completed by a total of 599 MN licensed childcare providers (0.08% response rate). Not all providers fully completed the questionnaire, therefore, the response rate (n) varies for each question.

Demographics

Table 1 presents participant demographics for childcare providers. Most of the childcare providers identified themselves as Caucasian (92 %) females (98%) between the ages of 23-71 (48.3 ± 10.6 years). This study's demographics coincide with the most prevalent demographics of licensed childcare providers in MN according to the Minnesota Department of Human Services: Caucasian (94%) females, 44 years old on average, (Minnesota Department of Human Services, 2012) matching the participants in this study. It was found that 34%-of childcare providers who participated in this study are of normal weight (BMI 18.50-24.99 kg/m^2), 31% overweight (BMI 25.00-29.99 kg/m^2), and 33% obese (BMI $\text{kg}/\text{m}^2 \geq 30 \text{ kg}/\text{m}^2$). Also, the majority (89%) had three hours or more of nutrition education in the past two years and participated in CACFP (80%).

Dietary Intake of Childcare Provider

Approximately 50% of the childcare providers reported not eating high fat meat such as hot dogs and a larger percentage (87%) reported not consuming fried meats such as fried chicken the previous day. Peanuts or nuts and cheese, cheese spread or sauce were consumed only once the previous day, by approximately 50% of the childcare providers. Dairy products were consumed by approximately two thirds of the providers the previous day. Most reported that they drank skim or 1% milk (noted at the bottom of Table 5.2) once (30.9%) or two or more times (32.6%) the previous day. However less than half (41.7%) reported consuming yogurt or cottage cheese. Approximately half of the providers reported that one or more times the previous day

they consumed brown rice, farro, macaroni or spaghetti (45.4%) and white bread, buns, bagels, tortilla or rolls (42.7%); while slightly more (57.9%) reported consuming whole wheat bread, buns, bagels, tortillas or rolls. The majority did not consume hot or cold cereal (62.5%), French fries or chips (69%) or starchy vegetables (61.9%). Over two-thirds reported consuming an orange vegetable (62%), green vegetables (62.6%) and other vegetables (70.7%) the previous day. The majority reported eating fruit (88.1%). Few reported consuming juice (82.2%), sports drinks or sweetened fruit-flavored beverages (97.1%), or soda (62.3%). Childcare providers reported consuming water (86.6%) two or more times the previous day and 63.7% reported consuming coffee, tea or coffee drinks one or more times the previous day. The majority did not consume a frozen dessert (80.1%), sweet rolls, cookies, pies or cakes (72.5%) or candy (63.8%) or food from a restaurant (75.9%) the previous day. Only a third of the childcare providers reported not having a snack the previous day. The majority (89.2%) reported eating two or more meals the previous day.

Table 5.1

Demographic Characteristics of Minnesota Licensed Childcare Providers

Characteristics	Response % (n ^a) Childcare Provider
Sex	
Male	2.3 (11)
Female	97.7 (476)
no answer provided	25.9 (170)
Age (y)	
20-29	4.8 (23)
30-39	26.9 (130)
40-49	30.6 (148)
50-59	27.1 (131)
60-69	10.3 (50)
70-79	0.4 (2)
80-89	0.0 (0)
no answer provided	26.3 (173)
Race/ethnicity	
Black or African American	0.6 (3)
Mexican-American Latino or Hispanic	1.4 (7)
White, Caucasian or Anglo	91.6 (444)
Other Asian	0.2 (1)
American Indian or Alaska Native	5.0 (24)
Other	1.0 (5)
no answer provided	26.2 (172)
Weight status (kg/m ²)	
Underweight (BMI <18.50)	1.9 (9)
Normal weight (BMI - 18.50-24.99)	35.9 (169)
Overweight (BMI >25.00)	28.9 (136)
Obese (BMI ≥30)	33.3 (157)
Obese Class I (BMI 30.00-34.99)	21.9 (103)
Obese Class II (BMI 35.00-39.99)	5.7 (27)
Obese Class III (BMI ≥40)	5.7 (27)
Participated in Child and Adult Care Food Program (CACFP)	
Yes	79.3 (340)
No	19.6 (84)
I do not know	1.2 (5)
no answer provided	34.7 (228)
≥3 hours of nutrition education past 2 years	
Yes	89.1 (383)
No	10.0 (43)
I do not know	0.9 (4)
no answer provided	34.6 (227)
Use Parent Aware	
Yes	41.7 (179)
No	57.6 (278)
I do not know	0.70 (3)

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

Nutrition-related Knowledge and Physical Activity

In response to questions that assessed the nutrition knowledge of the childcare provider, the majority use MyPyramid or ChooseMyPlate. Less than half correctly answered two of the six nutrition questions. Only 42% could identify the macronutrient containing the most calories and fewer (12%) correctly identified the food group from which they should consume the most servings (grains); most listed vegetables. Also, very few (3%) knew the recommended percentage of daily energy from fat (Table 5.3).

In response to questions that assessed childcare providers' knowledge of physical activity recommendations for preschoolers, the vast majority accurately answered (66.0%). They stated preschoolers need at least 60 minutes or more per day, for seven days (91%). However, few (19.6%) answered correctly they should have less than two hours of media-related activity per day (Table 5.3).

Nutrition-related Attitudes and Behaviors

In response to questions that assessed the childcare provider's nutrition attitudes, the majority reported a positive response. Approximately half of the childcare providers believed that the foods they usually eat and drink are healthy most of the time (56.5%) or some of the time (40.1%), so there is no reason for them to change their eating habits. The majority of childcare providers believed if they (95%) or others (92%) are overweight there is a greater risk of acquiring health problems like heart disease or cancer, but only 60% believed that people who are underweight are at a higher risk for health problems (Table 5.4).

Table 5.2

Dietary Intake-Nutrition Behavior of Minnesota Licensed Childcare Providers

Question	Response % (n ^a)		
	0	1	≤2
Yesterday, how many times did you eat/drink -			
hamburger meat, hot dogs, sausage (chorizo)?	49.2 (223)	39.3 (178)	11.5 (52)
fried meat such as chicken, fried pork?	87.1 (391)	11.8 (53)	1.1 (5)
peanuts or peanut butter, or other nuts?	38.2 (174)	48.3 (220)	13.6 (62)
any kind of cheese, cheese spread or sauce?	26.2 (119)	49.8 (226)	24.0 (109)
any kind of milk?	36.5 (167)	30.9 (141)	32.6 (149)
yogurt or cottage cheese or drink a yogurt drink?	58.3 (260)	33.2 (148)	8.5 (38)
brown rice, faro, macaroni, or spaghetti?	54.6 (245)	39.2 (176)	6.2 (28)
white bread, buns, bagels, tortillas, or rolls?	57.3 (254)	33.9 (150)	8.8 (39)
whole wheat bread, buns, bagels, tortillas?	42.1 (189)	43.9 (197)	14.0 (63)
hot or cold cereal?	62.5 (277)	35.9 (159)	1.6 (7)
French fries or chips?	69.0 (311)	28.4 (128)	2.7 (12)
any starchy vegetables like potatoes or peas?	61.9 (278)	32.3 (145)	5.7 (26)
any orange vegetables carrots, or sweet potatoes?	38.0 (173)	43.1 (196)	18.9 (86)
a salad with lettuce or any green vegetables?	37.4 (169)	46.9 (212)	15.7 (71)
any other vegetables like peppers, tomatoes, zucchini?	29.3 (133)	41.4 (188)	29.3 (133)
beans such as baked beans, kidney beans?	78.8 (354)	18.5 (83)	2.7 (12)
fruit?	11.9 (54)	32.8 (149)	55.4 (252)
	0-1	2-4	≥5
fruit juice?	82.2 (373)	16.1 (73)	1.8 (8)
any sports drinks, or other fruit-flavored drinks?	97.1 (438)	2.4 (11)	0.4 (2)
any diet sodas or soft drinks?	62.3 (278)	25.6 (114)	12.10 (54)
a bottle of glass of water?	7.1 (32)	6.4 (29)	86.6 (393)
coffee, tea, iced tea, or a coffee drink?	36.3 (165)	26.4 (120)	37.4 (170)
	0	1	≥2
a frozen dessert?	80.1 (362)	19.4 (83)	1.6 (7)
sweet rolls, doughnuts, cookies, pies, or cakes?	72.5 (329)	24.0 (109)	3.5 (16)
any candy?	63.8 (289)	28.5 (129)	7.7 (35)
food from any type of restaurant?	75.9 (343)	22.4 (101)	1.8 (8)
a snack?	31.4 (140)	43.3 (193)	25.3 (113)
	0-1	2	≥3
a meal?	1.8 (8)	9.0 (41)	89.2 (405)
What type of milk do you usually drink?	Whole/2%	1%/Skim	Soy/Rice/ Almond
	8.20 (37)	60.1 (271)	10.6 (48)

^aNot all respondents answered all the survey questions, resulting in varying number of responses for each question.

Table 5.3

Nutrition-Related and Physical Activity Knowledge of Minnesota Licensed Childcare Providers

Question	Response % (n ^a)		
	Correct	Incorrect	Do Not Know
Nutrition/Physical Activity Knowledge			
How many total cups of-			
fruits should you eat each day? (≥ 2)	53.2 (232)	14.5 (63)	5.7 (25)
vegetables should you eat each day? (≥ 2.5)	79.8 (348)	14.5 (63)	4.6 (20)
Which contains the most calories? (1 g fat)	42.4 (184)	73.0 (317)	22.8 (99)
From which food group should you eat the-			
most servings each day? (e.g. bread, cereal, rice)	11.8 (51)	85.7 (371)	2.5 (11)
fewest servings each day? (fats, oil, sweets)	83.1 (364)	16.2 (71)	0.7 (3)
What is the recommended amount of calories from fat? (35%)	2.5 (11)	97.5 (424)	0 (0)
Experts recommend that children should-			
be physically active for at least how many minutes per day? (60 minutes)	66.0 (279)	31.7 (134)	2.4 (10)
engage in no more than how many hours of media-related activities, per day? (2 hours)	19.62 (83)	77.3 (327)	3.1 (13)
be physically active on how many days per week? (7 days)	90.8 (385)	8.0 (34)	1.2 (5)
	Yes	No	Do Not Know
Do you use MyPyramid or ChooseMyPlate?	44.3 (195)	48.9 (215)	6.8 (30)

^aNot all respondents answered all the survey questions, resulting in varying number of responses for each question.

Table 5.4

Nutrition-Related Attitudes and Behaviors of Minnesota Licensed Childcare Providers

Question	Possible Response % (n ^a)		
	Agree	Disagree/ False	Neither/ Do Not Know
Skipping meals affects my ability to do well through the day.	87.6 (383)	9.2 (40)	3.2 (14)
I think that learning about the relationship between food and health is important for me to know.	94.9 (413)	4.8 (21)	0.2 (1)
I think that learning about the relationship between physical activity and health is important for me to know.	95.9 (416)	3.9 (17)	0.2 (1)
	Almost Always	Sometimes	Almost Never
I am willing to try new foods.	64.3 (281)	33.0 (144)	2.8 (12)
	True	False	Do Not Know
What you eat can make a difference in your chances of getting heart disease or cancer.	97.9 (428)	0.9 (4)	1.1 (5)
If I am over weight I am more likely to have more health problems like cancer or heart disease.	94.9 (413)	3.7 (16)	1.4 (6)
People who are overweight are more likely to have a higher risk of health problems like cancer or heart disease than people who are not overweight.	92.4 (403)	6.4 (28)	1.2 (5)
People who are underweight are more likely to have a higher risk of health problems than people who are not underweight.	59.6 (260)	18.8 (82)	21.6 (94)
	Yes All/Most of the Time	Yes Some of the Time	Never
Foods I usually eat and drink are healthy there is no reason for me to make changes.	56.5 (247)	40.1 (175)	3.4 (15)
Healthy food tastes good.	80.9 (352)	18.9 (82)	0.2 (1)

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

Table 5.5

Weight-Related Behaviors of Minnesota Licensed Childcare Providers

Question	Response % (n ^a)			
	No	Yes		No Answer
Weight-related Behaviors				
In the past 12 months, have you tried to lose weight?	29.9(129)	70.1(302)		33.6(218)
	Lose Weight	Stay Same /Nothing	Gain Weight	No Answer
Which of the following are you trying to do about your weight?	69.1(297)	14.9(64)	0.9(4)	33.7(219)
	Too Much	The Right Amount	Too Little	No Answer
Compared to other adults your age, who are as tall as you, do you think you weigh:	65.9(284)	31.8(137)	2.3(10)	33.6(218)

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

Weight-related Behaviors

Of the childcare providers who participated in this study, 70% stated that in the past year they had tried to lose weight, and 69% stated they are currently trying to lose weight. Also, 66% believe they weigh too much compared to other adults of their age and height (Table 5.5).

Meal Time and Physical Activity Behaviors

Only approximately half (52.8%) of the childcare providers reported eating breakfast while many more (64.8%) reported eating lunch with the children. The majority (94.2%) consumed a homemade evening meal when eating at home. Only 63% reported never watching TV while eating an evening meal (Table 5.6). During the past seven days 80.7% reported eating one or more times in a restaurant.

A substantial number (70%) reported being active for a total of 60 minutes of increased heart rate per day for three or more days in the last seven days. However 25% reported three or more days strengthening or toning exercises for the past seven days. Seventy-seven percent of childcare providers reported one hour or more of casual TV time per day (Table 5.6).

Childcare Providers Nutrition Offerings to Preschoolers

In response to questions that assessed nutritional offerings to preschoolers by the childcare provider, over the past seven days the majority reported following the Child and Adult Care Food Program (CACFP) guidelines when they reported serving three or more servings of vegetables (90.6%) and fruit (92%) at a meal or a snack. Eighty-one percent offered skim milk three or more servings a week. Almost three-quarters (78.4%) offered three or more servings of whole grain bread or tortillas per week. Most childcare providers reported limiting added sugar through cereal (92.5%) and beverages (98.8%) by offering them two or fewer times per week.

Table 5.6

Meal Time and Physical Activity Behaviors of Minnesota Licensed Childcare Providers

Question	Response % (n ^a)		
	With the Children	Away From the Children	I Do Not Usually Eat
Meal Time Behavior			
Where do you usually eat or drink something for- breakfast?	52.8 (293)	35.3 (160)	11.9 (54)
lunch?	64.8 (293)	33.1 (152)	1.3 (6)
	Yes, Homemade or Processed	Yes, Fast Food or Sit-Down Restaurant	No, I Do Not Eat An Evening Meal
Do you usually eat an evening meal? During the past 7 days	94.2 (425) 0	3.1 (14) 1-4	1.6 (7) ≥ 5
how many times did you watch TV while eating an evening meal?	63.1 (163)	46.2 (209)	17.7 (80)
how many times did you eat a meal from a sit-down or fast food restaurant?	22.4 (101)	75.6 (328)	5.1 (23)
Physical Activity Behavior			
During the past 7 days	0-2	3-5	>5
on how many days were you physically active for a total of at least 60 minutes per day?	29.6 (128)	53.1 (230)	17.3 (75)
did you do exercises to strengthen or tone your muscles, such as push-ups, or weight lifting?	70.4 (305)	25.2 (109)	4.4 (19)
How many hours per day do you usually- watch TV, DVDs, or movies?	<1 hour	1-3 hour	≥4 hour
spend on a computer away from work?	23.1 (100)	68.8 (298)	8.1 (8)
	39.7 (172)	24.7 (234)	4.6 (20)
	No	Yes	
Do you have a TV in your bedroom?	39.3 (170)	60.7 (263)	

Table 5.7

Nutrition Offerings to Preschoolers of Minnesota Licensed Childcare Providers

Question	Response % (n ^a)		
	0-2	3-6	≥7
During the past 7 days, how many times to your preschoolers			
were fresh/frozen vegetables served at meals or snacks?	12.2 (52)	33.2 (141)	57.4 (244)
were fresh/frozen fruits served at meals or snacks?	8.0 (34)	31.7 (134)	60.3 (255)
was skim or non-fat milk served at meals or snacks?	18.9 (80)	17.9 (76)	63.2 (268)
was 100% whole-wheat or tortillas served at meals/snacks?	21.6 (91)	39.3 (166)	39.1 (165)
was sugar-sweetened cereals served at breakfast?	92.5 (393)	6.4 (27)	1.2 (5)
were sugar-sweetened drinks served?	98.8 (418)	0.7 (3)	0.5 (2)

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

Discussion

Childcare providers are responsible for providing nutrition and physical activity to preschool children. However, having the knowledge to implement healthy nutrition recommendations does not always lead to a change in behavior (Freedman & Alvarez, 2010). Also, if childcare providers do not have sufficient understanding of nutrition and physical activity, it is highly improbable that they will have the skill set to implement evidence based childhood obesity prevention recommendations. The majority of childcare providers who participated in this study reported having three hours or more of nutrition education in the past two years and participating in the CACFP. This may reflect the value childcare providers place on nutrition education even without strong regulation.

On the other hand, data from this study indicates that childcare providers need additional education in nutrition. While the majority (79%) of childcare providers only answered two of the six nutrition knowledge questions correctly, most reported using ChooseMyPlate or MyPyramid providers. Fewer than half identified fat as the macronutrient with the most calories and only

12% correctly identified grains as the food group to consume the most servings of—most answered vegetables to this question. This error could be misinterpretation of servings versus portions. Also, very few (3%) knew the recommended percentage of daily energy from fat, and many reported the recommended percentage of daily energy from fat should be under 20%. This could be from old nutrition information. Educating the childcare providers about how to best use the tool ChooseMyPlate with preschoolers and parents would be of value. ChooseMyPlate is a nutrition education tool for preschoolers, parents and childcare providers.

The answers about nutrition knowledge support the previous day dietary reports from the majority of childcare providers regarding their limited intake of fried meat, French fries, chips, sweetened beverages or desserts and one or more servings of low-fat milk, fruit, vegetables, and whole grain bread. Overall, this could also reflect weight management efforts.

It appears the majority of childcare providers aim to reach or exceed the recommendation of daily physical activity for adults which calls for 150 minutes of moderate-intensity aerobic activity and strengthening activities on two or more days a week (CDC, 2015). A substantial number (70%) reported being active for a total of 60 minutes of increased heart rate per day for three or more days in the last seven days and almost 30% reported three or more days of strengthening or toning exercises in the past seven days. The strengthening activity exceeds the National Health Interview Survey from 2004 data that stated 17% of women reported strength training two or more times per week (CDC, 2006). This could be a reflection of weight loss efforts by 69.1% of the childcare providers who answered the questions “Which of the following are you trying to do about your weight?”

Intake of Fruits and Vegetables

Almost all of the childcare providers offered children fruits and vegetables three to six times per week and, within the “past day,” over half consumed both fruits and vegetables themselves. This is similar to the latest information available regarding adult intake of fruits and vegetables. During 2007–2010, 50% of the US adults consumed less than one cup of fruit and less than one and half cups of vegetables daily (Moore & Thompson, 2015). In addition, only 30% of preschoolers in the US consumed the recommended five servings of fruits and vegetables per day (Briefel, Deming, & Reidy, 2015). Research on school intervention to increase fruit and vegetables showed small improvement in fruit consumption, but little change in vegetable consumption (Evans, Christian, Cleghorn, Greenwood, & Cade, 2012). This reflects the need for future research to identify how to help increase fruit and vegetable consumption in childcare providers and preschoolers.

Improved nutrient quality occurs when fruits and vegetables are added to the diet (Aljadani Patterson, Sibbritt, Hutchesson, Jensen, & Collins, 2013; Hung, Joshipura, Jiang, Hu, Hunter, Smith-Warner, Willett, 2004). This study finds that childcare providers reported a slightly higher daily offering of fruits and vegetables to the preschoolers compared to what they reported consuming themselves. This suggests that the childcare providers may not be eating the fruits and vegetables that they offer the preschoolers. However, it would be of great importance for them to eat vegetables and fruits with the children because adult intake, in addition to simply being offered fruits and vegetables, has been positively associated with increased consumption amongst children (Rasmussen Krølner, Klepp, Lytle, Brug, Bere, & Due, 2006). Eight-five percent of the childcare providers reported participating in CACFP, and this could explain the high nutrient quality being offered to preschoolers.

Nutrition Attitudes

Attitudes have a daily influence on what childcare providers teach young children. Willingness to try new foods and believing most healthy food tastes good will help providers have a positive discussion about nutrition topics with children. Also, to further support a positive nutrition discussion it is important that the childcare providers believe what they consume can make a difference in their chances of getting heart disease or cancer, and that they identify the importance of learning about the relationship between physical activity, food, and health. Recent research supports the notion that verbally communicating positive nutrition messages that emphasize why food is important may have an impact on improving children's nutrition knowledge (Zarnowiecki, Sinn, Petkov, & Dollman, 2011). This study found many positive attitudes and mealtime behaviors of child-care providers. It also showed child-care providers' attitudes and mealtime behaviors that need improvement. For example, childcare providers need to eat with the children to have these daily conversations regarding healthy eating. However, fewer than half of the childcare providers in this study ate breakfast with the preschoolers. Slightly more ate lunch with the preschoolers. Eating with the preschoolers also provides an opportunity to encourage them to try new foods (Adessi et al., 2005). Furthermore, it provides an opportunity for the childcare provider to model positive eating behaviors, allowing the preschoolers to observe positive eating behaviors, which may influence their own food preferences and behaviors later in life (Birch & Fisher, 1998; Nicklas et al., 2001). Conversely, when the childcare providers in this study failed to eat meals with preschoolers, they missed opportunities to model positive eating behaviors, which could influence the preschoolers' eating habits.

Teaching role modeling to childcare providers could help improve new food acceptance by young children. Childcare providers may be more enthusiastic and willing to learn once they understand the benefits of enthusiastically modeling the consumption of new foods. Several strategies have been identified to encourage children's new food acceptance. Research results recommended that rather than quietly model, childcare providers' enthusiastically model "Mmm! I love peapods!", Another recommendation is to be enthusiastic during the first five new food offerings before the children's "novelty response" decreases (Hendy & Raudenbush, 2000).

Limitations of the study include collecting self-reported anthropometric data from the childcare provider. In addition, using e-mail limits the sample size, and creates bias by recruiting only providers with e-mail. Also, of those who agreed to participate, they may have had self-selection bias towards a greater focus on nutrition, physical activity and obesity than those who declined participation. Therefore, this may not accurately represent MN licensed childcare providers. In addition, the results found in the state of MN may not be generalizable to other areas or populations. Last, even though the survey was validated for use among low-income, minority children at the fourth-grade reading level (Penkilo et al., 2008), it was not validated in the childcare provider population.

In summary the majority of childcare providers have a positive attitude and belief towards nutrition and health and are overweight and actively trying to reduce their weight. The semi-quantitative food recall survey represented all food groups. The survey results reflect what the majority consumed the previous day: fresh fruit over juice, vegetables, a dairy source, either as milk, yogurt or cheese, whole grain bread over white bread, and little sweets, desserts or sweetened beverages all eaten within the home. The childcare providers also reported dietary offerings to the preschoolers, which followed the CACFP meal guidelines. There is evidence that

additional nutrition support and education is needed for childcare providers so they can be successful at implementing nutrition education to preschoolers and to their parents. Successful implementation of childhood obesity prevention recommendations occurs when childcare providers are provided professional training (Benjamin, et al., 2007; Sigman-Grant et al., 2011). Mounting evidence underscores the importance of developing positive nutrition behaviors and practices for childcare providers, parents, and children to obtain and sustain a healthy weight status (French et al., 2001; Natale et al., 2014).

Further research identifying effective interventions in the childcare setting that help develop healthy eating and activity behaviors is needed to help prevent childhood obesity. Additional research is needed to identify the barriers childcare providers perceive and experience in role modeling healthy nutrition behaviors. Providers need support through education that helps them develop easy and effective strategies.

**CHAPTER 6. NUTRITION KNOWLEDGE, ATTITUDE, AND BEHAVIOR AMONG
PARENTS OF PRESCHOOLERS WHO ATTEND A MINNESOTA LICENSED
CHILDCARE FACILITY**

Abstract

The present study examined the nutrition and physical activity knowledge, attitude and behavior of parents of preschoolers who attend a Minnesota (MN) licensed childcare facility. A total of 123 parents in MN completed a validated 86-item survey to assess their nutrition and physical activity knowledge, attitude, and behavior. Chi Square analysis was used to analyze categorical data. The parents identified themselves as Caucasian (93%) females (83%) between the age of 23 and 58. It was found that 26% of parents who participated in this study were overweight and 21% obese. Of the 123 parents, 44 parents provided the demographics of their children. The parents identified their children as Caucasian (98%), male (52%), ages three to five, and somewhat obese (23%). Parents answered only one out of six nutrition knowledge questions correctly. Eleven percent reported consuming fried meat, 55% had high fat red meat, approximately one-quarter had a sweet, and one-third reported drinking fruit-flavored beverages the previous day. Nineteen percent did not eat fruit, 31% did not eat vegetables, and 34% did not drink milk the previous day. A little over half reported they were trying to lose weight and fewer than half said they thought they weighed too much compared to other adults like them. This supports the need to provide nutrition education to parents to better help them to model and teach nutrition behaviors to their preschoolers and to improve their families' health.

Keywords: Parents, Nutritional Intake, Attitude, Behavior, Physical Activity

Introduction

Among young children in the United States there has been a recent decline in obesity. Despite this, obesity remains a public health concern in the United States. Therefore, it is of great importance that preschoolers are given the opportunity to develop healthy eating habits, which may persist into adulthood (Wright et al., 2015). Hence, preschoolers and parents are often the focus of obesity prevention since dietary habits are readily shaped and formed early in life. In addition, it is very possible to modify dietary habits before age five (Scaglioni et al., 2011; Schwartz et al., 2011).

Many families are not eating healthy foods, as noted by “What We Eat in America,” (What We Eat in America 2009-2010). Low exposure and availability for children to consume fruits, vegetables, and milk in the home environment, create a higher risk for excessive caloric intake from foods high in solid fats and added sugar. Parents are in the position to influence preschoolers when they model, teach, and support wholesome nutritional habits (John et al., 2012; Gubbels et al., 2015).

In fact, frequent exposure to new foods in a non-coercive setting and availability of fruits and vegetables within the home are examples of how adults may positively influence the child’s dietary behavior. These are a couple of the recommendations on long-term healthy eating behaviors and obesity prevention that are listed in the Academy of Nutrition and Dietetics’ (AND) position paper: “Interventions for the prevention and treatment of pediatric overweight and obesity” (Hoelscher, Kirk, Ritchie, & Cunningham-Sabo, 2013). In addition, numerous studies have shown that adults influence children’s dietary behavior (Boutelle, Cafri, & Crow, 2012; Natale, Lopez-Mitnik, Uhlhorn, Asfour, & Messiah, 2014). Thus a healthy home environment will have a possibly lifelong positive influence on preschoolers.

Methods

Experimental Design

This is a descriptive cross sectional study. An e-mail was sent to all MN licensed childcare providers who had a listed e-mail address with the Childcare Aware® of MN. The participating childcare providers were asked to forward the e-mail to all parents of preschoolers (age three to five) in their care.

Questionnaires

The 86-item questionnaire was self-administered and completed by a convenience sample and a total of 123 MN parents completed the questionnaire. Of those parents, 49 completed the questions regarding their preschoolers; not all parents fully completed the questionnaire, therefore, the response rate (n) varies for each question.

The study assessed the following: dietary behavior, nutrition knowledge and attitude, and physical activity of the parents of preschoolers, by using a questionnaire. The questionnaire has been adapted from the School Physical Activity and Nutrition Survey (SPAN) (The University of Texas Health Science Center at Houston School of Public Health, 2012).

Statistical Analysis

Data were analyzed using SAS software (version 14.1, Cary, NC). Descriptive statistics, with frequency and percent were calculated. Quetelet's index was used to calculate body mass index BMI from self-reported height and weight (Garrow, & Webster, 1984). Body mass index classification was that established by the CDC (CDC, 2015a) and obesity was subdivided into Class I, II, and III, as established by the World Health Organization (WHO) (2015). The criterion for statistical significance was set at 0.05 for all data.

Results

Demographic Characteristics

Table 1 presents participant demographics for parents and preschoolers. Most of the parents identified themselves as Caucasian (93.2 %) females (83.3%). Only 16.7% of parents who participated in this study were males. The age of the parents was between 23-58 years. The parents' BMI were divided into four categories: underweight ($<18.5 \text{ kg/m}^2$), normal weight ($18.50\text{-}24.99 \text{ kg/m}^2$), overweight ($25.00\text{-}29.99 \text{ kg/m}^2$), and obese ($\geq 30 \text{ kg/m}^2$) (World Health Organization, 2000). As for the BMI of the parents, it was found that 50% were normal weight, 26% overweight, and 21% obese. Of the 21% obese category, 10% are Obese Class I (BMI $30.00\text{-}34.99 \text{ kg/m}^2$), 7% Obese Class II (BMI $35.00\text{-}39.99 \text{ kg/m}^2$) and 4% Obese Class III (BMI $>40.00 \text{ kg/m}^2$).

The parents identified the majority of the preschoolers, in this study, as Caucasian (97 %). The preschoolers were almost equally divided between males (52%) and females (48%). The ages of the preschoolers were between two and five years; 41% were three years of age, 36% were four years of age, and 23% were five years of age. Preschoolers' BMI scores were converted to z-scores based on normative data for age and sex (Must and Anderson, 2006). The BMI was then divided into five percentile categories for age and sex: underweight ($<5 \text{ kg/m}^2$), normal weight ($5 \text{ kg/m}^2 \leq \text{BMI} < 85 \text{ kg/m}^2$), overweight ($85 \text{ kg/m}^2 \leq \text{BMI} < 95 \text{ kg/m}^2$), and obese (BMI > 95 th percentile kg/m^2), and severely obese (BMI > 120 percent for the 95th kg/m^2) (Ogden & Flegal, 2010; Kuczmarski et al., 2000). It was found that 23% were underweight (BMI $< 5^{\text{th}}$ percentile), 55% were normal weight (BMI between 5^{th} and 85^{th} percentile); 23% were obese (BMI ≥ 95 th percentile), and of those obese, 18% were classified as severely obese (BMI $\geq 120\%$ of 95th percentile).

Dietary Intake

Approximately half of the parents reported consuming hamburger meat, hot dogs or sausage and peanuts, peanut butter or other nuts one or more times the previous day and very few (86.2%) reported consuming fried chicken or other fried meat. A little over three-quarters (82.1%) reported consuming cheese or cheese spread, approximately two-thirds drank milk and slightly more than one-third ate yogurt or drank a yogurt drink one or more times the previous day. Only a third (37.3%) consumed brown rice, spaghetti, or pasta noodles, or hot or cold cereal (31.8%) the previous day while almost half reported consuming white bread, buns, tortillas, or rolls (49.3%) or whole wheat bread, buns or corn tortillas, one or more times the previous day. Close to two-thirds (60.6%) did not consume French fries or chips, or starchy vegetables the previous day. Over fifty percent consumed orange (56.1%), green (56.7%), or other vegetables (68.7%) one or more times the previous day. Close to a quarter (22.4%) reported consuming pinto beans or refried beans one or more times the previous day. Most (80.6%) consumed fruit while little (14.9%) drank fruit juice, punch, or sports drinks one or more times the previous day (10.5%). Sixty percent drank coffee or tea one or more times the previous day, almost matching the number of times water was drunk (59.7%). Fewer than a quarter (16.4%) consumed a frozen dessert yet slightly more than a third consumed sweet rolls, doughnuts, cookies (37.4%) or candy (41.9%) one or more times the previous day. Forty-three percent reported consuming one or more food items from a restaurant the previous day and 73% reported snacking one or more times a day. Ninety-seven percent of the parents reported eating two or more meals per day (Table 6.2).

Table 6.1

Demographic Characteristics of Parents and Preschoolers

Characteristics	Response % (n ^a)	
	Parents	Preschoolers ^b
Sex		
Male	16.7 (12)	52.3 (23)
Female	83.3 (60)	47.7 (21)
Age (y)		
3		40.9 (18)
4		36.4 (16)
5		22.7 (10)
20-29	5.7 (7)	
30-39	41.5 (51)	
40-49	10.6 (13)	
50-59	0.8 (1)	
60-69	0 (0)	
70-79	0 (0)	
80-89	0 (0)	
Race/ethnicity		
Black or African American	0 (0)	
Mexican-American Latino or Hispanic	0 (0)	
White, Caucasian or Anglo	93.2 (67)	97.7 (43)
Other Asian	1.4 (1)	2.2 (1)
American Indian or Alaska Native	4.2 (3)	
Other	1.4 (1)	
Weight status (BMI kg ²)		
Underweight (BMI <18.50)	2.8 (2)	
Normal weight (BMI - 18.50-24.99)	50.0 (36)	
Overweight (BMI >25.00)	26.4 (19)	
Obese (BMI ≥30)	9.7 (15)	
Obese Class I (BMI 30.00-34.99)	9.7 (7)	
Obese Class II (BMI 35.00-39.99)	6.9 (5)	
Obese Class III (BMI ≥40)	4.2 (3)	
Weight status- percentile for age and sex		
Underweight (BMI <5 th)	-	22.7 (5)
Normal weight (5 ≤ BMI < 85)	-	54.5 (12)
Overweight (85 ≤ BMI < 95)	-	0.0 (0)
Obese (BMI > 95 th percentile)	-	4.6 (1)
Severe Obese (BMI > 120 percent for the 95 th)		18.2 (4)

Note. BMI=body mass index

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

^b Preschoolers of parents who responded to the forward survey from participating childcare providers.

Table 6.2

Dietary Intake-Nutrition Behaviors of Parents

Question	Response % (n ^a)		
	0	1	≤2
Yesterday, how many times did you-			
eat hamburger meat, hot dogs, sausage?	45.5 (30)	45.5 (30)	9.1 (6)
eat fried chicken, fried pork?	86.2 (56)	10.8 (7)	3.1 (2)
eat peanuts or peanut butter, or other nuts?	46.2 (30)	46.2 (30)	7.7 (5)
eat any kind of cheese, cheese spread?	17.9 (12)	47.8 (32)	34.3 (23)
drink any kind of milk?	34.3 (23)	40.3 (27)	25.4 (17)
eat yogurt or drink a yogurt drink?	59.7 (40)	31.4 (21)	9.0 (6)
eat brown rice, spaghetti, or pasta noodles?	62.7 (42)	32.8 (22)	4.5 (3)
eat white bread, buns, tortillas, or rolls?	50.8 (34)	41.8 (28)	7.5 (5)
eat whole wheat bread, buns, or corn tortilla?	56.1 (37)	33.3 (22)	10.6 (7)
eat hot or cold cereal?	68.2 (45)	30.3 (20)	1.5 (1)
eat French fries or chips?	60.6 (40)	33.3 (22)	6.1 (4)
eat any starchy vegetables potatoes, corn?	60.6 (40)	27.3 (18)	12.1 (8)
eat any orange vegetables like carrots, or sweet potatoes?	45.6 (30)	40.9 (27)	15.2 (12)
eat a salad made with lettuce or any green vegetables?	43.3 (29)	43.3 (29)	13.4 (9)
eat any other vegetables like peppers, tomatoes, zucchini?	31.3 (21)	40.3 (27)	28.4 (19)
eat beans such as pinto beans, refried beans?	77.6 (52)	17.9 (12)	4.5 (3)
eat fruit?	19.4 (13)	41.8 (28)	38.8 (26)
	0-1	2-4	≥5
drink fruit juice?	85.1 (57)	13.4 (9)	1.5 (1)
drink any punch, sports drinks?	88.1 (59)	7.5 (5)	3.0 (2)
drink any diet sodas or soft drinks?	58.2 (39)	29.9 (20)	11.9 (8)
drink a bottle of glass of water?	6.0 (4)	3.0 (2)	56.7 (38)
drink a cup, bottle or can of coffee, tea?	39.4 (26)	27.3 (18)	33.3 (32)
	0	1	≥2
eat a frozen dessert?	83.6 (56)	16.4 (11)	0.0 (0)
eat sweet rolls, doughnuts, cookies?	62.7 (42)	28.4 (19)	9.0 (6)
eat any candy?	58.2 (39)	34.3 (23)	7.5 (5)
eat food from any type of restaurant?	56.7 (38)	40.3 (27)	3.0 (2)
eat or drink a snack?	27.3 (18)	39.4 (26)	33.3 (21)
	0-1	2	≥3
eat a meal?	0.0 (0)	3.0 (2)	97.0 (65)

^a Not all questions were answered by all parents; n will change—percentage is based on the number who answered the question.

Nutrition and Physical Activity-related Knowledge

Approximately a third answered correctly the number of cups they and their preschooler should consume each day of vegetables, but only 20.0% correctly answered the amount of fruit they should consumed in a day. The majority (88.9%) knew which food group (fats and oils) to eat the fewest servings from per day, yet only 13.1% of the parents correctly identified the food group to consume the most of (grains). Also, only 32.3% could identify the macronutrient containing the most calories and significantly fewer (1.6%) knew the recommended percentage of daily energy from fat. In response to questions that assessed nutrition knowledge of the parent, two-thirds (67.7%) indicated that they did not use MyPyramid or ChooseMyPlate. In response to questions that assessed parents' knowledge of physical activity recommendations for preschoolers, over half (59.0%) correctly answered the recommended minutes per day preschoolers need, 42.6% knew the number of hours for media-related activity per day and 88.5% correctly answered the number of days per week preschoolers should be active (Table 6.3). In summary only one of the seven nutrition questions was answered correctly by half of the parents. Of the three physical activity questions, two were answered correctly by over 50% of the parents. Fewer than half correctly answered the number of hours experts recommend children limit their screen time to.

Nutrition-related Attitudes and Beliefs

In response to questions that assessed the parent's nutrition attitudes, the majority responded positively to all of them. Most (93.6%) agreed that skipping meals affects their ability to do well throughout the day. The majority agreed that learning about the relationship between food and health (93.6%) and physical activity and health (96.8%) was important to them. Few (4.8%) were not willing to try new foods. Ninety-seven percent of the parents agreed with the

Table 6.3

Nutrition and Physical Activity-Related Knowledge of Parents

Question	Response % (n ^a)		
	Correct	Incorrect	Do Not Know
Nutrition/Physical Activity Knowledge			
How many total cups of			
fruits should you eat each day? (≥ 2.5)	20.0 (30.6)	58.1 (36)	11.3 (7)
vegetables should you eat each day? (≥ 2.5)	32.3 (20)	58.1 (36)	9.7 (6)
vegetables should your preschooler eat each day? (≥ 2)	39.3 (24)	49.2 (30)	11.45 (7)
Which contains the most calories? (1 g fat)	32.3 (20)	43.5 (27)	24.2 (15)
From which food group should you eat			
most servings each day? (e.g. bread, cereal, rice)	13.1 (8)	82.0 (50)	4.9 (3)
the fewest servings each day? (fats, oil, sweets)	88.7 (55)	6.5 (4)	4.8 (3)
What is the recommended amount of calories from fat that you should get from the foods you eat? (35%)	1.6 (1)	98.4 (61)	0.0 (0)
Experts recommend that children should			
be physically active for at least how many minutes per day? (60 minutes)	59.0 (36)	34.4 (21)	6.6 (4)
engage in no more than how many hours of media-related activities, such as TV watching and video game playing, per day? (2 hours)	42.6 (26)	54.1 (33)	3.3 (2)
be physically active on how many days per week? (7 days)	88.5 (54)	8.2 (5)	3.3 (2)
	Yes	No	Do Not Know
Do you use MyPyramid or ChooseMyPlate?	6.5 (4)	67.7 (42)	25.8 (16)

^a Not all questions were answered by all parents; n will change—percentage is based on the number who answered the question.

statement, “What you eat can make a difference in your chances of getting heart disease or cancer.” The majority of parents who believed that if they (88.7%) or others (98.4%) are overweight there is a greater risk of health problems like heart disease or cancer, and 80.7% believed that people who are underweight are also at a higher risk for health problems.

Approximately half of the parents believed that the foods they usually eat and drink are healthy most of the time (53.2%) or some of the time (47%), so there is no reason for them to change

their eating habits. Over three-quarters (80.7%) believed that healthy food tastes good most of the time (Table 6.4).

Table 6.4

Nutrition-Related Attitudes and Beliefs of Minnesota Parents

Question	Response % (n ^a)		
	Agree	Disagree False	Neither/Do Not Know
Nutrition Attitudes and Beliefs			
Skipping meals affects my ability to do well through the day.	93.6 (58)	0.0 (0)	6.5 (4)
I think that learning about the relationship between food and health is important for me to know.	93.6 (58)	1.6 (1)	4.8 (3)
I think that learning about the relationship between physical activity and health is important for me to know.	96.8 (60)	1.6 (1)	1.6 (1)
	Almost Always	Sometimes	Almost Never
I am willing to try new foods.	62.1 (39)	32.3 (20)	4.8 (3)
	True	False	Do Not Know
What you eat can make a difference in your chances of getting heart disease or cancer.	96.8 (60)	1.6 (1)	1.6 (1)
If I am over weight I am more likely to have more health problems like cancer or heart disease.	88.7 (55)	3.2 (2)	8.1 (5)
People who are overweight are more likely to have a higher risk of health problems like cancer or heart disease than people who are not overweight.	98.4 (61)	1.2 (1)	0.0 (0)
People who are underweight are more likely to have a higher risk of health problems than people who are not underweight.	80.7 (50)	11.3 (7)	8.1 (5)
	Yes All/Most of the Time	Yes Some of the Time	Never
Foods I usually eat and drink are healthy there is no reason for me to make changes.	53.2 (33)	46.8 (29)	0.0 (0)
Healthy food tastes good.	80.7 (50)	19.4 (12)	0.0 (0)

^a Not all questions were answered by all parents;, n will change—p, percentage is based on the number who answered the question.

Weight-related and Meal Time Behavior

Of the parents in this study, 55.7% stated that they are trying to lose weight. Also, about half (49.2%) believed they weighed too much compared to other adults their age and height. Ninety one percent reported eating breakfast and consuming an evening meal five or more times with their preschooler within the past seven days. Sixty-five percent reported never watching TV while eating an evening meal and 71.9% reported eating once or more in a restaurant during the past seven days (Table 6.5).

Table 6.5

Weight-Related and Meal Time Behaviors of Minnesota Parents

Question	Response % (n ^a)		
	Lose Weight	Stay Same /Nothing	Gain Weight
Weight-related Behaviors			
Which of the following are you trying to do about your weight?	55.7 (34)	44.3 (27)	0.0 (0)
	Too Much	The Right Amount	Too Little
Compared to other adults your age, who are as tall as you, do you think you weigh:	49.2 (30)	50.8 (31)	0.0 (0)
Meal Time Behavior			
	0	1-4	≥5
During the past 7 days, how many times did you eat breakfast	0.0 (0)	9.4 (6)	90.6 (58)
During the past 7 days, how many times did you eat an evening meal with your preschooler?	0.0 (0)	9.4 (6)	90.6 (58)
During the past 7 days, how many times did you watch TV while eating an evening meal?	65.1 (41)	27.0 (17)	7.9 (5)
During the past 7 days, how many times did you eat a meal from a sit-down or fast food restaurant?	28.1 (18)	70.3 (45)	1.6 (1)

^a not all questions were answered by all parents, n will change, percentage is based on the number who answered the question

Physical Activity Behaviors and Attitudes

Approximately half (48.4%) of the parents reported that they are never or sometimes active, while the other half (50.0%) reported being active most or all of the time. Fifty percent

reported being active most or all of the time with their preschoolers, and 59.7% watched their preschoolers when they were being physically active. A high percentage (60%) of parents reported that their preschoolers spent one to three hours a day watching TV, DVDs or movies and about the same amount (57.8%) reported that their preschoolers choose active activities when they have a choice of how to spend leisure time. The majority of parents (75.6%) strongly agree that they encourage their preschoolers to play outside if the weather is good. Only 58% strongly agree they do enough physical activity to maintain good health and fitness. Ninety-eight percent report that their preschooler has 30 minutes of daily outdoor play. Ninety-five percent of preschoolers do not have a TV in their bedrooms (Table 6.6).

Table 6.6

Physical Activity Behaviors and Attitudes of Minnesota Parents

Question	Response % (n ^a)		
	Never/ Sometimes	Most of the Time/All the Time	I/My Preschooler has a Disability
Physical Activity Behavior			
Are you physically active?	48.4 (30)	50.0 (31)	1.2 (1)
I am physically active with my preschooler.	48.4 (30)	51.6 (32)	0.0 (0)
I watch my preschooler when he/she is being physically active.	40.3 (25)	59.7 (37)	0.0 (0)
	<1 hour	1-3 hour	≥4 hour
How many hours per day does your preschooler spend usually watch TV, DVDs, or movies on the computer?	31.1 (14)	60.0 (27)	8.9 (4)
Physical Activity Attitude			
	Chooses Activities Like TV, Reading etc.	Chooses Active and Inactive Activities	Chooses Active Activities Like Bicycling, Dancing etc.
On most days what does your preschooler do when she/he has a choice about how to spend leisure time?	8.9 (4)	33.3 (15)	57.8 (26)
	Strongly Agree	Somewhat Agree/disagree	Strongly Disagree
If the weather is good, I encourage my preschooler to play outside.	75.6 (34)	15.6 (7)	8.9 (4)

Table 6.6. *Physical Activity Behaviors and Attitudes of Minnesota Parents (continued)*

Question	Response % (n ^a)		
	Never/ Sometimes	37.8 (17) Most of the Time/All the Time	4.4 (2) I/My Preschooler has a Disability
Most of the time does your preschooler play outdoors for at least 30 minutes/day?	97.8 (44)	0.0 (0)	2.2 (1)
Does your preschooler have a TV in his/her bedroom?	4.8 (3)	95.2 (59)	0.0 (0)

^a Not all questions were answered by all parents; n will change—percentage is based on the number who answered the question.

Discussion

This study assessed the nutritional knowledge, attitudes, and behaviors of parents who have preschoolers who attended a MN licensed childcare facility. Children learn nutrition knowledge and healthy eating habits best by example from those they are around most frequently. Analysis of the parents' surveys responses detected a lack of nutritional knowledge. However, parents did report a positive attitude toward nutrition, which will enhance parents' willingness and acceptance of further nutrition messages to improve nutrition knowledge. Once informed, further research will be needed for assessing a parent's ability to choose healthy options in an obesogenic or obesity promoting environment. These environments have features that deter preschoolers physical activity and dietary consumption.

The value and benefit of nutrition knowledge in being able to appropriately choose healthy nutrition behaviors are recognized as one of several components to reduce obesity and improve eating behaviors. The home food environment is the route through which children's dietary consumption patterns and knowledge are acquired. There are several avenues within the home environment, which are decided by parents' nutrition knowledge and attitudes, such as the type of food available for consumption, feeding practices, rules around eating, and the type of eating behavior being role modeled. Therefore, parents' nutrition knowledge influences the

children's nutritional knowledge. Many parents answered the question related to the amount of vegetables they and their preschoolers consume each day as much greater than the recommended two and a half and two, respectively. The survey asked the number of times consumed and not the amount consumed, so it is difficult to know if they consumed the recommended amount of vegetables. However, from the survey it would be reasonable to conclude that the same percent of parents consumed vegetables three or more times per day as reported by the CDC. The analysis of the Behavioral Risk Factor Surveillance System (BRFSS) by the CDC stated that in 2009, 26.4 percent of adults in MN, aged 18 or older consumed vegetables three or more times per day, this is up 3.1% from 2000. There is still much work to be done in identifying how to sustain the recommended five fruits and vegetables daily which has been identified as reducing the risk for many leading causes of death (Committee, 2015) and support weight management (Rolls, Ello-Martin, & Tohill, 2004).

The availability of certain food groups such as fruits and vegetables in the home has also been associated with children's intake of these foods (Reinaerts, de Nooijer, Candel, & de Vries, 2007; Spurrier, Magarey, Golley, Curnow, & Sawyer, 2008). Family behavior patterns such as higher fast-food frequency and having the television on during meals have been associated with lower intake of fruits and vegetables and higher intake of unhealthy foods such as salty snacks and soda in children (Bowman et al., 2004; Coon, Goldberg, Rogers, & Tucker, 2001). For two-thirds of the parents who reported not having the TV on during the evening meal in the study, they may be aware of the benefits of not having the TV on during meals. We could also speculate that the quarter of parents who reported not eating at a sit-down or fast food restaurant the past seven days understood the risk of consuming excess calories from saturated fats and

sugar. However, three-quarters of the parents may not be fully aware of the health risks of consuming food away from home.

Because children learn through repeated exposure, what a parent models for food choices and eating behaviors may impact the child's lifelong nutrition habits. Children may also increase their knowledge and understanding of nutritious food from discussions with their parents. As seen in Table 6.4, the majority of parents reported a positive nutrition attitude. Positive messages regarding the food's benefits may have a greater influence than negative messages. They agreed that healthy food tastes good and reported they were willing to try new food. A tool for parents to learn about, to increase nutrition knowledge and use is ChooseMyPlate. It provides information about healthy nutrition and physical activity for all ages.

The majority of parents reported skipping meals affects their ability to do well throughout the day. It would be reasonable to think that they routinely eat three meals daily since the majority reported consuming two or meals daily (Table 6.2) and answered that they ate breakfast and they consumed the evening meal with their preschoolers five or more times the past 7 days. Preschoolers who are routinely exposed to family dinners along with adequate sleep and limited screen-time have a lower prevalence of obesity than preschoolers who do not have those routines (Anderson and Whitaker, 2010). This study did not inquire about sleep habits. However, parents could be further educated about recommended sleep routines, how to place limits on screen time for preschoolers and they could be congratulated on having routine family meals.

Parent engagement in physical activity with their children has been inconsistently linked to children's physical activity and sedentary behavior (Sallis, Prochaska, & Taylor, 2000). In this study parents accurately reported the physical activity guidelines by the American Academy of Pediatrics, but fewer than half reported complying with these recommendations. Previous

research stated that parents see the child's activity preferences, safety, time, and siblings being barriers for their preschoolers obtaining adequate activity (Irwin, He, Bouck, Tucker, & Pollett, 2005). This could explain the reported high percentage (60%) of parents stating that their preschoolers spend one to three hours a day watching TV, DVDs, or movies. Yet about the same amount (57.8%) report their preschoolers choose active activities when they have a choice of how to spend leisure time. Another positive attribute of parents' attitudes toward physical activity is almost all (95.2%) reported that their preschooler did not have a TV in the bedroom. Evidence supports a positive relationship between a TV in the bedroom of a preschooler and more time spent in sedentary activity (Saelens, Sallis, Nader, Broyles, Berry, & Taras, 2002) and the preschooler's BMI (Mendoza, Zimmerman, & Christakis, 2007). Future research to identify how to circumvent the barriers can further contribute to the current literature and help prevent childhood obesity.

Limitations of the study include that parents were used as the child's proxy to obtain anthropometric measurements, which may introduce some social desirability bias (Natale et al., 2014). To support accuracy in measurements, instructions were provided. Another limitation was collecting self-reported anthropometric data from the parents. In addition, the results found in the state of MN may not be generalizable to other areas or populations. Also, using e-mail limits the sample size, and creates bias by recruiting only providers and parents with e-mail. Those who agreed to participate may have had self-selection bias towards a greater focus on nutrition, physical activity and obesity than those who declined participation. This sample may not accurately represent MN parents of preschoolers. Last, even though the survey was validated for use among low-income, minority children at the fourth-grade reading level, (Penkilo et al., 2008) it was not validated in the childcare provider population.

In summary, the present study indicates that parents need nutrition education to support healthy eating and physical activity behaviors at home such as congratulating them on having routine family meals and providing recommendations for how to place limits on screen time for preschoolers. This findings of this study support the need for further research in identifying how best to provide nutrition and physical education which induce behavior change primarily aimed at females. Future research to identify how to circumvent the barriers can contribute further to the current literature and help prevent childhood obesity. Furthermore, this study did not inquire about the parent's and preschooler's nutrition behavior and attitude when meals and snacks were eaten together. Research in this area would add to the current childhood obesity literature.

**CHAPTER 7. NUTRITION KNOWLEDGE, ATTITUDES, AND BEHAVIORS OF
MINNESOTA LICENSED CHILDCARE PROVIDERS AND THE PARENTS OF THE
PRESCHOOLERS THEY SERVE**

Abstract

The present study examined the nutrition and physical activity knowledge, attitude and behavior of Minnesota (MN) licensed childcare providers and parents of the preschoolers they served. A total of 707 childcare providers and 123 parents in MN completed a validated 75 and 86-item survey respectively, to assess their nutrition and physical activity knowledge, attitude, and behavior. Chi Square analysis was used to analyze categorical data. The majority of providers and parents identified themselves as Caucasian females. It was found that there was little difference between the childcare providers and parents' categorical weight distribution. Of the 123 parents, 44 parents provided the demographics of their children and identified them as Caucasian (98%), males (52%), ages of three to five. Twenty-three percent of the children who participated in this study were obese. Childcare providers and parents answered only one out of six nutrition knowledge questions correctly. More parents than childcare providers offered sweetened cereal and beverages to the preschoolers. More childcare providers were trying to lose weight and said they thought they weighed too much compared to other adults like them. This supports the need to provide nutrition education to childcare providers and parents to better help them to model and teach nutrition behaviors to their preschoolers for improved health.

Keywords: Childcare Provider, Parents, Nutritional Intake, Behavior, Physical Activity

Introduction

In the United States, 60 percent of both parents are currently working (United States Department of Labor Bureau of Labor Statistics, 2015). This has resulted in approximately 12 million United States children under five years of age are spending an average of 36 hours a week in some form of childcare (Wood et al., 2013). Today, parents and childcare providers share the responsibility for nurturing and educating children during important developmental years when the child is highly receptive to a variety of environmental experiences (Geoffroy et al., 2013; Mokdad et al., 2003; Aviva Must, 1996).

Healthy People 2020 is a program that is a Federal Interagency supported by the US Department of Health and Human Services and other Federal departments who identify the national health objectives every 10 years for all Americans. One of the Healthy People 2020 objectives (United States Department of Health Human Services Office of Disease Prevention Health Promotion, 2016) is to reduce the number of children and adolescents who are considered obese by 10% by the year 2020. In addition, the Institute of Medicine (IOM) designated childhood obesity prevention as a national health priority (Koplan et al., 2005). The IOM states, “the goal of obesity prevention among children is to create social change in the environment to promote a healthful energy balance” (Koplan et al., 2005 p. 4). The severity and public health implications of overweight and obese children has prompted the national anti-obesity initiative, “Let’s Move,” to address this epidemic (Wojcicki & Heyman, 2010). Furthermore, the need to prevent obesity in early childhood is evident because overweight or obese kindergarteners are more likely to be obese teens than kindergarteners who were of normal weight (Nader et al., 2006).

In addition, numerous studies have shown that adults influence children's dietary behavior (Boutelle et al., 2012; Natale et al., 2014b). In fact, frequent exposure to new foods in a non-coercive setting and availability of fruits and vegetables within the childcare setting or home are examples of how adults may positively influence the child's dietary behavior. These are a couple of the recommendations for long-term healthy eating behaviors and obesity prevention that are listed in the Academy of Nutrition and Dietetics' (AND) position paper: "Interventions for the prevention and treatment of pediatric overweight and obesity" (Hoelscher et al., 2013) and statement paper: "Benchmarks for nutrition in child care" (Neelon and Briley, 2011). These behaviors may impart health benefits such as a healthy weight status, euglycemia, normal lipids, and self-regulation of dietary intake (Savage, Fisher, & Birch, 2007).

Childcare facilities may provide one-third to two-thirds of the preschooler's nutritional needs (Briley and McAllaster, 2011). This allows for the childcare setting to be a place to reach young children and their parents with obesity prevention efforts.

Methods

Experimental Design

This is a descriptive cross sectional study. The North Dakota State University Institutional Review Board approved the study. The participating childcare providers were asked to forward the e-mail to all parents of preschoolers (age three to five) in their care.

Questionnaires

The 75 and 86-item self-reported questionnaire for the childcare provider and parent of the preschooler respectively was e-mailed to 8,186 MN licensed childcare providers who had a listed e-mail address with the Childcare Aware® of Minnesota. The childcare providers who cared for preschoolers ages three to five were asked to participate in the study. The participating

childcare providers were asked to forward the e-mail to all parents of preschoolers (age three to five) in their care. The questionnaires were self-administered and completed by a convenience sample: a total of 707 childcare providers and 123 MN parents. Fifty childcare providers completed the questionnaire twice. The duplicate surveys were omitted from data analysis to reduce bias. Not all childcare providers or parents fully completed the questionnaire.

By using a questionnaire the study assessed the following: dietary behavior, nutrition knowledge and attitude, and physical activity of childcare providers. The questionnaire has been adapted from the School Physical Activity and Nutrition Survey (SPAN) (The University of Texas Health Science Center at Houston School of Public Health, 2012).

Statistical Analysis

Data were analyzed using SAS program (revision 14.1, Cary, NC). Descriptive statistics were performed to complete characteristic data. Chi-square was used to analyze categorical data, and to test for significant differences. Pooled t-test was conducted to compare the BMI of the childcare providers and parents (Lanigan, 2012). Not all respondents answered all the survey questions, resulting in varying number of responses for each question. Thus, differences in the sample sizes of the data occurred. Quetelet's index was used to calculate BMI from self-reported height and weight (Garrow & Webster, 1984). BMI classification and obesity subdivision of Class I, II, and III established by World Health Organization (WHO, 2015). The criterion for statistical significance was set at 0.05 for all data. Fisher's exact test was used when cell size was less than five.

Results

Characteristics of the Participants

Table 1 presents participant demographics for childcare providers and parents. Most of the childcare providers and parents identified themselves as Caucasian (92 %, 92%) and female (98%, 83%). It was found that there was not a significant difference between childcare providers' BMI (M=28.1, SD = 6.5) and parents' BMI (M=26.7, SD= 6.7); $t(541)=1.63$, $Pr > t 0.103$ for $p=0.05$.

Dietary Intake

Overall, there were only two significant differences in the response from the childcare providers and parents for the 28-food consumption questions. Approximately half reported consuming high fat red meat and peanuts or other nuts and nut butters, and less than 20% consumed fried meat the previous day. Close to three-quarters reported consumption of cheese the previous day and only about a two-thirds drank milk the previous day. Only one-third reported consuming starchy vegetables. Over two-thirds reported consuming each of the following the previous day: orange vegetables, green vegetables and other vegetables; over three-quarters reported consuming fruit the previous day.

Childcare providers reported drinking punch, sports drinks or other fruit flavored drinks (3.2%) significantly less than parents (12.1%) ($p=0.001$). Also, childcare providers reported a lower frequency of consumption for food from any type of restaurant the previous day (24.0%) than parents (43.9%) ($p=0.005$) (Table 7.2). However, when asked the frequency during the past seven days for eating at a restaurant, the childcare providers and parents reported the same frequency (Table 7.3). Approximately two-thirds of the childcare providers and parents reported consuming one or more snacks and a little over half reported consuming two or more meals the

previous day (Table 7.2).

Table 7.1

Demographic Characteristics of Childcare Providers and Parents

Characteristics	Response % (n ^a)	
	All CCP	Parents
Sex		
Male	2.3 (11)	16.7 (12)
Female	97.7 (476)	83.3 (60)
Age (y)		
20-29	4.8 (23)	5.7 (7)
30-39	26.9 (130)	41.5 (51)
40-49	30.6 (148)	10.6 (13)
50-59	27.1(131)	0.8 (1)
60-69	10.3 (50)	0.0 (0)
70-79	0.4 (2)	0.0 (0)
80-89	0.0 (0)	0.0 (0)
Race/ethnicity		
Black or African American	0.6 (3)	0.0 (0)
Mexican-American, Latino, or Hispanic	1.4 (7)	0.0 (0)
White, Caucasian or Anglo	91.6 (444)	93.1 (67)
Other Asian	0.2 (1)	1.4 (1)
American Indian or Alaska Native	5.0 (24)	4.2 (3)
Other	1.0	1.4 (1)
Weight status (BMI kg/m ²)		
Underweight (BMI <18.50)	2.0 (9)	2.8 (2)
Normal weight (BMI - 18.50-24.99)	35.9 (169)	50.0 (36)
Overweight (BMI >25.00)	28.9 (136)	26.4 (19)
Obese (BMI ≥30)	33.3 (157)	20.83 (15)
Obese Class I (BMI 30.00-34.99)	21.9 (103)	9.7 (7)
Obese Class II (BMI 35.00-39.99)	5.7 (27)	6.9 (5)
Obese Class III (BMI ≥40)	5.7 (27)	4.2 (3)
Participated in Child and Adult Care Food Program (CCACFP)		
Yes	79.3 (340)	-
No	19.6 (84)	-
I do not know	1.2 (5)	-
3 hours or more of nutrition education past 2 years		
Yes	89.1 (383)	-
No	10.0 (43)	-
I do not know	1.0 (4)	-
Use Parent Aware		
Yes	41.7 (179)	-
No	57.6 (247)	-
I do not know	0.7	-

Note. BMI-body mass index

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

Nutrition Offerings to Preschoolers

In response to questions that assessed nutritional offerings to preschoolers by the childcare providers and parents, over the past seven days the majority reported offering three or more servings of vegetables (90.6%, 90.9%) and fruit (82%, 93%) at a meal or a snack. Parents did not offer skim milk as frequently as childcare providers ($p=0.004$). Approximately a third of the parents did not offer their preschoolers skim milk. Parents were also reporting a higher offering of sugar-sweetened cereal ($p<0.001$) and sugar-sweetened beverages ($p<0.001$). Almost three-quarters of childcare providers and parents offered three or more servings of whole grain bread or tortilla per week. The reported offerings by the childcare provider comply with the CACFP guidelines, and taking into account 85% reported participating might explain the high nutrient quality beginning offered. Few parents were using Parent Aware to seek childcare and 41% of the childcare providers were members ($p<0.001$) (Table 7.3).

Nutrition and Physical Activity Knowledge

In response to questions that assessed nutrition knowledge, the following showed a significant difference between the parent and childcare provider in understanding the correct amount of either fruits ($p<0.014$) or vegetables ($p<0.001$). More childcare providers answered correctly the amount of vegetables and fruit to be consumed within a day. Also, even though both had less than 10% of the group accurately answering question about the recommended percentage of daily energy from fat, the childcare providers had more correct responses ($p=0.024$). Last, more childcare providers use MyPyramid or ChooseMyPlate than parents ($p<0.001$). This tool may be supporting the childcare providers in nutrition education they pass on to preschoolers. In response to questions that assessed childcare providers' and parents' knowledge of physical activity recommendations for preschoolers, a little over half accurately

answered the questions stating “preschoolers need at least 60 minutes or more per day (61%, 58%), for seven days” (91%, 88%). Childcare providers and parents poorly answered (16%, 0%) the question about the recommended screen-time for preschoolers per day. Yet again more of the childcare providers than parents answered this question correctly ($p < 0.001$) (Table 7.4).

Table 7.2

Dietary Intake-Nutrition Behaviors of Minnesota Childcare Providers and Parents

Question		Response % (n ^a)			p	F
		0	1	≥2		
Yesterday, how many times did you- eat red meat e.g. hamburger meat, hot dogs?	CCP	49.3 (140)	39.8 (113)	10.9 (31)	0.854	0.774
	Parent	46.2 (30)	44.6 (29)	9.2 (6)		
eat fried chicken, fried pork chops, fried fish?	CCP	87.3 (248)	11.3 (32)	1.4 (4)	0.635	0.564
	Parent	85.9 (55)	10.9 (7)	3.1 (2)		
eat peanuts or peanut butter, or other nuts?	CCP	37.2 (106)	50.5 (144)	12.3 (35)	0.671	0.748
	Parent	46.9 (30)	45.3 (29)	7.8 (5)		
eat any kind of cheese, cheese spread, or cheese sauce?	CCP	25.3 (72)	52.1 (148)	21.8 (64)	0.230	0.218
	Parent	18.2 (12)	47.0 (31)	34.9 (23)		
drink any kind of milk?	CCP	36.7 (105)	31.5 (90)	30.8 (91)	0.436	0.438
	Parent	33.3 (22)	40.9 (27)	25.8 (17)		
eat yogurt or cottage cheese or drink a yogurt drink?	CCP	56.0 (155)	33.6 (93)	10.5 (29)	0.247	0.420
	Parent	59.1 (39)	31.8 (21)	7.6 (5)		
eat brown rice, farro, macaroni, spaghetti, or pasta noodles?	CCP	54.4 (154)	39.2 (111)	37.9 (18)	0.612	0.733
	Parent	62.1 (41)	33.3 (22)	4.6 (3)		
eat white bread, buns, bagels, tortillas, or rolls?	CCP	59.8 (165)	30.4 (84)	9.8 (27)	0.421	0.347
	Parent	50.0 (33)	42.4 (28)	7.6 (5)		
eat whole wheat bagels, tortillas, or rolls; or corn tortilla?	CCP	41.9 (117)	45.2 (126)	12.9 (36)	0.480	0.385
	Parent	55.4 (36)	33.9 (22)	10.8 (7)		
eat hot or cold cereal?	CCP	61.9 (172)	36.7 (102)	1.4 (4)	0.769	0.587
	Parent	67.7 (42)	30.8 (20)	1.5 (1)		
eat French fries or chips?	CCP	66.4 (188)	30.4 (86)	3.2 (9)	0.482	0.436
	Parent	60.0 (39)	33.9 (22)	6.2 (4)		
eat any starchy vegetables?	CCP	62.9 (176)	32.5 (91)	4.6 (13)	0.112	0.098
	Parent	60.0 (39)	27.7 (18)	12.3 (8)		
any orange vegetables like carrots, squash?	CCP	37.2 (106)	41.8 (119)	21.1 (60)	0.083	0.074
	Parent	46.2 (30)	40.0 (26)	12.3 (8)		

Table 7.2. *Dietary Intake-Nutrition Behaviors of Minnesota Childcare Providers and Parents (continued)*

Question		Response % (n ^a)			p	F
		0	1	≥2		
a salad made with lettuce or any green vegetables?	CCP	37.1 (105)	46.3 (131)	16.6 (47)	0.307	0.334
	Parent	42.4 (28)	43.9 (29)	13.6 (9)		
any other vegetables like peppers, tomatoes, zucchini?	CCP	27.779)	42.5 (121)	29.8 (84)	0.909	0.931
	Parent	30.3 (20)	40.9 (27)	28.8 (19)		
Yesterday, how many times did you-						
beans e.g. pinto beans, baked beans?	CCP	78.6 (220)	18.9 (53)	2.5 (7)	0.730	0.569
	Parent	78.8 (52)	16.7 (11)	4.6 (3)		
eat fruit?	CCP	11.2 (32)	33.7 (96)	55.1 (157)	0.225	0.237
	Parent	19.7 (13)	40.9 (27)	39.4 (26)		
drink fruit juice?	CCP	78.6 (224)	19.3 (55)	2.1 (6)	0.523	0.624
	Parent	84.9 (56)	13.6 (9)	1.5 (1)		
drink any punch, Kool-Aid®, sports drinks?	CCP	96.8 (273)	3.2 (9)	0.0 (0)	0.001*	0.002*
	Parent	87.9 (58)	7.6 (5)	4.6 (3)		
drink any diet sodas or soft drinks?	CCP	58.6 (164)	28.9 (81)	12.5 (35)	0.434	0.587
	Parent	59.1 (39)	28.8 (19)	10.6 (7)		
		0-1	2-4	≥5		
drink a bottle of glass of water?	CCP	24.2 (39)	54.0 (154)	32.3 (92)	0.904	0.936
	Parent	6.06 (4)	3.0 (2)	33.3 (22)		
drink a cup, bottle or can of coffee, tea?	CCP	62.8 (179)	35.1 (100)	2.1 (6)	0.877	0.947
	Parent	66.2 (43)	33.9 (15)	0.0 (0)		
eat a frozen dessert?	CCP	80.9 (228)	16.7 (47)	2.5 (7)	0.432	0.646
	Parent	83.3 (55)	16.7 (11)	0.0 (0)		
		None	1	≥2		
eat sweet rolls, doughnuts, cookies, brownies?	CCP	72.2 (205)	25.0 (71)	2.8 (8)	0.093	0.074
	Parent	62.1 (41)	28.8 (19)	9.1 (6)		
eat any candy?	CCP	64.6 (184)	26.7 (76)	8.8 (25)	0.683	0.694
	Parent	59.1 (39)	33.3 (22)	7.6 (5)		
eat food from any type of restaurant?	CCP	76.0 (215)	22.3 (63)	1.8 (5)	0.005*	0.004*
	Parent	56.1 (37)	40.9 (27)	3.0 (2)		
eat or drink a snack?	CCP	30.1 (84)	44.1 (123)	23.2 (72)	0.713	0.693
	Parent	26.2 (17)	40.0 (26)	33.9 (22)		
		0-1	2	≥3		
eat a meal?	CCP	13.4 (38)	33.5 (95)	53.2 (151)	0.080	0.103
	Parent	3.0 (2)	30.3 (20)	66.7 (44)		

Table 7.2. *Dietary Intake-Nutrition Behaviors of Minnesota Childcare Providers and Parents (continued)*

Question		Response % (n ^a)			P	F
		0	1	≥2		
		Whole/2%	1%/Skim	Rice/ Soy/ Almond		
What type of milk do you usually drink?	CCP	7.1 (20)	60.4 (171)	10.6 (30)	0.059	0.056
	Parent	18.2 (12)	51.5 (34)	12.1 (8)		

Note. F=Fisher's exact test CCP=childcare provider

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

*Indicates significance at p<0.05

Table 7.3

Nutrition and Physical Activity Behaviors of Minnesota Childcare Providers and Parents

Question		Response % (n ^a)			p	F
		0	1-4	≥5		
Meal Time Behavior						
During the past 7 days how many times did you						
watch TV while eating an evening meal?	CCP	22.0 (62)	73.8 (208)	4.3 (12)	0.647	0.674
	Parent	28.6 (18)	69.9 (44)	7.9 (1.6 (1))		
Nutrition and Physical Activity Offerings to Preschoolers						
During the past 7 days, how many times to your preschooler						
		0-2	3-6	≥7		
were fresh/frozen vegetables served at meals or snacks?	CCP	9.4 (24)	34.6 (89)	56.0 (144)	0.889	0.914
	Parent	9.1 (4)	34.1 (15)	56.8 (25)		
were fresh/frozen fruits served at meals or snacks?	CCP	7.4 (19)	34.4 (88)	58.2 (149)	0.856	0.743
	Parent	7.0 (3)	39.5 (17)	53.5 (23)		
was skim or non-fat milk served at meals or snacks?	CCP	16.8 (44)	18.3 (47)	64.6 (166)	0.004*	0.004*
	Parent	36.4 (16)	15.9 (7)	47.7 (21)		
was 100% whole-wheat or whole-grain bread or tortillas served at meals or snacks?	CCP	22.8 (58)	37.4 (95)	39.8 (101)	0.109	0.083
	Parent	27.3 (12)	50.0 (22)	22.7 (10)		

Table 7.3 Nutrition and Physical Activity Behaviors of Minnesota Childcare Providers and Parents (continued)

was sugar-sweetened cereals (Frosted Flakes, Fruit Loops, Coco Pebbles, etc.) served at breakfast?	CCP	94.9 (244)	4.3 (11)	0.78 (2)	<.0001*	<.0001*
	Parent	68.2 (30)	31.8 (14)	0.0 (0)		
were sugar-sweetened drinks served?	CCP	98.4 (7)	0.8 (2)	0.4 (1)	<.0001*	<.0001*
	Parent	86.4 (38)	9.1 (4)	0.0 (0)		
Parent Aware		Yes	No	I Am Not Aware		
Have you used the Parent Aware rating to seek child-care ratings?	CCP	44.7 (113)	54.2 (137)	1.2 (3)	<.0001*	<.0001*
	Parent	18.2 (8)	40.9 (18)	40.9 (18)		

Note. F=Fisher’s exact test CCP=childcare provider

^aNot all respondents answered all the survey questions, resulting in varying number of responses for each question.

*Indicates significance at $p < 0.05$ $F = < 0.05$

Nutrition Attitudes

Fewer parents (89%) believed that if they were overweight they would be more likely to have more health problems like cancer or heart disease. However, more childcare providers (95%) ($p=0.015$) responded correctly to that question. Yet fewer of the childcare providers (62%) believed that “People who are underweight are more likely to have a higher risk of health problems than people who are not underweight” compared to 80% of the parents ($p=0.018$).

Childcare providers reported having a TV in their bedrooms more frequently than parents ($p=0.040$). The childcare providers were actively trying to reduce their weight more so than parents ($p=0.040$) and reported that they weighed too much in comparison to adults their age, more so than parents did ($p=0.003$) (Table 7.5).

Table 7.4

Nutrition and Physical Activity Knowledge of Minnesota Childcare Providers and Parents

Question		Response % (n ^a)			p	F
		Correct	Incorrect	Do Not Know		
Nutrition/Physical Activity Knowledge						
How many total cups of-						
fruits should you eat each day? (≥ 2)	CCP	53.0 (141)	40.2(107)	6.8 (18)	0.014*	0.009*
	Parent	29.5 (18)	59.0 (36)	11.5 (7)		
vegetables should you eat each day? (≥ 2)	CCP	25.8 (69)	68.9 (184)	5.2 (14)	0.001*	<.0001*
	Parent	8.2 (5)	82.0 (50)	9.8 (6)		
Which contains the most calories? (1 g fat)	CCP	45.7 (121)	34.7 (92)	19.6 (52)	0.309	0.269
	Parent	328 (20)	42.6 (26)	24.6 (15)		
From which food group should you eat the-						
most servings each day? (e.g. bread, cereal, rice)	CCP	12.9 (34)	85.6 (226)	1.5 (4)	0.276	0.233
	Parent	13.3 (8)	81.7 (49)	5.0 (3)		
fewest servings each day? (fats, oil, sweets)	CCP	81.0 (217)	18.3 (49)	0.8 (2)	0.059	0.080
	Parent	88.5 (54)	6.6 (5)	4.9 (3)		
What is the recommended amount of calories from fat? (35%)	CCP	7.5 (20)	92.5 (247)		0.024*	0.017*
	Parent	3.3 (2)	88.0 (59)			
Experts recommend that children should-						
be physically active for at least how many minutes per day? (60 minutes)	CCP	60.9 (156)	35.5 (91)	3.5 (9)	0.828	0.749
	Parent	58.3 (35)	35.0 (21)	6.7 (4)		
engage in no more than how many hours of media-related activities, per day? (2 hours)	CCP	16.1 (41)	81.29 (207)	2.8 (7)	<.0001*	<.0001*
	Parent	0.0 (0)	100.0 (60)	0.0 (0)		
be physically active on how many days per week? (7 days)	CCP	91.4 (234)	7.8 (20)	0.8 (2)	0.051	0.065
	Parent	88.3 (53)	8.3 (5)	3.3 (2)		
Do you use MyPyramid or ChooseMyPlate?	CCP	42.6 (115)	49.6 (134)	7.8 (21)	<.0001*	1.765E-09*
	Parent	6.6 (4)	67.2 (41)	26.2 (16)		

Note. F=Fisher's exact test CCP=childcare provider

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

*Indicates significance at $p < 0.05$ $F < 0.05$

Table 7.5

Nutrition-Related Attitudes and Weight-Related Behaviors of Minnesota Childcare Providers and Parents

Question		Response % (n ^a)			p	F
		True	False	Do Not Know		
People who are overweight are more likely to have a higher risk of health problems like cancer or heart disease than people who are not overweight.	CCP	91.0	7.9	1.1	0.145	0.195
	Parent	98.4	1.6	0.0		
If I am overweight I am more likely to make more health problems like cancer or heart disease.	CCP	95.5	3.0	1.5	0.015*	0.023*
	Parent	88.5	3.3	8.2		
People who are underweight are more likely to have a higher risk of health problems than people who are not underweight.	CCP	61.7	17.7	20.7	0.018*	0.018*
	Parent	80.3	11.5	8.2		
The foods that I usually eat and drink are healthy so there is no reason for me to make changes.	CCP	58.4	39.3	2.3	0.230	0.318
	Parent	52.5	47.5	0.0		
Healthy food tastes good.	CCP	13.2	68.3	18.5	0.914	0.865
	Parent	14.8	65.6	19.7		
Do you have a TV in your bedroom?	CCP	64.2	35.9		<.0001*	<.0001*
	Parent	4.9	95.1			
Weight-related Behaviors						
Which of the following are you doing about your weight?	CCP	73.33	13.7	0.4	0.040*	0.028*
	Parent	55.0	23.3	0.0		
Compared to other adults your age, who are as tall as you, do you think you weigh:	CCP	68.8	29.3	1.9	0.003*	0.004*
	Parent	48.3	51.7	0.0		

Note. F=Fisher's exact test CCP=childcare provider

^a Not all respondents answered all the survey questions, resulting in varying number of responses for each question.

*Indicates significance at $p < 0.05$ $F < 0.05$

Discussion

The aim of this study was to assess the difference in nutrition knowledge, attitude, and behavior between MN Licensed childcare providers and the parents of preschoolers they serve. Despite widespread use of childcare providers and a high prevalence of overweight and obese preschool-age children, MN lacks strong regulations for childcare settings related to healthy eating and physical activity. This study-identified the need for improving the nutritional knowledge for both childcare providers and even more so for the parents. It also highlighted the need for parents to improve their nutritional offerings to the preschoolers.

A reduction in misconceptions was associated with improved feeding practices amongst childcare providers (Lanigan, 2012), and this could be true for parents also. Parents were offering up to two servings of sweetened beverages in the past week to their preschoolers. Research identifies that parents believe some sugary drinks such as sports drinks, flavored waters, and fruit drinks are healthy options for children (Munsell, Harris, Sarda, & Schwartz, 2016). Childcare providers who participate in CACFP must serve low-fat or nonfat milk to children aged two years and older, and drinking water must be made available throughout the day; however, there are no restrictions on 100% juice, flavored milk, or other sugar-sweetened beverages. Environmental factors that influence children's dietary consumption are availability and accessibility of foods (Busick, Brooks, Pernecky, Dawson, & Petzoldt, 2008; Pearson, Biddle, & Gorely, 2009).

Childhood obesity prevention guidelines for physical activity and healthy eating have been established and endorsed by the American Academy of Pediatrics (Gidding, Dennison, Birch, Daniels, Gilman, Lichtenstein, Van Horn, 2006; Strasburger, Hogan, Mulligan, Ameenuddin, Christakis, Cross, McCarthy, 2013). The recommendations are summarized as the

5,2,1,0 guidelines (Let's Go, 2015). Eat at least 5 servings of fruits and vegetables per day, limit screen time to less than 2 hours per day, get at least 60 minutes per day of moderate to vigorous physical activity and consume 0 sugar sweetened beverages. In this study, childcare providers understood and reported that the preschoolers were supported in all four recommended guidelines. However, only two of the four guidelines were known and supported by parents.

Improved nutrient quality occurs when fruits and vegetables are added to the diet (Aljadani et al., 2013; Hung et al., 2004). This study finds that while childcare providers reported a slightly higher daily intake of fruits and vegetables compared to parents, daily both offered fruits and vegetables to the preschoolers at a similar frequency. Parental intake and home availability/accessibility of fruits and vegetables have been positively associated with increased consumption amongst children (Rasmussen et al., 2006).

The child feeding relationship has become a shared responsibility between the parents and child-care providers. Both need to send a consistent message verbally with what they say and physically by what they offer and do. Childcare educators and parents are important role models for developing children's healthy lifestyle behaviors. And their involvement in offering healthy food and physical activity contribute to healthier children.

Fewer parents than childcare providers believed that if they were overweight they would be more likely to have health problems like cancer or heart disease. However, fewer of the childcare providers believed that "People who are underweight are more likely to have a higher risk of health problems than people who are not underweight" compared to 80% of the parents. This could present a challenge for parents and childcare providers agreeing on how best to care for an overweight or underweight child.

Nutrition and physical activity behaviors formed during the preschool years have a strong potential to prevent long-term unhealthy weight status. Since the majority of US parents and childcare providers depend on each other to provide nutritious food and adequate physical activity, well-designed studies evaluating modifiable factors within the childcare facility and home environment can enhance the current childhood obesity literature and recommendations. The goal is to implement successful healthy eating behaviors in preschoolers. Early prevention may be the most promising strategy for reducing problems with weight and obesity and the associated health conditions that result with excessive weight gain during childhood.

Limitations of the study include that parents were used as the child's proxy to obtain anthropometric measurements, which may have introduced some social desirability bias (Natale et al., 2014a). To support accuracy in measurements, instructions were provided. Another limitation was collecting self-reported anthropometric data from the childcare provider and parents. However, research from Craig et al. shows significant agreement between self-reported and measured height and weight in adult US women (Craig and Adams, 2009). In addition, the results found in the state of MN may not be generalizable to other areas or populations. Also, using e-mail limits the sample size, and creates bias by recruiting only providers and parents with e-mail. Of those who agreed to participate, they may have had self-selection bias towards a greater focus on nutrition, physical activity and obesity than those who declined participation. This may not accurately represent MN licensed childcare providers and or exaggerate particular findings in the study (Rosenthal, 1965). For example, according to national survey data, the risk of being overweight and obese varies across sex, age, and race (Ogden, et al., 2014). Last, even though the survey was validated for use among low-income, minority children at the fourth-

grade reading level (Penkilo, George, & Hoelscher, 2008) it was not validated in the childcare provider population.

Additional research is needed to advance obesity prevention efforts in childcare and home settings. To better promote the health of future generations, well-designed studies evaluating modifiable factors within the childcare facility and home environment will enhance the current understanding of childhood obesity and improve the current recommendations and success of implementation of the guidelines.

CHAPTER 8. SUMMARY

Overall, assessing the nutritional knowledge, attitude and behavior of MN licensed childcare providers and preschoolers' parents, proved interesting. Considerable research has been gathered on the recommendations for best practice in obesity prevention for preschoolers in childcare and home environments. In fact, prior studies have documented the need for further obesity prevention education for childcare providers (Sharma et al., 2013; Lanigan, 2012) and parents (Zarnowiecki et al., 2011). However, these studies have looked at the knowledge of the childcare provider or parent as a separate group and have not compared the difference between groups. In this study we assessed the potential impact of nutrition education courses adopted by Minnesota's Parent Aware on nutrition-related knowledge, attitudes, and behaviors amongst childcare providers who participate (intervention group) and those who did not participate in Parent Aware (control group), and compared MN licensed childcare providers to preschoolers' parents using a 75 and 86-item questionnaire, respectively. Last we looked to see if there was a difference in BMI of the intervention and control group.

In this study we found that virtually in all cases, there were few differences between the control and intervention group for nutrition knowledge. One possible explanation is that 85% of the childcare providers reported having three or more hours of nutrition education in the past two years, providing a greater depth of knowledge than the preschoolers' parents may have. In fact, this may reflect the value childcare providers place on nutrition education even without strong regulation. However, similar to other studies childcare providers overall need additional nutrition education.

There was a difference in BMI amongst the childcare providers who reported being the intervention group and the control group. The intervention group had more childcare providers

classified in the obese I category than the control group. This could be related to the fact that significantly more childcare providers in the control group reported that “healthy food taste good.” Previous studies have suggested that taste is the most important influence on their food choice, followed by cost. Taste and cost are above nutrition and weight control except for those who place a significant value on nutrition and weight control (Glanz, Basil, Maibach, Goldberg, & Snyder, 1998).

The focus on health may predict the consumption of fruits and vegetables (Glanz et al., 1998). Increasing fruits and vegetables is one of the obesity prevention recommendations. The intervention group and control group reported consumption of fruits and vegetables greater than the average consumption in the state of MN for adults (Center for Disease Control and Prevention, 2013). These results are supported by two additional findings: 1) the majority of childcare providers reported participating in the CACFP program, which requires fruits and vegetables be offered to preschoolers, and 2) childcare providers reported consuming lunch and breakfast with the preschoolers, another recommendation of the CACFP. This highlights the benefits of the CACFP for the preschoolers and the childcare providers.

Eating with the preschoolers also provides an opportunity to encourage them to try new foods (Addessi et al., 2005). Furthermore, it provides an opportunity for the childcare provider to model positive eating behaviors, allowing the preschoolers to observe positive eating behaviors, which may influence their own food preferences and behaviors later in life (Birch and Fisher, 1998; Nicklas et al., 2001). When childcare providers fail to eat meals with preschoolers, they miss an opportunity to model positive eating behaviors, which can influence the preschoolers’ eating habits.

There are several possible reasons for no significant differences in nutrition related

knowledge, attitude, and behavior between the intervention and control group. One reason may be simply the study was not randomized and was of a convenience sample. Second, as previously mentioned the majority of childcare providers have had nutrition education. Last, there may be a cultural shift in overall awareness of health practices within the community.

In terms of comparison of MN licensed childcare providers and preschoolers' parents, we found there was a significant lack of nutrition knowledge for both groups even though the majority of childcare providers who participated in this study reported having three hours or more of nutrition education in the past two years, participating in the CACFP and reported using ChooseMyPlate or MyPyramid. This suggests that childcare providers and parents have an elementary level understanding of nutrition. Future work in improving nutrition education and a means of implementing it will be of great value since childcare providers and parents are responsible for providing nutrition and physical activity to preschool children. In fact Zarnowiecki et al., found that a parent's level of nutritional knowledge and attitude predicts the young child's nutrition knowledge and dietary intake (2011). In contrast to our study, Hart, Damiano, Cornell, & Paxton, reported that parents understand health nutrition recommendations for their preschoolers, but lack the understanding of how to actively implement the recommendations (2015). Our study implies that parents were implementing the recommendations but lacked the understanding. Although, if childcare providers and parents do not have sufficient nutrition and physical activity understanding, it is highly improbable that they will intentionally implement evidence based childhood obesity prevention recommendations. Also, having the knowledge to implement healthy nutrition recommendations does not always carry through to a change in behavior (Freedman & Alvarez, 2010). Further work is needed to identify what type of education would create behavior change amongst childcare providers and

preschooler parents.

In this study parents offered the preschooler sugar-sweetened cereal, and sweetened beverages, including sports drinks more often than the childcare providers, and childcare providers offer skim milk or non-fat milk more frequently than parents. The nutritional guidelines for CACFP participants require childcare providers to offer skim or 1% milk for reimbursement and do not reimburse sugary drinks or cereal.

In addition, research identifies that parents believe some sugary drinks such as sports drinks, flavored waters and fruit drinks are healthy options for children (Munsell et al., 2016). This supports our data noting that parents are more likely to have had a sugar-sweetened beverage than the childcare provider. Moreover, only a third of childcare providers and parents reported drinking five or more cups or bottles of water the previous day. This means that two-thirds of the childcare providers may not be modeling healthy beverage choices and/or are not having water readily available. Modeling drinking and having water readily available will support children in drinking the daily fluid recommendations.

There was no difference in BMI between childcare providers and preschoolers' parents. However, a great number of childcare providers in this study stated they were also actively pursuing weight loss compared to preschoolers' parents. Childcare providers who calorically restrict for weight management may also change how they feed a child they have weight concerns about (Dev et al., 2014). That could be harmful for the preschooler. Hence, a childcare provider may need support attending to their health problems. The expert consensus on priorities for obesity prevention research in childcare emphasized the need to address staff's own health challenges (Ward et al., 2013).

Our findings support the Feeding Infants and Toddler Study of 2008, which reported that most (79%) preschoolers in the U. S. were involved in an athletic activity or played outside one or more hours a day, while one-fourth watched over two hours of screen time per day (Briefel et al., 2015). Since children who are physically active are at a lower risk of excessive weight gain (Hesketh and Campbell, 2010; Waters et al., 2014), it will be important to assess the preschooler's play environment and the childcare provider's physical activity policy regarding how they impact physical activity preschoolers obtain when they are at the childcare facilities.

Head Start facilities identified challenges such as lack of time, money, and knowledge for implementing childhood obesity prevention guidelines (Hughes, Gooze, Finkelstein, & Whitaker, 2010). However, a recent study has reported that preschool children from the Michigan area who were at an unhealthy weight and participated in Head Start obtained a healthier weight prior to entering kindergarten in comparison to children in the primary health care system (Lumeng, Kaciroti, Sturza, Krusky, Miller, Peterson, Reischl, 2015). This may be the result of Head Start following the nutrition guidelines recommendations of the Academy of Nutrition and Dietetics as well as the required CACFP guidelines. Furthermore, Head Start facilities also support physical activity and prohibit television viewing, which are all recommended strategies for obesity prevention. Head Start reported positive results in developmental outcomes in children from low-income families. This is further supported by research that shows good nutritional status (Rampersaud et al., 2005) and adequate physical activity (Chomitz et al., 2009) has positive benefits on academic performance.

The results of this study challenge the assumption that a childcare provider who is a member of the Parent Aware has greater nutrition knowledge compared to the childcare provider who does not participate in Parent Aware. This preliminary study helps to identify and adds to

the literature by being the first to report the impact nutrition education accepted by the Parent Aware has on MN childcare providers' nutrition related knowledge, attitudes and behaviors compared to childcare providers who are not part of Parent Aware. There is evidence that additional nutrition support and education is needed for childcare providers. Further research is needed to identify how to best improve the knowledge and behavior of childcare providers and parents of preschoolers to ensure their ability to model health behaviors to their preschoolers. Providers need support through education that helps them develop easy and effective strategies to assist parents in also supporting and implementing healthy eating and activity behaviors at home. Another intervention is to identify if the preschooler's play environment and the childcare provider's physical activity policy impact the physical activity preschoolers obtain when they are at the childcare facility.

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APPENDIX A. E-MAIL LETTER TO CHILDCARE PROVIDERS

Dear Childcare Providers and Parents of Preschool Age Children,

My name is Rose Prissel, a registered dietitian in MN pursuing a Master's in the Department of Health, Nutrition, and Exercise Sciences at North Dakota State University. I am seeking childcare providers and parents of preschool age children (3-5 years old) who are willing to complete a 5-10 minute survey today and again in 6 months. The survey responses will be kept confidential; only the researcher who analyzes the responses will view it.

The survey will ask questions regarding your nutritional knowledge, behavior and attitude; and dietary intake and physical activity.

If you decide to participate, click on the informed consent link. (Insert consent form link)

If you are the childcare provider please forward this e-mail to parents of preschool age children that you care for and click on the Childcare Provider survey link.

Childcare provider survey

If you are the parent of a preschooler, who is in the care of this childcare provider whom forward this letter, click on the Parent survey link.

Parent survey

If you decide not to participate, please delete this e-mail.

Thank you for your time and support.

Respectfully,

Rose Prissel, RDN, CSSD, LD
Master's Candidate
North Dakota State University
Health, Nutrition, and Exercise Sciences
Fargo, ND 58108-6050
RosePrissel.RND.LD@gmail.com
507-269-4581

Yeong Rhee, Ph.D. R.D.
Professor, Health, Nutrition, and Exercise Sciences
North Dakota State University
E. Morrow Lebedeff Hall 351
Phone: 701-231-7476
Yeong.rhee@ndsu.edu

APPENDIX B. CHILDCARE PROVIDER QUESTIONNAIRES

SPAN Child Care Provider Survey

Today's date: _____

Anthropometrics

1. How tall do you think you are? (If unsure, give your best guess)
 - a. Feet: _____ Inches: _____
2. How much do you think you weigh? (If unsure, give your best guess)
 - a. Pounds: _____

Demographics

1. Your age: _____
2. Your sex:
 - a. Male
 - b. Female
3. How do you best describe yourself?
 - a. Black or African-American
 - b. Mexican-American, Latino or Hispanic
 - c. White, Caucasian or Anglo
 - d. Vietnamese
 - e. Chinese
 - f. Indian or Pakistani
 - g. Other Asian
 - h. American Indian or Alaska Native
 - i. Native Hawaiian or Other Pacific Islander
 - j. Other: (type in other) _____
4. What is your zip code? _____

Behavior-Diet 24-Hour Recall

The next questions are about what you ate or drank YESTERDAY.

1. Yesterday, how many times did you eat hamburger meat, hot dogs, sausage (chorizo), steak, bacon, or ribs?
 - a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times

- e. 4 times
 - f. 5 or more times
2. Yesterday, how many times did you eat fried chicken, chicken nuggets, chicken fried steak, fried pork chops, fried fish or fish sticks?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
3. Yesterday, how many times did you eat peanuts or peanut butter, or other nuts such as pecans, walnuts or almonds?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
4. Yesterday, how many times did you eat any kind of cheese, cheese spread, or cheese sauce? (Include cheese on pizza or in dishes such as tacos, enchiladas, lasagna, sandwiches, cheeseburgers, or macaroni and cheese)
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
5. Yesterday, how many times did you drink any kind of milk? (Include chocolate or other flavored milk, milk on cereal, and drinks made with milk.)
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
6. Yesterday, how many times did you eat yogurt or cottage cheese or drink a yogurt drink?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times

- f. 5 or more times
7. Yesterday, how many times did you eat brown rice, farro, macaroni, spaghetti, or pasta noodles?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
8. Yesterday, how many times did you eat white bread, buns, bagels, tortillas, or rolls?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
9. Yesterday, how many times did you eat whole wheat or dark bread, buns, bagels, tortillas, or rolls; or corn tortilla?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
10. Yesterday, how many times did you eat hot or cold cereal?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
11. Yesterday, how many times did you eat French fries or chips? (Include potato chips, tortilla chips, Cheetos®, corn chips, or other snack chips.)
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times

12. Yesterday, how many times did you eat any starchy vegetables like potatoes, corn, or peas?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
13. Yesterday, how many times did you eat any orange vegetables like carrots, squash, or sweet potatoes?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
14. Yesterday, how many times did you eat a salad made with lettuce or any green vegetables like spinach, green beans, broccoli, or other greens?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
15. Yesterday, how many times did you eat any other vegetables like peppers, tomatoes, zucchini, asparagus, cabbage, cauliflower, cucumbers, mushrooms, eggplant, celery, or artichokes?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
16. Yesterday, how many times did you eat beans such as pinto beans, baked beans, kidney beans, refried beans, or pork and beans?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times

17. Yesterday, how many times did you eat fruit? (Fruits are all fresh, frozen, canned, or dried fruits. Do not count 100% fruit juice.)
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
18. Yesterday, how many times did you drink fruit juice? Fruit juice is a 100% juice drink like orange juice, apple juice, or grape juice. (Do not count punch, Kool-Aid®, sports drinks, or other fruit-flavored drinks.)
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
19. Yesterday, how many times did you drink any punch, Kool-Aid®, sports drinks, or other fruit-flavored drinks? (Do not count 100% fruit juice.)
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
20. Yesterday, how many times did you drink any diet sodas or soft drinks?
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
21. Yesterday, how many times did you drink a bottle of glass of water? (Include sparkling or any other water drink that has 0 calories.)
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times

22. Yesterday, how many times did you drink a cup, bottle or can of coffee, tea, iced tea, or a coffee drink like Frappuccino®?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
23. Yesterday, how many times did you eat a frozen dessert? (A frozen dessert is a cold, sweet food like ice cream, frozen yogurt, an ice cream bar, or a Popsicle®.)
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
24. Yesterday, how many times did you eat sweet rolls, doughnuts, cookies, brownies, pies, or cakes?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
25. Yesterday, how many times did you eat any candy? (Count chewy, gummy, hard, or chocolate candy. Do not count brownies, chocolate cookies, or gum.)
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
26. Yesterday, how many times did you eat food from any type of restaurant? (Restaurants include fast food, sit-down restaurants, pizza places, and coffee shops.)
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times

27. Yesterday, how many times did you eat or drink a snack? (A snack is any food or beverage that you eat or drink before, after, or between meals.)
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
28. Yesterday, how many times did you eat a meal?
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
29. What type of milk do you usually drink? (Fill in only one)
- Regular (whole) milk
 - 2% milk
 - 1% (low-fat) or fat-free (skim/non-fat) milk
 - Soy milk, almond milk, rice milk, or other milk
 - I don't drink milk
 - I don't know

Behavior-Meal Time

- Where do you usually eat or drink something for breakfast?
 - With the children
 - Away from the children
 - I don't usually eat breakfast
- Where do you usually eat or drink something for lunch?
 - With the children
 - Away from the children
 - I don't usually eat lunch
- Do you usually eat an evening meal?
 - Yes, I usually eat an evening meal that is homemade
 - Yes, I usually eat an evening meal at home that is not homemade (frozen pizza, microwave meal, etc.)
 - Yes, I usually eat an evening meal from a fast food restaurant
 - Yes, I usually eat an evening meal from a sit-down restaurant or pizza place
 - Yes, I usually eat an evening meal from a place other than home or a restaurant
 - No, I don't usually eat an evening meal

4. **During the past 7 days**, how many times did you watch TV while eating an evening meal?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

5. **During the past 7 days**, how many times did you eat a meal from a sit-down or fast food restaurant?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

Knowledge-Nutrition

1. Do you use MyPyramid or Choose MyPlate?
 - a. Yes
 - b. No
 - c. I do not know what MyPyramid or Choose MyPlate is

2. How many total cups of fruits should you eat each day?
 - a. At least 2 cups
 - b. At least 3 cups
 - c. At least 4 cups
 - d. At least 5 cups
 - e. I don't know

3. How many total cups of vegetables should you eat each day?
 - a. At least 2 cups
 - b. At least 3 cups
 - c. At least 4 cups
 - d. At least 5 cups
 - e. I don't know

4. Which contains the most calories?
 - a. One gram of protein
 - b. One gram of fat
 - c. One gram of carbohydrate
 - d. I don't know

5. From which food group should you eat most servings each day? Choose only one group.
 - a. Breads, cereals, rice pasta
 - b. Fruits
 - c. Dairy products
 - d. Fats, oil, sweets
 - e. Vegetables
 - f. Meat, beans, eggs, nuts
 - g. Don't know

6. From which food group should you eat the fewest servings each day? Choose only one group.
 - a. Breads, cereals, rice pasta
 - b. Fruits
 - c. Dairy products
 - d. Fats, oil, sweets
 - e. Vegetables
 - f. Meat, beans, eggs, nuts
 - g. Don't know

7. What is the recommended amount of calories from fat that you should get from the foods you eat?
 - a. Not more than 10%
 - b. Not more than 20%
 - c. Not more than 25%
 - d. Not more than 30%
 - e. Not more than 35%

Attitude

1. What you eat can make a difference in your chances of getting heart disease or cancer.
 - a. True
 - b. False
 - c. Don't know

2. Skipping meals such as breakfast or lunch affects my ability to do well through the day.
 - a. Agree
 - b. Neither agree nor disagree
 - c. Disagree

3. I think that learning about the relationship between food and health is important for me to know.
 - a. Agree
 - b. Neither agree nor disagree
 - c. Disagree

4. I think that learning about the relationship between physical activity and health is important for me to know.
 - a. Agree
 - b. Neither agree nor disagree
 - c. Disagree

5. I am willing to try new foods.
 - a. Almost always or always
 - b. Sometimes
 - c. Almost never or never

6. The foods that I usually eat and drink are healthy so there is no reason for me to make changes.
 - a. Yes, all of the time
 - b. Yes, some of the time
 - c. Yes, most of the time
 - d. Never

Belief

1. People who are overweight are more likely to have a higher risk of health problems like cancer or heart disease than people who are not overweight.
 - a. True
 - b. False
 - c. Don't know

2. People who are underweight are more likely to have a higher risk of health problems than people who are not underweight.
 - a. True
 - b. False
 - c. Don't know

3. Healthy food tastes good.
 - a. Yes, all of the time
 - b. Yes, some of the time
 - c. Yes, most of the time
 - d. Never

Behavior-Physical Activity

1. During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.)
 - a. 0 days
 - b. 1 days
 - c. 2 days

- d. 3 days
 - e. 4 days
 - f. 5 days
 - g. 6 days
 - h. 7 days
2. On how many of the past 7 days did you do exercises to strengthen or tone your muscles, such as push-ups, sit-ups, or weight lifting?
- a. 0 days
 - b. 1 days
 - c. 2 days
 - d. 3 days
 - e. 4 days
 - f. 5 days
 - g. 6 days
 - h. 7 days
3. How many hours per day do you usually watch TV, DVDs, or movies?
- a. My child does not do any of the above activities
 - b. Less than 1 hour
 - c. 1 hour
 - d. 2 hours
 - e. 3 hours
 - f. 4 hours
 - g. 5 hours
 - h. 6 hours or more
4. How many hours per day do you usually spend on a computer away from work? (Time on the computer includes time spent surfing the Internet instant messaging, and playing online video or computer games.)
- a. I don't use a computer
 - b. Less than 1 hour
 - c. 1 hour
 - d. 2 hours
 - e. 3 hours
 - f. 4 hours
 - g. 5 hours
 - h. 6 hours or more
5. Do you have a TV in your bedroom?
- a. Yes
 - b. No

Behavior-Weight

1. In the past 12 months, have you tried to lose weight?
 - a. Yes
 - b. No

2. Which of the following are you trying to do about your weight?
 - a. Lose weight
 - b. Stay the same weight
 - c. Gain weight
 - d. I am not trying to do anything about my weight

3. Compared to other adults your age, who are as tall as you, do you think you weigh:
 - a. Too much
 - b. The right amount
 - c. Too little (or not enough)

Behavior-Nutrition Offerings-Preschooler's

1. **During the past 7 days, how many times to your preschooler** were fresh/frozen vegetables served at meals or snacks?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

2. **During the past 7 days, how many times to your preschooler** were fresh/frozen fruits served at meals or snacks?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

3. **During the past 7 days, how many times to your preschooler** was skim or non-fat milk served at meals or snacks?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

4. **During the past 7 days, how many times to your preschooler** was 100% whole-wheat or whole-grain bread or tortillas served at meals or snacks?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

5. **During the past 7 days, how many times to your preschooler** was sugar-sweetened cereals (Frosted Flakes, Fruit Loops, Coco Pebbles, etc.) served at breakfast?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

6. **During the past 7 days, how many times to your preschooler** were sugar-sweetened drinks served?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

Knowledge-Physical Activity-Preschooler's

1. Experts recommend that children should be physically active for at least how many minutes per day?
 - a. At least 10 minutes
 - b. At least 20 minutes
 - c. At least 30 minutes
 - d. At least 60 minutes
 - e. At least 90 minutes
 - f. I don't know

2. Experts recommend that children engage in no more than how many hours of media-related activities, such as TV watching and video game playing, per day?
 - a. 1 hour
 - b. 2 hours
 - c. 3 hours
 - d. 4 hours
 - e. 5 hours
 - f. 6 hours
 - g. I don't know

3. Experts recommend that children should be physically active on how many days per week?
 - a. 0 days
 - b. 1 day
 - c. 2 days
 - d. 3 days
 - e. 4 days
 - f. 5 days
 - g. 6 days
 - h. 7 days
 - i. I don't know

Nutrition Education

1. Do you participate in the Child and Adult Care Food Program (CACFP)?
 - a. Yes
 - b. No
 - c. I do not know what CACFP is

2. Have you had in the past 2 years a total of 3 hours or more of nutrition education through a workshop, in-service nutrition, school course, and or on-line courses?
 - a. Yes
 - b. No
 - c. I don't know

Parent Aware

1. Have you used the Parent Aware rating to seek child-care ratings?
 - a. Yes
 - b. No
 - c. I am not familiar with Parent Aware

Thank you for your participation!

Questions adapted from: 2009 SPAN Project, University of Texas Health Science Center at Houston, School of Public Health; 2001 PACE, San Diego State University

APPENDIX C. PARENT QUESTIONNAIRE

SPAN Parent Survey

Today's date: _____

Anthropometrics

1. How tall do you think you are? (If unsure, give your best guess)
 - a. Feet: _____ Inches: _____
2. How much do you think you weigh? (If unsure, give your best guess)
 - b. Pounds: _____

Demographics

1. Your age: _____
2. Your sex:
 - a. Male
 - b. Female
3. How do you best describe yourself?
 - a. Black or African-American
 - b. Mexican-American, Latino or Hispanic
 - c. White, Caucasian or Anglo
 - d. Vietnamese
 - e. Chinese
 - f. Indian or Pakistani
 - g. Other Asian
 - h. American Indian or Alaska Native
 - i. Native Hawaiian or Other Pacific Islander
 - j. Other: (type in other) _____
4. What is your zip code? _____
5. What is your relationship to the preschooler you are completing the survey for?
 - a. Mother
 - b. Father
 - c. Grandmother
 - d. Grandfather
 - e. Other female adult- biologically related to preschooler
 - f. Other female adult- not biologically related to preschooler
 - g. Other male adult- biologically related to preschooler
 - h. Other male adult- not biologically related to preschooler

6. Who takes care of the children in your household most of the time? (check only one)
 - a. Mother
 - b. Grandmother
 - c. Other female adult- biologically related to preschooler
 - d. Other female adult- not biologically related to preschooler
 - e. Father
 - f. Grandfather
 - g. Other male adult- biologically related to preschooler
 - h. Other male adult- not biologically related to preschooler

Behavior-Diet 24-Hour Recall

The next questions are about what you ate or drank YESTERDAY.

1. Yesterday, how many times did you eat hamburger meat, hot dogs, sausage (chorizo), steak, bacon, or ribs?
 - a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times

2. Yesterday, how many times did you eat fried chicken, chicken nuggets, chicken fried steak, fried pork chops, fried fish or fish sticks?
 - a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times

3. Yesterday, how many times did you eat peanuts or peanut butter, or other nuts such as pecans, walnuts or almonds?
 - a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times

4. Yesterday, how many times did you eat any kind of cheese, cheese spread, or cheese sauce? (Include cheese on pizza or in dishes such as tacos, enchiladas, lasagna, sandwiches, cheeseburgers, or macaroni and cheese)
 - a. None
 - b. 1 time
 - c. 2 times

- d. 3 times
 - e. 4 times
 - f. 5 or more times
5. Yesterday, how many times did you drink any kind of milk? (Include chocolate or other flavored milk, milk on cereal, and drinks made with milk.)
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
6. Yesterday, how many times did you eat yogurt or cottage cheese or drink a yogurt drink?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
7. Yesterday, how many times did you eat brown rice, farro, macaroni, spaghetti, or pasta noodles?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
8. Yesterday, how many times did you eat white bread, buns, bagels, tortillas, or rolls?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
9. Yesterday, how many times did you eat whole wheat or dark bread, buns, bagels, tortillas, or rolls; or corn tortilla?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times

10. Yesterday, how many times did you eat hot or cold cereal?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
11. Yesterday, how many times did you eat French fries or chips? (Include potato chips, tortilla chips, Cheetos®, corn chips, or other snack chips.)
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
12. Yesterday, how many times did you eat any starchy vegetables like potatoes, corn, or peas?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
13. Yesterday, how many times did you eat any orange vegetables like carrots, squash, or sweet potatoes?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times
14. Yesterday, how many times did you eat a salad made with lettuce or any green vegetables like spinach, green beans, broccoli, or other greens?
- a. None
 - b. 1 time
 - c. 2 times
 - d. 3 times
 - e. 4 times
 - f. 5 or more times

15. Yesterday, how many times did you eat any other vegetables like peppers, tomatoes, zucchini, asparagus, cabbage, cauliflower, cucumbers, mushrooms, eggplant, celery or artichokes?
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
16. Yesterday, how many times did you eat beans such as pinto beans, baked beans, kidney beans, refried beans, or pork and beans?
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
17. Yesterday, how many times did you eat fruit? (Fruits are all fresh, frozen, canned, or dried fruits. Do not count 100% fruit juice.)
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
18. Yesterday, how many times did you drink fruit juice? Fruit juice is a 100% juice drink like orange juice, apple juice, or grape juice. (Do not count punch, Kool-Aid®, sports drinks, or other fruit-flavored drinks.)
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
19. Yesterday, how many times did you drink any punch, Kool-Aid®, sports drinks, or other fruit-flavored drinks? (Do not count 100% fruit juice.)
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times

20. Yesterday, how many times did you drink any diet sodas or soft drinks?
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
21. Yesterday, how many times did you drink a bottle of glass of water? (Include sparkling or any other water drink that has 0 calories.)
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
22. Yesterday, how many times did you drink a cup, bottle or can of coffee, tea, iced tea, or a coffee drink like Frappuccino®?
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
23. Yesterday, how many times did you eat a frozen dessert? (A frozen dessert is a cold, sweet food like ice cream, frozen yogurt, an ice cream bar, or a Popsicle®.)
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
24. Yesterday, how many times did you eat sweet rolls, doughnuts, cookies, brownies, pies, or cakes?
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times

25. Yesterday, how many times did you eat any candy? (Count chewy, gummy, hard, or chocolate candy. Do not count brownies, chocolate cookies, or gum.)
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
26. Yesterday, how many times did you eat food from any type of restaurant? (Restaurants include fast food, sit-down restaurants, pizza places, and coffee shops.)
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
27. Yesterday, how many times did you eat or drink a snack? (A snack is any food or beverage that you eat or drink before, after, or between meals.)
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
28. Yesterday, how many times did you eat a meal?
- None
 - 1 time
 - 2 times
 - 3 times
 - 4 times
 - 5 or more times
29. What type of milk do you usually drink? (Fill in only one)
- Regular (whole) milk
 - 2% milk
 - 1% (low-fat) or fat-free (skim/non-fat) milk
 - Soy milk, almond milk, rice milk, or other milk
 - I don't drink milk
 - I don't know

Behavior-Mealtime

1. **During the past 7 days**, how many times did you eat breakfast?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

2. **During the past 7 days**, how many times did you eat an evening meal together with your preschooler?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

3. **During the past 7 days**, how many times did you watch TV while eating an evening meal?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

4. **During the past 7 days**, how many times did you eat a meal from a sit-down or fast food restaurant?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

Knowledge-Nutrition

1. Do you use MyPyramid or Choose MyPlate?
 - a. Yes
 - b. No
 - c. I do not know what MyPyramid or Choose MyPlate is

2. How many total cups of fruits should you eat each day?
 - a. At least 2 cups

- b. At least 3 cups
 - c. At least 4 cups
 - d. At least 5 cups
 - e. I don't know
3. How many total cups of fruits should your **preschooler** eat each day?
- a. At least 2 cups
 - b. At least 3 cups
 - c. At least 4 cups
 - d. At least 5 cups
 - e. I don't know
4. How many total cups of vegetables should you eat each day?
- a. At least 2 cups
 - b. At least 3 cups
 - c. At least 4 cups
 - d. At least 5 cups
 - e. I don't know
5. How many total cups of vegetables should your **preschooler** eat each day?
- a. At least 2 cups
 - b. At least 3 cups
 - c. At least 4 cups
 - d. At least 5 cups
 - e. I don't know
6. Which contains the most calories?
- a. One gram of protein
 - b. One gram of fat
 - c. One gram of carbohydrate
 - d. I don't know
7. From which food group should you eat most servings each day? Choose only one group.
- a. Breads, cereals, rice pasta
 - b. Fruits
 - c. Dairy products
 - d. Fats, oil, sweets
 - e. Vegetables
 - f. Meat, beans, eggs, nuts
 - g. Don't know
8. From which food group should you eat the fewest servings each day? Choose only one group.
- a. Breads, cereals, rice pasta
 - b. Fruits
 - c. Dairy products

- d. Fats, oil, sweets
 - e. Vegetables
 - f. Meat, beans, eggs, nuts
 - g. Don't know
9. What is the recommended amount of calories from fat that you should get from the foods you eat?
- a. Not more than 10%
 - b. Not more than 20%
 - c. Not more than 25%
 - d. Not more than 30%
 - e. Not more than 35%

Attitude

1. What you eat can make a difference in your chances of getting heart disease or cancer.
 - a. True
 - b. False
 - c. Don't know
2. Skipping meals such as breakfast or lunch affects my ability to do well through the day.
 - a. Agree
 - b. Neither agree nor disagree
 - c. Disagree
3. I think that learning about the relationship between food and health is important for me to know.
 - a. Agree
 - b. Neither agree nor disagree
 - c. Disagree
4. I think that learning about the relationship between physical activity and health is important for me to know.
 - a. Agree
 - b. Neither agree nor disagree
 - c. Disagree
5. I am willing to try new foods.
 - a. Almost always or always
 - b. Sometimes
 - c. Almost never or never
6. The foods that I usually eat and drink are healthy so there is no reason for me to make changes.
 - a. Yes, all of the time
 - b. Yes, some of the time

- c. Yes, most of the time
- d. Never

Belief

1. People who are overweight are more likely to have a higher risk of health problems like cancer or heart disease than people who are not overweight.
 - a. True
 - b. False
 - c. Don't know
2. People who are underweight are more likely to have a higher risk of health problems than people who are not underweight.
 - a. True
 - b. False
 - c. Don't know
3. Healthy food tastes good.
 - a. Yes, all of the time
 - b. Yes, some of the time
 - c. Yes, most of the time
 - d. Never

Behavior-Physical Activity

1. Are you physical active?
 - a. Never
 - b. Yes, some of the time
 - c. Yes, most of the time
 - d. Yes, all of the time
 - e. I have a disability or health condition that prevents me from being physically active
2. I am physically active with my preschooler. (Examples: running, jogging, walking fast, bike riding, swimming, dancing, or skating)
 - a. Never
 - b. Yes, some of the time
 - c. Yes, most of the time
 - d. Yes, all of the time
 - e. My preschooler has a disability or health condition that prevents me from being physically active
 - f. I have a disability or health condition that prevents me from being physically active
3. I watch my preschooler when he/she is being physically active.
 - a. Never

- b. Yes, some of the time
 - c. Yes, most of the time
 - d. Yes, all of the time
 - e. My preschooler has a disability or health condition that prevents me from being physically active
4. Does your preschooler have a TV in his/her bedroom?
- a. Yes
 - b. No

Behavior Weight

1. Which of the following are you trying to do about your weight?
- a. Lose weight
 - b. Stay the same weight
 - c. Gain weight
 - d. I am not trying to do anything about my weight
2. Compared to other adults your age, who are as tall as you, do you think you weigh:
- a. Too much
 - b. The right amount
 - c. Too little (or not enough)

Anthropometrics-Preschooler's

If you have height and weight measurements taken within the past 3 weeks by a healthcare provider, enter those measurements and the date the measurements were taken.

If you take height and weight measurements at home, follow these guidelines:

- Measuring Height Accurately At Home
- Measuring Weight Accurately At Home

How tall is your preschooler?
Feet _____ Inches _____

How much does your preschooler weigh?
Pounds _____

Demographics-Preschooler's

1. What is the sex of your preschooler?
- a. girl
 - b. boy
2. Your preschooler's age:
- a. 3 years old

- b. 4 years old
 - c. 5 years old
3. How do you best describe your preschooler?
- a. Black or African-American
 - b. Mexican-America, Latino or Hispanic
 - c. White, Caucasian or Anglo
 - d. Vietnamese
 - e. Chinese
 - f. Indian or Pakistani
 - g. Other Asian
 - h. American Indian or Alaska Native
 - i. Native Hawaiian or Other Pacific Islander
 - j. Other: (type in other)_____

Attitude-Preschooler's

1. On most days what does your preschooler do when she or he has a choice about how to spend leisure/free time?
- a. Almost always chooses activities like TV, reading, listening to music, computers or video games
 - b. Usually chooses activities like TV, reading, listening to music, computers or video games
 - c. Just as likely to choose active as inactive activities
 - d. Usually chooses activities like bicycling, dancing, outdoor games, or active sports
 - e. Almost always chooses activities like bicycling, dancing, outdoor games, or active sports
2. If the weather is good, I encourage my preschooler to play outside.
- a. Strongly disagree
 - b. Somewhat disagree
 - c. Neutral
 - d. Somewhat agree
 - e. Strongly agree

Belief-Preschooler's

1. My preschooler does enough physical activity to maintain a good health and fitness.
- a. Strongly disagree
 - b. Somewhat disagree
 - c. Neutral
 - d. Somewhat agree
 - e. Strongly agree

Behavior-Physical Activity-Preschooler's

1. Does your preschooler have any medical conditions or disabilities (e.g. asthma) that limit his/her physical activity?
 - a. No
 - b. Yes
 - c. Yes, but controlled with medicine

2. On most days how many hours per day does your preschooler spend on the computer, watching TV, and playing video games?
 - a. My child does not do any of the above activities
 - b. Less than 1 hour
 - c. 1 hour
 - d. 2 hours
 - e. 3 hours
 - f. 4 hours
 - g. 5 hours
 - h. 6 hours or more

3. Most of the time does your preschooler play outdoors for at least 30 minutes per day?
 - a. No
 - b. Yes
 - c. I don't know

Behavior-Nutrition Offerings-Preschooler's

1. **During the past 7 days, how many times to your preschooler** were fresh/frozen vegetables served at meals or snacks?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

2. **During the past 7 days, how many times to your preschooler** were fresh/frozen fruits served at meals or snacks?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

3. **During the past 7 days, how many times to your preschooler** was skim or non-fat milk served at meals or snacks?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

4. **During the past 7 days, how many times to your preschooler** was 100% whole-wheat or whole-grain bread or tortillas served at meals or snacks?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

5. **During the past 7 days, how many times to your preschooler** was sugar-sweetened cereals (Frosted Flakes, Fruit Loops, Coco Pebbles, etc.) served at breakfast?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

6. **During the past 7 days, how many times to your preschooler** were sugar-sweetened drinks served?
 - a. Never
 - b. 1 to 2 times
 - c. 3 to 4 times
 - d. 5 to 6 times
 - e. 7 times
 - f. More than 7 times

Knowledge-Physical Activity-Preschooler's

1. Experts recommend that children should be physically active for at least how many minutes per day?
 - a. At least 10 minutes
 - b. At least 20 minutes
 - c. At least 30 minutes
 - d. At least 60 minutes
 - e. At least 90 minutes
 - f. I don't know

2. Experts recommend that children engage in no more than how many hours of media-related activities, such as TV watching and video game playing, per day?
 - a. At least 10 minutes
 - b. At least 20 minutes
 - c. At least 30 minutes
 - d. At least 60 minutes
 - e. At least 90 minutes
 - f. I don't know

3. Experts recommend that children should be physically active on how many days per week?
 - a. 0 days
 - b. 1 day
 - c. 2 days
 - d. 3 days
 - e. 4 days
 - f. 5 days
 - g. 6 days
 - h. 7 days
 - i. I don't know

Parent Aware

1. Have you used the Parent Aware rating to seek child-care ratings?
 - a. Yes
 - b. No
 - c. I am not familiar with Parent Aware

Thank you for your participation!

Questions adapted from: 2009 SPAN Project, University of Texas Health Science Center at Houston, School of Public Health; 2001 PACE, San Diego State University

APPENDIX D. ANTHROPOMETRIC MEASUREMENTS

Measuring Children's Height and Weight Accurately At Home

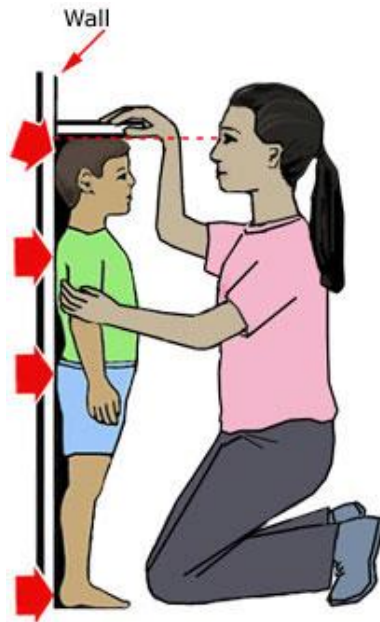
If you have height and weight measurements taken by a healthcare provider within the past three weeks, enter those measurements.

If you take height and weight measurements at home, follow these guidelines:

A. Measuring Height Accurately At Home

To measure height accurately at home:

1. Remove the child's shoes, bulky clothing, and hair ornaments, and unbraided hair that interferes with the measurement.
2. Take the height measurement on flooring that is not carpeted and against a flat surface such as a wall with no molding.
3. Have the child stand with feet flat, together, and against the wall. Make sure legs are straight, arms are at sides, and shoulders are level.
4. Make sure the child is looking straight ahead and that the line of sight is parallel with the floor.
5. Take the measurement while the child stands with head, shoulders, buttocks, and



heels touching the flat surface (wall). (See illustration.) Depending on the overall body shape of the child, all points may not touch the wall.

6. Use a flat headpiece to form a right angle with the wall and lower the headpiece until it firmly touches the crown of the head.
7. Make sure the measurer's eyes are at the same level as the headpiece.
8. Lightly mark where the bottom of the headpiece meets the wall. Then, use a metal tape to measure from the base on the floor to the marked measurement on the wall to get the height measurement.

9. Accurately record the height to the nearest 1/8th inch or 0.1 centimeter.
- B. Measuring Weight Accurately At Home
To measure weight accurately at home:



1. Use a digital scale. Avoid using bathroom scales that are spring-loaded. Place the scale on firm flooring (such as tile or wood) rather than carpet.
2. Have the child or teen remove shoes and heavy clothing, such as sweaters.
3. Have the child or teen stand with both feet in the center of the scale.
4. Record the weight to the nearest decimal fraction (for example, 55.5 pounds or 25.1 kilograms).(Centers for Disease Control and Prevention, 2014a)

APPENDIX E. CURRENT CHILD CARE MEAL PATTERN CACFP

Child Care Meal Pattern

Breakfast			
Select All Three Components for a Reimbursable Meal			
Food Components	Ages 1-2	Ages 3-5	Ages 6-12¹
1 milk² fluid milk	1/2 cup	3/4 cup	1 cup
1 fruit/vegetable juice, ³ fruit and/or vegetable	1/4 cup	1/2 cup	1/2 cup
1 grains/bread⁴ bread or cornbread or biscuit or roll or muffin or cold dry cereal or hot cooked cereal or pasta or noodles or grains	1/2 slice 1/2 serving 1/4 cup 1/4 cup 1/4 cup	1/2 slice 1/2 serving 1/3 cup 1/4 cup 1/4 cup	1 slice 1 serving 3/4 cup 1/2 cup 1/2 cup

¹ Children age 12 and older may be served larger portions based on their greater food needs. They may not be served less than the minimum quantities listed in this column.
² Milk served must be low-fat (1%) or non-fat (skim) for children ages 2 years and older and adults.
³ Fruit or vegetable juice must be full-strength.
⁴ Breads and grains must be made from whole-grain or enriched meal or flour. Cereal must be whole-grain or enriched or fortified.

Child Care Meal Pattern

Lunch or Supper			
Select All Four Components for a Reimbursable Meal			
Food Components	Ages 1-2	Ages 3-5	Ages 6-12¹
1 milk² fluid milk	1/2 cup	3/4 cup	1 cup
2 fruits/vegetables juice, ³ fruit and/or vegetable	1/4 cup	1/2 cup	3/4 cup
1 grains/bread⁴ bread or cornbread or biscuit or roll or muffin or cold dry cereal or hot cooked cereal or pasta or noodles or grains	1/2 slice 1/2 serving 1/4 cup 1/4 cup 1/4 cup	1/2 slice 1/2 serving 1/3 cup 1/4 cup 1/4 cup	1 slice 1 serving 3/4 cup 1/2 cup 1/2 cup
1 meat/meat alternate meat or poultry or fish ⁵ or alternate protein product or cheese or egg or cooked dry beans or peas or peanut or other nut or seed butters or nuts and/or seeds ⁶ or yogurt ⁷	1 oz. 1 oz. 1 oz. 1/2 1/4 cup 2 Tbsp. 1/2 oz. 4 oz.	1½oz. 1½ oz. 1½ oz. 3/4 3/8 cup 3 Tbsp. 3/4 oz. 6 oz.	2 oz. 2 oz. 2 oz. 1 1/2 cup 4 Tbsp. 1 oz. 8 oz.

¹ Children age 12 and older may be served larger portions based on their greater food needs. They may not be served less than the minimum quantities listed in this column.
² Milk served must be low-fat (1%) or non-fat (skim) for children ages 2 years and older and adults.
³ Fruit or vegetable juice must be full-strength.
⁴ Breads and grains must be made from whole-grain or enriched meal or flour. Cereal must be whole-grain or enriched or fortified.
⁵ A serving consists of the edible portion of cooked lean meat or poultry or fish.
⁶ Nuts and seeds may meet only one-half of the total meat/meat alternate serving and must be combined with another meat/meat alternate to fulfill the lunch or supper requirement.
⁷ Yogurt may be plain or flavored, unsweetened or sweetened.

APPENDIX F. PROPOSED CHILD CARE MEAL PATTERN CACFP



Current and Proposed Meal Patterns: Let's Compare

Breakfast Meals*- 13 to 18 year old age group for proposed meal pattern only

	1—2 years		3—5 years		6—12 yrs & 13—18 yrs		Adults	
	Current	Proposed	Current	Proposed	Current	Proposed	Current	Proposed
Fruits/ Vegetables	1/4 c	1/4 c	1/2 c	1/2 c	1/2 c	1/2 c	1/2 c	1/2 c
Grains	1/2 serv	1/2 serv**	1/2 serv	1/2 serv**	1 serv	1 serv**	2 serv	2 serv**
Milk	1/2 c	1/2 c	3/4 c	3/4 c	1 c	1 c	1 c	1 c

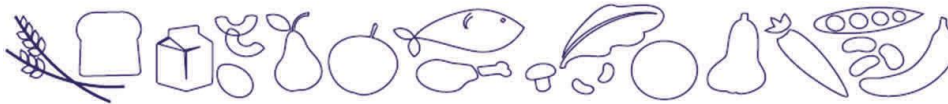
Lunch and Supper Meals*- 13 to 18 year old age group for proposed meal pattern only

	1—2 yrs		3—5 yrs		6—12 yrs & 13—18 yrs		Adults	
	Current	Proposed	Current	Proposed	Current	Proposed	Current	Proposed
Fruits	1/4 c	1/8 c	1/2 c	1/4 c	3/4 c	1/4 c	1 c	1/2 c
Vegetables		1/8 c		1/4 c		1/2 c		1/2 c
Grains	1/2 serv	1/2 serv	1/2 serv	1/2 serv	1 serv	1 serv	2 serv	2 serv
Meat/Meat Alternates	1 oz	1 oz	1 1/2 oz	1 1/2 oz	2 oz	2 oz	2 oz	2 oz
Milk	1/2 c	1/2 c	3/4 c	3/4 c	1 c	1 c	1 c***	1 c***

Snacks*- 13 to 18 year old age group for proposed meal pattern only

	1—2 years		3—5 years		6—12 yrs & 13—18 yrs		Adults	
	Current	Proposed	Current	Proposed	Current	Proposed	Current	Proposed
Fruits	1/2 c	1/2 c	1/2 c	1/2 c	3/4 c	3/4 c	1/2 c	1/2 c
Vegetables		1/2 c		1/2 c		3/4 c		1/2 c
Grains	1/2 serv	1/2 serv	1/2 serv	1/2 serv	1 serv	1 serv	1 serv	1 serv
Meat/Meat Alternates	1/2 oz	1/2 oz	1/2 oz	1/2 oz	1 oz	1 oz	1 oz	1 oz
Milk	1/2 c	1/2 c	1/2 c	1/2 c	1 c	1 c	1 c	1 c

*All serving sizes are minimum quantities of the food components that are required to be served. **A meat/meat alternate may be used to substitute up to 1/2 of the grain requirements. ***A serving of milk is not required at the supper meal.



APPENDIX G. NEW CHILD CARE MEAL PATTERN CACFP

CHILD MEAL PATTERN

Lunch and Supper (Select all five components for a reimbursable meal)				
Food Components and Food Items ¹	Ages 1-2	Ages 3-5	Ages 6-12	Ages 13-18 ² <small>(at-risk afterschool programs and emergency shelters)</small>
Fluid Milk³	4 fluid ounces	6 fluid ounces	8 fluid ounces	8 fluid ounces
Meat/meat alternates				
Lean meat, poultry, or fish	1 ounce	1 ½ ounce	2 ounces	2 ounces
Tofu, soy product, or alternate protein products ⁴	1 ounce	1 ½ ounce	2 ounces	2 ounces
Cheese	1 ounce	1 ½ ounce	2 ounces	2 ounces
Large egg	½	¾	1	1
Cooked dry beans or peas	¼ cup	¾ cup	½ cup	½ cup
Peanut butter or soy nut butter or other nut or seed butters	2 tbsp	3 tbsp	4 tbsp	4 tbsp
Yogurt, plain or flavored unsweetened or sweetened ⁵	4 ounces or ½ cup	6 ounces or ¾ cup	8 ounces or 1 cup	8 ounces or 1 cup
The following may be used to meet no more than 50% of the requirement: Peanuts, soy nuts, tree nuts, or seeds, as listed in program guidance, or an equivalent quantity of any combination of the above meat/meat alternates (1 ounces of nuts/seeds = 1 ounce of cooked lean meat, poultry, or fish)	½ ounce = 50%	¾ ounce = 50%	1 ounce = 50%	1 ounce = 50%
Vegetables⁶	½ cup	¼ cup	½ cup	½ cup
Fruits^{6,7}	½ cup	¼ cup	¼ cup	¼ cup
Grains (oz eq)^{8,9}				
Whole grain-rich or enriched bread	½ slice	½ slice	1 slice	1 slice
Whole grain-rich or enriched bread product, such as biscuit, roll or muffin	½ serving	½ serving	1 serving	1 serving
Whole grain-rich, enriched or fortified cooked breakfast cereal ¹⁰ , cereal grain, and/or pasta	¼ cup	¼ cup	½ cup	½ cup

¹ Must serve all five components for a reimbursable meal. Offer versus serve is an option for only adult and at-risk afterschool participants.

² Larger portion sizes than specified may need to be served to children 13 through 18 year olds to meet their nutritional needs.

³ Must be unflavored whole milk for children age one. Must be unflavored low-fat (1 percent) or unflavored fat-free (skim) milk for children two through five years old. Must be unflavored low-fat (1 percent), unflavored fat-free (skim), or flavored fat-free (skim) milk for children six years old and older and adults.

⁴ Alternate protein products must meet the requirements in Appendix A to Part 226.

⁵ Yogurt must contain no more than 23 grams of total sugars per 6 ounces.

⁶ Pasteurized full-strength juice may only be used to meet the vegetable or fruit requirement at one meal, including snack, per day.

⁷ A vegetable may be used to meet the entire fruit requirement. When two vegetables are served at lunch or supper, two different kinds of vegetables must be served.

⁸ At least one serving per day, across all eating occasions, must be whole grain-rich. Grain-based desserts do not count towards the grains requirement.

⁹ Beginning October 1, 2019, ounce equivalents are used to determine the quantity of the creditable grain.

¹⁰ Breakfast cereals must contain no more than 6 grams of sugar per dry ounce (no more than 21 grams sucrose and other sugars per 100 grams of dry cereal).

Snack				
(Select two of the five components for a reimbursable snack)				
Food Components and Food Items¹	Ages 1-2	Ages 3-5	Ages 6-12	Ages 13-18² <small>(at-risk afterschool programs and emergency shelters)</small>
Fluid Milk³	4 fluid ounces	6 fluid ounces	8 fluid ounces	8 fluid ounces
Meat/meat alternates				
Lean meat, poultry, or fish	½ ounce	½ ounce	1 ounce	1 ounce
Tofu, soy product, or alternate protein products ⁴	½ ounce	½ ounce	1 ounce	1 ounce
Cheese	½ ounce	½ ounce	1 ounce	1 ounce
Large egg	½	½	½	½
Cooked dry beans or peas	⅓ cup	⅓ cup	¼ cup	¼ cup
Peanut butter or soy nut butter or other nut or seed butters	1 tbsp	1 tbsp	2 tbsp	2 tbsp
Yogurt, plain or flavored unsweetened or sweetened ⁵	2 ounces or ¼ cup	2 ounces or ¼ cup	4 ounces or ½ cup	4 ounces or ½ cup
Peanuts, soy nuts, tree nuts, or seeds	½ ounce	½ ounce	1 ounce	1 ounce
Vegetables⁶	½ cup	½ cup	¾ cup	¾ cup
Fruits⁶	½ cup	½ cup	¾ cup	¾ cup
Grains (oz eq)^{7,8}				
Whole grain-rich or enriched bread	½ slice	½ slice	1 slice	1 slice
Whole grain-rich or enriched bread product, such as biscuit, roll or muffin	½ serving	½ serving	1 serving	1 serving
Whole grain-rich, enriched or fortified cooked breakfast cereal ⁹ , cereal grain, and/or pasta	¼ cup	¼ cup	½ cup	½ cup
Whole grain-rich, enriched or fortified ready-to-eat breakfast cereal (dry, cold) ^{9,10}				
Flakes or rounds	½ cup	½ cup	1 cup	1 cup
Puffed cereal	¾ cup	¾ cup	1 ¼ cup	1 ¼ cup
Granola	½ cup	½ cup	¼ cup	¼ cup

¹ Select two of the five components for a reimbursable snack. Only one of the two components may be a beverage.

² Larger portion sizes than specified may need to be served to children 13 through 18 year olds to meet their nutritional needs.

³ Must be unflavored whole milk for children age one. Must be unflavored low-fat (1 percent) or unflavored fat-free (skim) milk for children two through five years old. Must be unflavored low-fat (1 percent), unflavored fat-free (skim), or flavored fat-free (skim) milk for children six years old and older and adults.

⁴ Alternate protein products must meet the requirements in Appendix A to Part 226.

⁵ Yogurt must contain no more than 23 grams of total sugars per 6 ounces.

⁶ Pasteurized full-strength juice may only be used to meet the vegetable or fruit requirement at one meal, including snack, per day.

⁷ At least one serving per day, across all eating occasions, must be whole grain-rich. Grain-based desserts do not count towards meeting the grains requirement.

⁸ Beginning October 1, 2019, ounce equivalents are used to determine the quantity of creditable grains.

⁹ Breakfast cereals must contain no more than 6 grams of sugar per dry ounce (no more than 21 grams sucrose and other sugars per 100 grams of dry cereal).

¹⁰ Beginning October 1, 2019, the minimum serving sizes specified in this section for ready-to-eat breakfast cereals must be served. Until October 1, 2019, the minimum serving size for any type of ready-to-eat breakfast cereals is ¼ cup for children ages 1-2; 1/3 cup for children ages 3-5; ¾ cup for children 6-12; and 1 ½ cups for adults.

Iteration date October 1, 2017

APPENDIX H. IRB APPROVAL OF HUMAN RESEARCH PROJECT



April 13, 2015

Dr. Yeong Rhee
Health, Nutrition & Exercise Sciences

Re: IRB Certification of Exempt Human Subjects Research:
Protocol #HE15231 , "A Longitudinal Quantitative Study identifying the Potential Impacts of Nutrition Education Courses Accepted by the Parent Aware Program on Nutritional-Related Knowledge, Attitudes, and Dietary and Physical Activity Behaviors among Preschoolers' Parents and Childcare Providers and on Preschoolers' Body Mass Index Trajectories"

Co-investigator(s) and research team: Rose Prissel

Certification Date: 4/13/15 Expiration Date: 4/12/18
Study site(s): varied - online
Sponsor: n/a

The above referenced human subjects research project has been certified as exempt (category # 2) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, Protection of Human Subjects). This determination is based on the original protocol materials with revised consent process and updated human subjects training (received 4/10/15).

Please also note the following:

If you wish to continue the research after the expiration, submit a request for recertification several weeks prior to the expiration.

The study must be conducted as described in the approved protocol. Changes to this protocol must be approved prior to initiating, unless the changes are necessary to eliminate an immediate hazard to subjects.

Notify the IRB promptly of any adverse events, complaints, or unanticipated problems involving risks to subjects or others related to this project.

Report any significant new findings that may affect the risks and benefits to the participants and the IRB.

Research records may be subject to a random or directed audit at any time to verify compliance with IRB standard operating procedures.

Thank you for your cooperation with NDSU IRB procedures. Best wishes for a successful study.

Sincerely,

 Kristy Shirley
Digitally signed by Kristy Shirley
DN: cn=Kristy Shirley, o=NDSU,
ou=Institutional Services Bureau,
email=kristy.shirley@ndsu.edu, c=US
Date: 2015.04.13 09:20:16 -0500

Kristy Shirley, CIP, Research Compliance Administrator

For more information regarding IRB Office submissions and guidelines, please consult http://www.ndsu.edu/research/integrity_compliance/irb/. This Institution has an approved FederalWide Assurance with the Department of Health and Human Services: FWA00002439.

INSTITUTIONAL REVIEW BOARD

NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | 701.231.8995 | Fax 701.231.8098 | ndsu.edu/irb

Shipping address: Research 1, 1735 NDSU Research Park Drive, Fargo ND 58102

NDSU is an EO/AAA university.