NUTRITION KNOWLEDGE OF PARENTS AND THE PACKED LUNCHES THEY PROVIDE THEIR PRESCHOOLERS.

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NUTRITION KNOWLEDGE OF PARENTS AND THE PACKED LUNCHES THEY PROVIDE THEIR PRESCHOOLERS (100 pp.)

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The purpose of this study was to measure if the level of nutrition knowledge of preschool parents reflects the frequency of fruits, vegetables, low-fat dairy, and whole grain food items while also observing the amount of calories, fat, saturated fat and fiber provided in preschooler’s packed lunches. Participants included 27 parents of preschool children, age two to five years old, who completed a nutrition knowledge questionnaire with demographic questions and a three day food log reporting the items packed in their lunches. A percent score for the nutrition questionnaire, demographics, the frequency of the food groups, and nutritional information were recorded for each participant. Analyses were considered statistically significant at \( p \leq 0.05 \). The results concluded that nutrition knowledge only had a significant effect on the amount of grains and meat/beans present in packed lunches. Parents with high nutrition knowledge consumed meals outside the home significantly more than parents with low nutrition knowledge. Overall, the lunches were found to not meet USDA’s MyPyramid or CACFP standards for preschoolers. The demographics concluded that mothers were the main lunch packer and grocery shopper and nutrition knowledge was mainly obtained from other parents and magazines. The results of this study provide future researchers and developers of nutrition intervention
programs information on the effectiveness of nutrition knowledge in parents. This can help initiate healthy eating during the formative years and increase the chances of future healthy lifestyle choices.
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CHAPTER I
INTRODUCTION

In 2007, about 55 percent of children ages three to six, not yet in kindergarten, were enrolled in center-based care (ChildStats.gov). The children attending preschool and daycare are in their developmental years which are the prime time for nutritional impact. The eating habits and attitudes about food that children develop during their preschool years often last throughout their lives (Martin & Oakely, 2008). The importance of consuming the appropriate amount of nutrients is crucial during growth and development. Nutrition can influence cognitive development of the brain and it is imperative to understand the importance of consuming a well-balanced diet starting in infancy (Bryan et al., 2004). Many nutrients are important in bone growth and development too, with calcium, protein and Vitamin D being the nutrients that have the greatest effect (Prentice et al., 2006).

Several studies have assessed food items and portion sizes in children’s sack lunches and compared their nutritional content to the Dietary Reference Intakes (DRI) and the Child and Adult Care Food Program (CACFP). In those studies, more than half of the children’s average lunch intake provided less than 33 percent of the DRI for energy, carbohydrates, fiber, Vitamin A, calcium, iron and zinc. Those children consumed less Vitamin A and calcium from their sack lunches than those children participating in CACFP (Sweitzer, Briley, & Roberts-Gray, 2009). Packed lunches studied in the United Kingdom found that a large majority did not meet all the food-based standards for school Cade, 2010). Similarly, when children’s packed lunches were
compared with school provided meals only three and a half percent of the packed lunches included food items from all of the MyPyramid food groups (Rogers, Ness, Hebditch, Jones & Emmett, 2007). Moreover, children consuming a packed lunch had high mean intakes of saturated fat and sugar compared with the meal provided by the school. Conway et al. (2002) found that nutritionally, half of the students brought lunches containing greater than the recommended fat content of less than or equal to 30 percent of energy from fat.

The excessive intake of high calorie, low nutrient dense foods is cause for concern and may influence the increase in obesity status of young children. According to the American Obesity Association, (AOA, 2010) the prevalence of overweight and obese children has increased in the past several decades and is being seen more in younger children, even preschoolers. Health concerns related to obesity are also developing during childhood. This increase of overweight and obese children is increasing the occurrence of specific health conditions like asthma, wheezing, headaches, and nighttime coughing as well as other co-morbidities like hypertension, hyperlipidemia, type two diabetes mellitus, and psychological problems like depression. This earlier manifestation of obesity in children may increase the chances of mortality and morbidity of these children’s lives and also for the occurrence of adulthood obesity (Dietz, 1998).

The children’s dietary intake can be affected by many factors including food neophobia and parental influence like parental control and parental intake (Falciglia, Couch, Gribble, Pabst, & Frank, 2000; Fisher, Mitchell, Wright, & Birch, 2002; Wardle, Carnell, & Cooke, 2005). These factors have been found to be interrelated with each
other. Parental control is negatively associated with parental intake of fruits and vegetables and positively associated with food neophobia (Wardle et al., 2005). Food neophobia is a concern in meeting the nutrient requirements due to the unwillingness to try new or unfamiliar foods and peaks during the preschool age (Birch, McPhee, Shoba, Pirok, & Steinberg, 1987). Children with food neophobia have diets high in saturated fat content and low in fruit and vegetable intake (Falciglia et al., 2000; Wardle et al., 2005). Parental intake, especially the mothers, has been found to be a strong indicator of their child’s intake and may be attributed to genetic similarities and the availability and accessibility of fruits and vegetables (Cooke et al., 2003; Wardle et al., 2005). Also, parental consumption is a significant predictor among demographics and child’s personality traits of fruit and vegetable intake. Parental control and pressure have shown to negatively affect the fruit and vegetable intake of children and parents (Fisher et al., 2002).

Another factor that not only affects the child’s intake but also may affect the success of nutrition interventions are parental perceptions. For example, studies have found that parental perceptions underestimated the weight of their child and these parents did not even recognize their child was overweight (Harnack et al., 2009; Hernandez, Cheng, & Serwint, 2010).

**Statement of the Problem**

According to Sweitzer et al. (2009) most children attend out of home daycares during the week where they consume lunch either provided by the school or by the parent. Research on the dietary intake of preschool children has shown children are
consuming low quality food items and not enough of the recommended food groups when compared to the United States Department of Agriculture’s (USDA) MyPyramid for preschool children (Ball, Benjamin, & Ward, 2008; Padget & Briley, 2005). However, these studies that compared what children were eating to the Child and Adult Care Food Program’s (CACFP) lunch time meal pattern were in centers where they provided meals and snacks. Children who bring packed lunches or centers that do not provide lunch do not have nutritional guidelines or requirements for parents to follow. The food items in child’s packed lunches have been found to not meet the MyPyramid recommendations or be of a high nutrient quality. Observations of preschooler’s packed lunches have indicated a need among parents for guidance in packing healthy lunches (Sweitzer et al., 2010). Recent research suggested that packed lunches by parents of preschool children did not regularly meet the USDA’s dietary recommendations and that more energy dense foods were replacing healthy foods in percentage of calories (Hovland, McLeod, Duffrin, Johanson, & Berryman, 2010; Sweitzer et al., 2009).

These packed lunches provide an opportunity for parents to increase their child’s exposure to fruits, vegetables, low-fat dairy and whole grains. Parent nutrition knowledge has not been extensively studied but parents have reported feeling challenged in providing healthful lunches for their children on a daily basis and even though they understand the importance of lunch to include nutrients they do not regularly pack healthful lunches (Sweitzer et al., 2009). These foods consumed have a major impact on whether the child’s nutritional needs are being met to promote growth and development and if healthy eating habits are being developed. They can be taught healthier eating
habits and get introduced to healthier foods early on to prevent disease and support a lifetime of good health (Benjamin-Neelon & Briley, 2011; Martin & Oakely 2008).

**Purpose Statement**

The purpose of this study was to measure if the level of nutrition knowledge of preschool parents reflects the frequency of fruits, vegetables, low-fat dairy, and whole grain food items while also observing the amount of calories, fat, saturated fat and fiber provided in preschooler’s packed lunches. The aims of the study were: (a) to compare the nutrition knowledge of parents and the food items packed in their lunches, specifically observing amount of fruits, vegetables, whole grains, low-fat dairy items, and the amount of calories, fat, saturated fat and fiber; (b) to compare the lunch contents to United States Department of Agriculture’s (USDA) MyPyramid and the Child and Adult Care Food Program’s (CACFP) lunch standards for preschool age children; (c) to report any significant demographic differences in the population when compared to the packed lunches and/or level of nutrition knowledge. This investigation can help with development of intervention methods focused on the feeding practices of preschool aged children and dietary behaviors to effectively address the childhood obesity epidemic in the United States.

**Research Hypothesis**

Parents with a high knowledge of basic nutrition will have more fruits, vegetables, low-fat dairy, and whole grain food items while also having the appropriate amount of calories, fat, saturated fat and fiber in their preschoolers’ packed lunches compared to the packed lunches of preschoolers with parents that have a low knowledge of basic nutrition.
Operational Definitions

Dietary intake: Average food consumption of various food groups

Infants/Toddlers: Children ages six months to twenty-three months

Nutrition knowledge: Basic knowledge of major nutrients and nutrition

Parental control: The pressure put on children to consume either a certain amount of food or consume certain foods

Poor intake: Consumption of high calorie, high fat food products and not enough consumption of fruits, vegetables and whole grains

Preschool-age child: A child between the ages of two and five years old

School-age child: A child attending school from Kindergarten through eighth grade
CHAPTER II

REVIEW OF LITERATURE

Childhood Obesity

Childhood obesity is best identified by calculating the child’s body mass index (BMI) and plotting it on the Center for Disease Control and Prevention (CDC) sex specific growth charts (Center for Disease Control and Prevention [CDC], 2010). BMI is calculated by dividing the weight in kilograms divided by height in meters squared (kg/m²). According to an expert committee, children and adolescents ages two to nineteen years of age at or above the 85th percentile of BMI for age are labeled “overweight” and those at or above the 95th percentile of BMI for age are labeled “obese” (Krebs et al., 2007). Overweight in infants and toddlers are defined as weight greater than or equal to the 95th percentile of weight-for-recumbent length on the sex-specific CDC growth charts (CDC, 2010). Furthermore, BMI does not directly measure adiposity but could be correlated with amount of adiposity, especially with higher BMIs (Ogden, Carroll, Curtin, Lamb & Flegal, 2009).

Prevalence of Obesity and Overweight Status in Childhood

The prevalence of overweight and obese children has increased significantly since 1980 and is estimated that one out of five children are overweight in the United States (American Obesity Association [AOA], 2010). Not only are the children becoming overweight but these overweight children are becoming obese. The data from the 1976-1980 National Health and Nutrition Examination Survey (NHANES) reported five and a half percent of all children in the United States were obese. According to the data from
the 2007-2008 NHANES survey, 16.9 percent of all children and adolescents in the United States were obese. The rate of obese children, six to eleven year olds, was 19.6 percent in 2007-2008 compared to six and a half percent in 1976-1980 and the obesity rates for adolescents, ages 12-19 in 2007-2008, were 18.1 percent compared to five percent in 1976-1980 (CDC, 2010).

This increase of childhood obesity is now being observed in preschool aged children. Data from the 2007-2008 NHANES reported that the childhood obesity rate in preschool age children two to five years old was 10.4 percent and in 1976-1980 was five percent. A study researching the prevalence of obesity among multi-ethnic low income preschool children found that the obesity rates have slightly declined and overweight is continuing to rise during the years 2002-2007. However, even with the decrease of obesity prevalence, preschool children were still higher than the national average rate of preschool age obesity (Sekhobo, Edmunds, Reynolds, Dalenius, & Sharma, 2010). The study conducted by Ogden and Carroll (2010) analyzed the data from the 2007-2008 NHANES survey and stated that 10 percent of infants and toddlers, ages 6-23 months, were greater than or equal to the 95th percentile of the 2000 CDC weight-for-recumbent-length growth chart. This percentage has increased from the 1976-1980 NHANES survey of almost six percent (CDC, 2010).

**Risk Factors for Childhood Obesity**

Identification of the increased risk for a child to develop obesity can be assessed through sex, parental weight status, socioeconomic status, race/ethnicity and child’s BMI. The excess adiposity on children who are overweight and obese is a strong predictor in
becoming overweight and obese in adolescence and adulthood (Guo, Chumela, & Roche, 2002). Past studies suggested that 33 percent of adult obesity originated in childhood obesity (Molnar & Livingstone, 2000). The resulting weight status in adulthood due to the obesity or overweight status in childhood may cause an increase in mortality and morbidity (Dietz, 1998). The major contributing factor to the increase of obesity and overweight status in children was energy imbalance with regards to children’s unhealthy eating habits and lack of physical activity (Manios, Moschonis, Grammatikaki, Anastasiadou, & Liarigkovinos 2010). However, factors such as genetics, societal, metabolic, psychological and environmental factors also play a role (Wilkins, Kendrick, Stitt, Stinett, & Hammarlund, 1998). During these years of increasing childhood obesity prevalence, it is important to identify the risk factors associated with increased weight status to better initiate preventative interventions for overweight and obese children (Guo et al., 2002).

**Socioeconomic status.** There are factors that affect the prevalence of childhood obesity. In 2008, the Pediatric Nutrition Surveillance System (PedNSS) reported that from 2003-2006 14.8 percent of children ages zero to five years old from low-income families were obese. This percentage increased from 12.7 percent in 1999 but had been stable since 2003. Another study demonstrated that socioeconomic status of children was negatively related to the child’s BMI (Baughcum, Chamberlan, Deeks, Powers & Whitaker, 2000). Fox, Condon, Briefel, Reidy, and Deming (2010) found that low income children were more likely than higher income children to consume whole milk. Fruit and fiber intake were found to be slightly lower in children from more deprived
families (Gibson, Wardle, & Watts, 1998). In addition to the low-income factor, mothers with less education were more likely to be overweight as were their children. Findings were similar in a study of six year old children where a high BMI was associated with low income and low maternal education level (Burke et al., 2005). However, no relationship between education level and nutrition knowledge has been shown and the socioeconomic status has also shown little effect on distribution of fruit and vegetable intakes (Gibson et al., 1998; Healy, 2009).

**Gender.** Gender may also play a role in prevalence of obesity among preschool children. Data has shown that the prevalence of overweight status in preschool children was higher in girls ages four to five years old than boys of the same age (Moore, Nguyen, Rothman, Cupples & Ellison, 1995). It was hypothesized that this could be due to preschool boys being more physically active than preschool girls. Girls have been found to eat more vegetables than boys ages two to six year olds and the frequency of both fruits and vegetables have been found to be higher in 11 year old girls than boys (Cooke et al., 2003; Kristjansdottir, Bourdeaudhuij, Klepp, & Thorsdottir, 2009). However, gender has also been found to not have an impact on obesity. Studies have shown no significant effect on prevalence of obesity when children were three to five or children at age 12 (Nader et al., 2006; Skinner, Perrin, & Steiner, 2010).

**Ethnicity.** Different ethnicities/races were studied in PedNSS and the highest prevalence of obesity was found in American Indian or Alaska Native (20.2 percent) and Hispanic children (18.4 percent) while White, Black and Asian or Pacific Islander were the ethnicities/races that had the lowest rates of obesity of 12.6 percent, 12.0 percent and
12.3 percent respectively. All ethnicities/races’ (except Asian or Pacific Islander) obesity rates have also increased in the last 10 years (Polhamus, Dalenius, Mackentosh, Smith, & Grummer-Strawn, 2009). Data reported by the CDC using the 1988-1994 NHANES and 2007-2008 NHANES surveys compared the growth of obesity rates in adolescents in white, black and Mexican-American races. White boys and girls’ obesity rates increased from 11.6 to 16.7 percent and about nine percent to 14.5 percent black boys’ and girls’ obesity rates increased from 10.7 to 19.8 percent and 16.3 to 29.2 percent, and Mexican-American boys’ and girls’ obesity rates increased from 14.1 to 26.8 percent and 13.4 to 17.4 percent (Ogden & Carroll, 2010).

**Genetics.** The most compelling risk factor for overweight or obese children was parental obesity (Agras, Hammer, McNicholas, & Kraemer, 2004). There has been evidence reported that hereditary is a strong indicator of children’s BMI but that environmental factors may also have input on child’s weight (Stunkard, Harris, Pedersen, & McClearn, 1990). The genetic factor can be a powerful factor as seen in a study of adopted adults having similar weight status as their biological parents rather than where and how they were raised (Kiess et al., 2001). However, prevalence of obesity’s rapid increase cannot be explained by genetics alone. Parental obesity may influence childhood obesity through environment-gene interactions, where these genetic factors are important in determining the different responses within the same environment (Hill & Peters, 1998). Weight status of parents was a risk factor that can be seen in the earlier years of a child. An Italy study that was following children from birth, found that most overweight children at age five, had overweight parents (Scaglioni et al., 2000). One
study found that children with two obese parents had an 80 percent chance of being obese. This probability declined to 40 percent when the child had only one parent who is obese (Garn & LaVelle, 1985). Similar results were found in a study identifying certain parental determinants of childhood overweight and obesity in preschool children where they revealed that an increase in the maternal and paternal BMI was associated to significantly increase the likelihood for childhood obesity (Manios et al., 2010). Also, a high maternal BMI in pregnancy was associated with an increased risk of their children becoming obese (Eriksson, Forsen, Osmond, & Barker, 2003). This pattern of familial obesity may also be due to environmental factors in the households. It was reported that preschool children of obese parents showed an increased preference for energy-dense foods (Birch & Fisher, 1998). Hereditary was not the only factor increasing this childhood obesity epidemic. Genetic characteristics of the population had not changed in the last three decades but the prevalence of obesity has tripled (Schwager, 2010).

**Physical activity.** Physical activity can have an influence on a child’s weight. Physical activity level was more important in determining childhood obesity than dietary intake (Manios et al., 2010). One study showed that low physical activity levels were one of the important factors that significantly increased the likelihood for obesity in preschool children. Reaching the recommended amount of exercise a day may be challenging for young children. Physical activity had declined in recent years due to technologic advances, reduction of physical activity programs in schools and unsafe community recreation facilities. The CDC reported that attendance in daily physical education programs had dropped from 42 percent in 1991 to 28 percent in 2003 among adolescents.
Obesity generally occurs from increased energy intake without an equivalent increase in energy expenditure (Molnar & Livingstone, 2000).

According to the American Dietetic Association (ADA, 2011) and MyPyramid, a child should participate in at least 60 minutes of moderate to vigorous activity a day to maintain a healthy weight. In a study, they found that children tended to participate in low to moderate forms of exercise rather than vigorous exercise and had short bouts of activity (Molnar & Livingstone, 2000). Children are found to be more active than adults but this activity decreased into adolescence (CDC, 2010). To encourage the continuation of physical activity the CDC recommended school and community programs to enable safe areas for physical activity, implement physical education programs to help children develop motor and behavioral skills to continue physical activity, provide extracurricular activities that met needs of various children, include parents and guardians in participation or support of the participation in physical activity, and provide training for education, coaching, training, recreation and healthcare personnel who worked with the children to promote lifelong physical activity (CDC, 2010). In preschools, children were found to participate in an average of seven minutes of moderate to vigorous physical activity per hour of attendance at a child-care center and boys were found to be more active than girls, along with black children being more active than white children (Pate, Pfieffer, Trost, Ziegler & Dowda, 2004).

Regular physical activity has been linked to increased health and decreased risk of chronic diseases and mortality in adults. It has been apparent that physical inactivity caused an increased risk for childhood obesity. Children were similar to adults in that
regular exercise can prevent future health risks (Carnethon et al., 2003). A study found that with increased amount of playing outdoors among preschool children correlated to decreased coronary heart disease risk factors like total serum cholesterol, HDL cholesterol, HDL/total cholesterol ration, triglycerides, blood pressure and BMI (Saakslahati et al., 2004). Regular physical activity has been seen to have a positive effect on those with type two diabetes. A 2001 study found that a higher level of moderate physical activity was associated with a decreased risk of diagnosis of type two diabetes (Hu et al., 2001). Research showed that increased physical activity increased insulin sensitivity and lowered insulin concentrations (Kriska et al., 2001). Evidence has also been established that physical activity played a role in prevention of developing certain types of cancer, especially colon and breast. The correlation of physical inactivity and developing chronic diseases were based on the accumulation of body fat, especially in the abdominal area (Goran, Ball, & Cruz, 2003). Exercise during those years was not for weight loss but for an increase in the health and well-being of the children so they do not become obese or overweight adults (Oliver, Schofield & Kolt, 2007). The American Heart Association recommended that preschool children should be encouraged in developing motor skills for physical activity to increase the likelihood of performing exercise as they get older (Strong, 1990).

Sedentary lifestyles hinder the level of physical activity. Along with assessing the physical activity of young children, it is just as important to assess their sedentary lifestyles. According to Hu et al. (2001) sedentary lifestyles can be directly related to the risk of type two diabetes. The adolescent culture has shown trends of decreasing the
amount of moderate to vigorous activities and has been increasing their sedentary behaviors specifically to computer use (Nelson, Neumark-Stzainer, Hannan, Sirard, & Story, 2006). One study of three to four year olds showed that those children who watched more television during the day and in longer bouts of time were less likely to engage in physical activity (Durant, Baranowski, Johnson, & Thompson, 1994). However, another study found conflicting evidence that television viewing did not have an impact on amount of physical activity on children three to eight years old (Taras, Sallis, & Patterson, 1989).

**Childhood weight status.** As mentioned earlier, weight status in childhood and adolescence was a strong indicator of the resulting weight status in adults. This information is important in identifying the risk for adult obesity (Guo et al., 2002). According to the research done by Nader et al. (2006) preschool aged children with BMIs greater than the 50th percentile were more likely to become overweight in the childhood and adolescent years. The study concluded the longer a child remained in the lower range of normal BMI, the less likely a child will become overweight by adolescence. Additionally, the increase in occurrences of a child reaching a BMI status greater than the 85th percentile then the greater the chance the child would continue to gain weight and/or remain overweight. Ethnicity, parental and sibling weight status, family and environmental factors and BMI could all be considered risk factors for childhood obesity. Moreover, rapid infant weight gain and lower physical activity levels were specifically important factors that significantly increased the probability for obesity in preschool children (Manios et al., 2010). The relationship between rapid infant weight gain and the
resulting likelihood of childhood obesity could be a reason for preventative measures in infancy. Although, reasons for the rapid weight gain were not known, overfeeding was one of the possible causes either with formula, breast milk or premature introduction of solid foods.

**Developing Diseases due to Obesity**

Obesity is a serious public health concern and is the nation’s number one cause of preventable death (Dennison, Edmunds, Stratton, & Pruzek, 2006). The adult diseases related to obesity were currently becoming more prevalent in children and adolescence. Most of these health problems can be prevented, reversed and even resolved with weight loss. Because children who were overweight might grow up to be more obese as adults, their chances of morbidity and mortality in adulthood might be increased.

Health problems due to childhood obesity can also develop during childhood. Skinner et al. (2010) examined the relationship of BMI status of children with specific health conditions reported by parents or by NHANES. They found asthma and greater wheezing in obese and overweight boys and increased frequency of headaches and nighttime coughing in obese and overweight girls. Severe obesity ($\text{BMI} \geq 99^{\text{th}}$ percentile) in young children may have caused increases in other health concerns and limit activity as reported by the parents. This was a concern because the decrease in physical activity can only worsen the weight status of these obese children. However, along with this observation, Skinner et al. (2010) found that children between the $85^{\text{th}}$ and $99^{\text{th}}$ percentile did not report any worsened health concerns.
The co-morbidities associated with obesity include cardiovascular risk factors including hypertension and hyperlipidemia, type two diabetes, many psychological problems due to body image issues and other health problems in children due to overweight/obesity status. These obesity-associated diseases, especially type two diabetes and cardiovascular disease have been found to be emerging problems in the pediatric population (Goran et al., 2003).

**Cardiovascular disease.** Overweight children and adolescents have been reported to likely have significant increases for several cardiovascular disease risk factors (Freedman, Dietz, Srinivasan & Berenson, 1999). These cardiovascular abnormalities increased mortality in overweight individuals. Studies performed by Laur, Lee and Clarke (1988) and Laur and Clarke (1989) have shown that hyperlipidemia and hypertension can be associated risk factors of cardiovascular disease due to childhood obesity alone. An increased blood pressure is associated with an increased BMI in both children and adults (Freedman et al., 1999). One Australian study showed an increase in cardiovascular risk factors associated with overweight and obesity can already be seen in infancy and by the age of eight years old these children have an increase in blood pressure and more adverse levels of blood lipids (Burke et al., 2005). All these factors were important risk factors for cardiovascular disease and can both be reversed or reduced with weight loss (Laur & Clarke, 1989). A 2009 study found that the risk of cardiovascular disease was high in preschool children, especially if severely obese. This risk was able to be identified as early as two years old (Yin et al., 2009). Another concern in the development of cardiovascular disease due to obesity was obstructive
sleep apnea. A study conducted by Amin et al. (2002) showed that an increase in BMI was related to an increased risk of obstructive sleep apnea in children and adolescents.

**Type two diabetes.** The rise of obesity has been linked to the increase in prevalence of type two diabetes being diagnosed in childhood and adolescence (Pinhas-Hamiel et al., 1996). Pinhas-Hamiel et al. (1996) also concluded that the earlier on-set of type two diabetes may have caused a long-term public health concern due to the many adverse side effects of this disease when it is uncontrolled or untreated. In adulthood, the prevalence of type two diabetes and obesity was seen across males and females, all ages, all races, all educational levels and all smoking levels (Mokdad et al., 2001). The association of these risk factors with the identification of overweight and obese children indicates that features of the metabolic syndrome were already present in these children (Burke et al., 2005). Metabolic syndrome was defined as a “condition that consists of a cluster of metabolic disorders, including insulin resistance, elevated blood pressure, elevated plasma glucose, a prothrombic state, and atherogenic dyslipidemia” (Grundy, 1999, p. 28F). The study also stated that the metabolic syndrome’s metabolic disorders promoted the development of atherosclerosis and cardiovascular disease.

**Psychological characteristics.** There may be a relationship between obesity during childhood and psychosocial abnormalities but there was not much data to back it. Braet, Mervielde, and Vandereycken (1997) found that the obese children in their study reported more negative physical self-perceptions and had a lower self-worth. Progression of overweight status in children may also be related to abnormal psychosocial development (Strauss & Pollack, 2003). Overweight children were found to have fewer
friends, a decrease in social networking, and more isolated relationships which suggested that children in normal weight ranges for their age had more relationships with other children their age. Overweight adolescents were found to have low body satisfaction, low self-esteem and depression symptoms independent of gender and ethnicity (Eisenberg, Neumark-Sztainer, & Story, 2003). Also, these overweight adolescents were highly susceptible to being teased about their body weight which in turn could be associated with the increase in suicidal thoughts and attempts. Pine, Goldstein, Wolk, and Weissman (2001) found that adults who were clinically diagnosed with depression in childhood had a greater BMI than adults who were not diagnosed with depression. Another study showed that depression scores were highest in the children with the greatest increase in BMI (Goodman & Whitaker, 2002).

Research has shown that gender did play a role in severity of psychological symptoms of overweight/obese children (Erickson, Robinson, Haydel, & Killen, 2000). A relationship between depressive symptoms and BMI was found for eight to nine year old girls but not boys and these symptoms were strongly associated with overweight concerns. Girls as young as five and seven years old have self-perceptions based on their weight status (Davison & Birch, 2002). The young girls that had a higher BMI at age five had significantly lower self-esteem than non-overweight/obese girls and this significance only increased to age seven. The overweight girls who were found to have had low self-esteem were also found to have had low perceived physical ability, lower perceived peer acceptance and believed they were less competent than others.
Dietary Intake of Children

Nutrient Intake

There is little concern for preschool children not meeting their recommended daily macronutrient and micronutrient intakes (Devaney, Ziegler, Pac, Karwe, & Barr 2004). Nevertheless, there was still concern for children’s overall diet. In the 2004 study, parents reported energy intakes that exceeded the estimated requirements of infants and toddlers. Also reported was the low fiber intake, Vitamin E intakes below the EAR, and intake of Vitamin A and zinc exceeding the UL in toddlers. However, a study conducted in rural Appalachia found that third graders were not meeting the Recommended Dietary Intakes (RDA) or Adequate Intakes of Vitamin A along with fiber, Vitamin E, calcium and iron. The students of this study also did not consume enough of any of the food groups of the United States Department of Agriculture’s (USDA) MyPyramid and concluded that more energy dense foods were replacing healthy foods in percentage of calories (Hovland et al., 2010). Past studies of adults found that an increased intake of macronutrients above the RDA, especially fat, would have an influence on body composition and increase in adiposity (Lissner & Heitmann, 1995). However, this idea was examined in preschool children and they concluded that dietary intake had no effect on the percentage of body fat in children. This finding could be due to the development of body fat occurring later in life or the amount of physical activity was more resilient in influencing body composition (Atkin & Davies, 2000).

More specifically, preschool consumption of food groups was also studied. A 2010 study found that preschoolers fell within the acceptable macronutrient distribution...
range (AMDR) percentage of energy from protein and carbohydrates but not fat (Butte et al., 2010). Energy from fat was below the AMDR; however 76 percent of preschoolers’ usual intakes provided more saturated fat than recommended by the 2005 Dietary Guidelines for Americans demonstrating that good fats (polyunsaturated and monounsaturated) were not being represented. This study also found the mean intakes of antioxidants, B Vitamins, bone-related nutrients, and other micronutrients were adequate except for Vitamin E. Overall, they concluded that the preschool age diet quality could be improved by consuming alternate sources of dietary fat, decreasing sodium, increasing fiber and providing guidance on the importance of fruit, vegetable and whole grain focus to provide good nutrition and also build healthy eating habits during the critical developmental window of the preschool years. Another 2010 study investigated the food groups children age two to three years old were consuming with the aid of a 24 hour dietary recall by telephone (Fox et al., 2010). Their research found that the most common dairy consumed was two percent milk in three year olds, but was whole milk before age three. Seventy percent of the children consumed vegetables at least once a day but the most common vegetable was white potato (31 percent) and it was usually in a fried form. The least types of vegetables consumed were the dark green and deep yellow vegetables at fifteen percent. Eighty-seven percent of two to three year olds consumed at least one portion of fruit or 100 percent juice in one day, with fresh fruit being the most abundant form. Although 55 percent of two to three year olds consumed ready-to-eat cereals or hot breakfast cereals daily, there was little difference between the amounts of sweetened vs. non-sweetened cereals (28 and 30 percent respectively). Forty percent of
the cereals were identified as whole grain by the parent but only 9 percent of the breads were identified whole grain. Another concern of the study found that 86 percent of two to three year old children consumed some type of sweetened beverage, desserts, sweets and salty snacks in a day. Sixty-eight percent of two year olds and 74 percent of three year olds consumed some form of dessert or candy each day with 82-89 percent of those children consuming more than one of those foods per day. Also, 46 percent of both two and three year olds consumed sugar sweetened beverages each day (Fox et al., 2010).

**Dietary Intake during Child Care/Preschool**

The early years spent in child care are very important in child development. In 2007, about 55 percent of children ages three to six years old, not yet in kindergarten, were enrolled in center-based care (ChildStats.gov). Since up to two-thirds of dietary intake can be consumed at child care centers, it is important to assess the nutrients and food items children may be consuming. A study conducted in North Carolina child care centers found that children were not consuming the recommend amount of the MyPyramid food groups besides milk. Furthermore, the data suggested that children were not consuming recommended amounts of whole grains, fruits, or vegetables while attending full-time child care. Instead, children were consuming excessive amounts of added sugars from sweet snacks and condiments, and saturated fat from whole milk and high-fat or fried meats (Ball, Benjamin & Ward, 2007). Another study in a Texas preschool found similar results in not meeting the recommended amounts of the food groups in accordance with MyPyramid. A difference was the children were being served the appropriate portion of the food item, but was either not consuming the entire amount
or the food item served was not of high nutritional value (Padget & Briley, 2005). Additional sweets given during a meal may impede the nutritional quality and/or cause decreased intakes of nutritious items. A 2000 study examined the eating behavior of preschool children offered chocolate-flavored or plain milk at lunch. Reported findings of this study demonstrated that preschool children consumed more of a beverage when it was sweetened and did not reduce their intake of the other food items, increasing their overall energy intake (Wilson, 2000). This data agreed with previous research in concluding sweetened beverages did not decrease overall food intake (Wilson, 1991).

Several studies assessed food items and portion sizes in children’s sack lunches and compared their nutritional content to the Dietary Reference Intakes (DRI) and the Child and Adult Care Food Program (CACFP). One study found that only 29 percent of the children’s packed lunches provided enough servings of fruits and vegetables and 20 percent had the minimum number of milk servings but did meet the meat/meat alternatives and grain/bread foods. Overall, more than half of the children’s average lunch intake over three days provided less than 33 percent of the DRI for energy, carbohydrates, fiber, Vitamin A, calcium, iron and zinc. These children consumed less Vitamin A and calcium from their sack lunches than those children that participated in CACFP (Sweitzer et al., 2009). Packed lunches studied in the UK found that a large majority did not to meet all the food-based standards for school meals (Evans et al., 2010). Over half of the lunches contained fruit and sweetened beverages, while very few contained vegetables and nearly half contained milk based desserts. The majority of lunches contained salty snack items. Protein and Vitamin C were estimated to be the
only nutrient standards met by packed lunches. Similarly, when children’s packed lunches were compared with school provided meals only three and a half percent of the packed lunches included starch, protein, dairy, vegetable/salad, and fruit and the five most common types of food items included in these packed lunches were white bread, fat spreads, salty snacks, sweets with chocolate and fruit (Rogers et al., 2007). Also, less than the recommended one portion of fruits and vegetables each were consumed by children with the packed lunches. Moreover, children consuming a packed lunch had lower mean daily intakes of potassium and zinc and had high mean intakes of saturated fat and sugar compared with the school provided dinners. Conway et al. (2002) conducted a four year study with middle school children and found that fruits were included in almost half of the packed lunches, five percent contained vegetables and 40 percent included non-chip and chip snacks. Also, over half of the lunches included meat items and the majority of these meats were regular-fat items and over half lunches had condiments with 40 percent regular fat. Therefore, nutritionally, half of the students brought lunches containing greater than the recommended fat content of less than or equal to 30 percent of energy from fat. Researchers of this study found many of the regular/high fat items could easily be replaced with low/no fat substitutes and felt with nutrition education this could be accomplished (Conway et al., 2002).

Food Neophobia in Childhood

Behavioral problems of children may have an effect on the child’s dietary intake regardless if they are offered the food or not. Food neophobia is a relatively new concern in meeting the nutrient requirements of young children due to the restrictive diets these
children usually consume. Neophobia is a “personality trait” of an individual who is unwilling to try unfamiliar foods (Falciglia et al., 2000). This trait peaks in early childhood, ages two to three years old and decreases as one gets older (Birch et al., 1987). According to the 2005 Dietary Guidelines for Americans, importance of consuming a nutritious diet is in the variety, moderation and balance in food choices (USDA, 2011f). Neophobic children were found to have low dietary variety and high saturated fat content of the foods consumed. The high saturated fat content lowered the overall diet quality of neophobic children (Falciglia et al., 2000). However, Falciglia et al. reported that children of the study met most of the RDA recommendations for essential micronutrients except Vitamin E, folate, calcium, zinc and fiber. Vitamin E was the only micronutrient that neophobic children did not consume adequately compared to non-neophobic children.

This personality trait not only increased foods high in fat content but therefore decreased the healthier options. In a study aimed to find the cause of low fruit and vegetable intake among two to six years old found that child neophobia was the second largest predictor (Wardle et al., 2005). Also, neophobic children were found to eat fruit and vegetables less often compared to children without neophobia (Wardle et al., 2003). Low fruit and vegetable intake has been found to be correlated with low micronutrient intake and high fat intake (Fisher et al., 2002).

Children that are picky eaters could also hinder the consumption of important nutrients. A national random sample of infants and toddlers found that picky eaters had lower nutrient intakes of energy and several nutrients but were nutritionally adequate and
met or exceeded the RDAs (Carruth, Ziegler, Gordon & Barr, 2004). Food related experiences in the first two years of life have been found to influence dietary variety in school-aged children (Skinner, Carruth, Bounds, & Ziegler, 2002). Multiple exposures to vegetables has been shown to be the strongest factor in improving child’s diet rather than just informing children of the importance of eating healthy (Wardle et al., 2003).

**Inadequate Dietary Intake in Children due to Allergies**

Allergies found in children are another factor that could cause consumption of an inadequate diet. The most common food allergies include milk, egg, soy, wheat and peanuts. The only treatment available for a food allergy is complete avoidance of the food (Christie, Hine, Parker, & Burks, 2002). Gluten intolerance, also called celiac disease, affects one percent of the pediatric population and was found to be one of the most common food-related chronic diseases in the United States (Fasano & Catassi, 2005). Those diagnosed with celiac disease were on a gluten free diet and eliminated all food that contained wheat, barley or rye. Due to the amount of nutrients found in those food items, dietary intake may have been affected. A Swedish study conducted in 2010 found that children who followed the gluten free diet did not have different eating patterns of children that were on a regular diet in regard to consuming high amounts of sucrose and saturated fat and low amounts of fiber, magnesium and Vitamin D (Ohlund, Olsson, Hernell & Ohlund, 2010). Christie et al. (2002) explained potential growth difficulties in children with food allergies, especially with children allergic to cow’s milk and wheat because of the affect the avoidance had on macronutrient and micronutrient intake. Cow’s milk and its products are especially important in obtaining calcium and
Vitamin D. Children with peanut, tree nut, egg and fish allergies have been found to not usually suffer from the specific nutrient deficiencies found in the products since nutrients in these products can be consumed elsewhere in the diet.

**Dietary Intake Effect on Growth and Development**

Importance of consuming the appropriate amount of nutrients is crucial during growth and development. Nutrition can influence cognitive development of the brain (Bryan et al., 2004). It is nearly impossible to diagnose which nutrient deficit is causing abnormal brain development because during early development many nutrient deficiencies can occur together and affect the same regions of the brain (Georgieff, 2007). Therefore, it is imperative to understand the importance of consuming a well-balanced diet starting in infancy. Many nutrients are important in bone growth and development too, with calcium, protein and Vitamin D being the nutrients that have the greatest effect (Prentice et al., 2006).

**Parent Influence**

Identification of the causes of children’s poor diet is important in understanding the needs of intervention. Parental control may be a factor in affecting the dietary intake of children. Parents can influence their children’s dietary behaviors many ways, whether it is in the availability of certain types of food, the portion of food, or how foods are prepared or through their own eating behaviors. To reverse the trend toward obesity, children have to have access to and consume healthy foods like fruit and vegetables (Story, Kaphingst, & French, 2006). Eckstein et al. (2006) found that parents agreed they could influence their child’s food choices and physical activity but parents of overweight
children were less likely to perceive themselves as having the ability to influence their child’s physical activity.

**Parent Intake**

When discussing children’s nutrition, it is important to understand there are influential factors that affect their dietary intake. The most influential part of young child’s environment may be attributed to the family and food-related behaviors of parents, especially the mothers. Mothers were found to be the one providing the food to their children (Wardle et al., 2005). Also, mothers have been found to primarily be responsible for the grocery shopping (Sweitzer et al., 2009). Mothers may affect the child’s weight status before the child has been born. Pregnant women diagnosed with gestational diabetes mellitus (GDM) compared to pregnant women with normal glucose tolerance found that GDM women had infants with significantly greater skinfold measures, fat mass and obesity during childhood than compared with infants of women with normal glucose tolerance (Catalano, Thomas, Huston-Presley, & Amini, 2003). After birth, infants continued to be influenced by their mother’s decisions. A study found breast fed children ate more vegetables than those who were breast and bottle fed and ate even more vegetables than those that were only bottle fed (Wardle et al., 2005). Mother’s education was associated with greater intake of fruit and vegetables (Cooke et al., 2003). Parents with higher education had kids who ate more vegetables. Parents of higher socioeconomic status were associated with a higher intake of fruits and vegetables (Baughcum et al., 2000).
Parental intake has shown to be a strong indicator of their child’s intake. Parental consumption was the strongest significant predictor among demographics and child’s personality traits of fruit and vegetable intake among children. A 2003 study found that fruit intake among both parents and children was low and that the amount of fruits and vegetables the parent ate, strongly predicted the fruit and vegetable intake of children (Cooke et al., 2003). Similarly, a 2005 study found that fruit and vegetable intake of children two to six years old was strongly predicted by the fruit and vegetable consumption of their parents. The explanation of this mechanism could be due to genetic similarities or the availability and accessibility of fruits and vegetables (Wardle et al., 2005). Also noted in the study performed by Cooke et al. (2003) was that the earlier the age that the children were introduced to fruit and vegetables the greater the child’s current intake would be. Traditional family meal times increased intake of fruit and vegetables, older children ate more vegetables than younger children, and children of other ethnicities ate less fruit than white children but there was no difference in vegetable intake.

**Parental Control**

Parental intake may influence the parental control and pressure of child feeding. Fisher et al. (2002) found that parents, who do not consume fruit and vegetables, put more pressure on their daughters to consume more fruits and vegetables. This amount of pressure was found to be negatively associated with the fruit and vegetable intake of the young girls.
Parental control was found to be the third overall predictor of childhood obesity, behind child neophobia and parental intake. It was found that an increase in parental control was associated with a decrease in children’s fruit and vegetable consumption. Interestingly, parental control may be interrelated with child neophobia because parental control was also negatively correlated with parental consumption of fruits and vegetables and positively with children’s food neophobia. Therefore, parental control over child’s feeding has been found to be in response to inadequate intake of fruit and vegetables which can be partly influenced by neophobia and explained that control may be a reaction to children’s eating behaviors rather than a cause of the behavior (Wardle et al., 2005). A previously mentioned study investigated the parents’ fruit and vegetable intake along with their use of pressure to have their daughters consume fruits and vegetables (Fisher et al., 2002). In this study, the girls’ intake of fruit and vegetables was lower than the age/gender recommendations and their energy intake was 16 percent below the RDA for their specific age/gender. Zinc was 30 percent lower than the RDA and folate was two and a half percent lower than the RDA. Calcium, iron, Vitamin B6, Vitamin C and Vitamin A were at or above dietary recommendations. Also, the daughters who consumed less overall calories received more pressure to eat from their parents. However, most parents reported low levels of pressure in child feeding.

Sweitzer et al. (2009) found that 55 percent parents realized their children received less than three to five servings of fruits and vegetables in their lunches and ate more “junk” food. Though these parents understood that lunch was an important meal opportunity to receive essential nutrients, 67 percent of parents knew their child might
not eat the nutritious foods they packed and 63 percent responded that they tended to pack foods they knew their child would eat. The factors that parents reported in selecting food items included family preferences and produce in season while convenience of store locations and quality of fruits and vegetables were factors affecting grocery store behavior.

**Parental Perceptions**

As stated earlier, mothers were usually the primary care takers in feeding their children. Therefore, any effort in changing the feeding practices of their child’s diet must consider the mother’s perceptions and attitudes of the child’s feeding and weight status. A study of focus groups found that low income/low educated mothers believed a heavy infant was considered a healthy infant and none of the mothers in the focus group thought their infants were too heavy, and that a heavy infant was a sign of a healthy baby. This study also found that parents, especially mothers thought their infants were not getting enough to eat and used food to shape behavior. This perspective was even more popular with overweight and obese mothers because they assumed their children would be genetically heavy. The mothers also stated that although they knew their practices went against the advice of health professionals and physicians they still used food to shape the toddlers behavior (Baughcum, Burklow, Deeks, Powers, & Whitaker, 1998).

Many studies have found that parental perceptions, especially mothers, underestimate the weight of their child. In a study of predominantly white and well educated mothers, about 91 percent of the parents classified their overweight preschoolers as normal weight and even a higher percentage classified their children who
were at risk of becoming overweight as normal weight. Forty-seven percent of all parents participating in the study misclassified their child’s weight with about half of the parents estimating their child was in a lower weight category than was actually the case (Harnack et al., 2009). In a 2006 study, a visual image tool was developed to more accurately categorize a child’s weight, and found that the parents of children who were overweight or at risk of becoming overweight identified their child as overweight by words but selected a heavier image. The children of highly educated parents were less likely to be overweight or at risk of becoming overweight but there were no gender or ethnicity influences (Eckstein et al., 2006). On the other side of the socioeconomic status and education level spectrum, mothers from a program for WIC were studied to find factors associated with the maternal perceptions of their child’s weight. In this study, 79 percent of mothers failed to perceive their child as overweight and this misperception was more common in mothers with less education. Twenty nine percent of mothers believed their obese children were considered overweight. However, nearly all the overweight/obese mothers accurately perceived their own weight status but one third of normal weight mothers misperceived themselves as being overweight. Parental misperception of their child’s weight can be a major concern because these parents of overweight or at risk of being overweight children will be less likely to engage in obesity prevention efforts because they do not realize their child is even at risk (Harnack et al., 2009). Nevertheless, those mothers who accurately perceived their child as overweight were concerned about their child being overweight (Baughcum et al., 2000).
These misperceptions were usually during the critical time of intervention, young childhood. In a study of children 0-19 years old, the researchers found that parents were more likely to recognize their child was overweight by words when the child was less than or equal to six years old than those with a younger child. Also, parents of children less than or equal to six years old were more likely than parents of younger children to be worried about their child’s weight (Eckstein et al., 2006). However, misperceptions of child’s weight may continue into middle childhood. In a study of parents of nine to eleven year old children, with various ethnicities and education levels, more than half of the parents of overweight children did not recognize or admit their child was overweight. But, 97.2 percent of the parents of non-overweight children rated their child as non-overweight (Jansen & Brug, 2006). Hernandez et al. (2010) showed that parents were unable to recognize their child was obese and if they do recognize it, they do not realize to what extent. A study of predominantly non-Latino black children found that the risk of parental misclassification of child’s weight was greatest among overweight preschoolers. Nearly one in three children participating in the study were overweight or obese but 83 percent of parents verbally reported their child at “just about the right weight.” Also, 35 percent of the parents of obese children felt their child was “a little overweight.”

Hernandez et al. (2010) also studied what parents and society perceived as a healthy weight for children. Using visual sketches, parents chose an image that they believed and what their close social networks believed represented what a healthy weight for a child should be independent of what their own child weighs. Twenty percent of parents of overweight preschoolers indicated an image heavier than their child was a
healthy preschooler. Underestimation of child’s weight may reflect societal influences. Parents reported that their close social networks would have chosen a heavier image as a representation of a healthy preschooler.

**Parental Nutrition Knowledge**

Clark, Goyder, Bissell, Blank, and Peters (2007) stated that many factors can influence parental food choices for their children and parents with good nutrition knowledge were more likely to make healthy food choices for their children. A study conducted by Wardle, Parmenter, and Waller (2000) agreed with this theory and found that as nutrition knowledge increased, so did fruit and vegetable intake and fat intake decreased. It was stated that those with the highest scores were 25 times more likely to be meeting current dietary recommendations than those with the lowest scores. Similarly, mother’s nutrition knowledge was strongly and independently correlated to fruit intake but not vegetables or confectionary (Gibson et al., 1998). This study also pointed out that the children’s level of nutrition was related to their mothers showing evidence of nutritional awareness transmission. Nutrition knowledge was also found to improve the overall quality of the diet (Rasanen et al., 2003). However, the nutrition knowledge was found to be poorly correlated with nutrient intake and therefore other factors may influence dietary decisions. Nutrition knowledge was the least strong determinant for fruit and vegetable intake behind availability at home, modeling after parents and demanding family rule among 11 year olds (Kristjansdottir et al., 2008). Parental nutrition knowledge was also found to not reflect the foods provided (Healy,
Parents were not using their nutrition knowledge and placing it into practice in their child’s packed lunches and therefore the standard of lunches were low.

**Preschool Lunch Standards**

The Child and Adult Care Food Program (CACFP) purpose is to provide nutritious meals and snacks in child care centers, family day care homes, Head Start, after-school programs, shelters and adult day care centers. This program provides reimbursement for nutritious meals and snacks for eligible children who are enrolled in the previously mentioned sites. The nutritional requirements of the CACFP are set by the United States Department of Agriculture Food Nutrition Services (USDA FNS). The program serves children 12 years or younger, migrant children 15 years or younger, or any age child with disabilities. However, the majority of the participants in CACFP are preschool-aged children, ages three to five years old (Martin & Oakely, 2008). These children can be attending a child care or day care where they can receive up to two meals and a snack or an afterschool program where they can receive free snacks or even dinners through CACFP depending on the economic status of children enrolled. The CACFP provides nutritious meals and snacks to infants and children as a regular part of their day care and can be administered in licensed day care institution (United States Department of Agriculture [USDA], 2011a). The meal pattern for lunch of three to five year olds include three-fourths cup milk, one cup fruits and vegetables, one-third to one-fourth cup or half slice of whole grain, enriched or fortified products or bread, and one and a half ounces of meat or equivalent portion of meat alternative (USDA, 2011b).
The National School Lunch Program (NSLP), a federal meal program under the USDA, not only serves public and private schools up to 12th grade but also may include residential child care centers. This program allows these schools to provide nutrition balanced low cost or free lunches (USDA, 2011d). The nutritional requirements of the provided lunches are based on the recommendations of the 2005 Dietary Guidelines for Americans. Therefore, no more than 30 percent of calories can come from fat, less than 10 percent from saturated fat, and the lunches will provide one third of the RDA for protein, Vitamin A, Vitamin C, iron, calcium and calories. Schools are able to decide which foods to serve and how to prepare these food but they must follow these nutrition requirements. However, there has been inconsistency with the school lunch’s nutrition and the 2005 Dietary Guidelines for Americans and therefore needed to be changed to better align with the requirements of the Dietary Guidelines for Americans (USDA, 2011e). These proposed changes were based on the 2009 Institute of Medicine report “School Meals: Building Blocks for Healthy Children” and is the first update in 15 years. This proposed rule will update the NSLP meal requirements by increasing the availability of fruits, vegetables and whole grains, decrease starchy vegetables like potato products, corn, and peas and also serve fat free and low fat milk and milk products. To help increase the exposure of fruits and vegetables, there can be one serving of fruit offered at breakfast and lunch, and two servings of vegetables offered at lunch with a variety of vegetables like green leafy vegetables, orange vegetables, beans, and starchy vegetables over the week. Also, an updated guideline for the nutrition requirements of the NSLP may be developed due to the 2010 Dietary Guidelines for Americans. These changes
included lowering the amount of sodium, percent of saturated fat from calories and the addition of a new red/orange vegetables subgroup (USDA, 2011c).

**Education Programs and Interventions**

Health professionals proposing a nutrition/exercise intervention program to the parent of an overweight or obese child should keep in mind that many parents may not be aware or may deny the realistic weight of their child (Jansen & Brug, 2006). The biggest predictor of parents misclassifying their child’s body image was due to their most valued advisor not telling the parents that their child was gaining weight too fast or was overweight (Hernandez et al., 2010). Parents reported feeling challenged in providing healthful lunches for their children on a daily basis and even though they understood the importance of lunch to include nutrients. They do not regularly pack healthful lunches (Sweitzer et al., 2009). Therefore, there has been a need for health professionals to counsel children and families to consume adequate nutrition (Barlow, 2007). One study found that there was a need for an increased focus on children during their preschool years, especially among the high risk population like low-income children and that the focus should be directed on the dietary behaviors, particularly in the child care setting (Lee et al., 2010).

Treatment of obesity has shown to be difficult and has high rates of relapse; therefore preventative measures need to be taken in early childhood before chronic overweight is established (Nader et al., 2006). Most prevention programs of childhood obesity and resulting obesity in adulthood were implemented in school settings with classroom and physical education curriculum, changes in school meals, vending
machines and cafeterias, and after school programs (Campbell, Waters, O’Meara & Summerbell, 2001). Observing what the child was actually eating was another step in improving the diets of preschool children. It was imperative to know exactly what these children were eating, instead of planning and preparing their menus. Structured observation in these preschool settings to assess dietary intake can be significant because it allows for prospective data collection. However, observers must be trained for consistency and accuracy to become a valid and reliable approach to in assessing the dietary intake of young children (Ball et al., 2007). As stated earlier, nutrition knowledge may be a determinant of diet quality and intake (Rasanen et al., 2002; Wardle et al., 2000). Implementing regular intervals of nutrition education to parents has been found to increase nutrition knowledge (Rasanen et al., 2002).

The success of intervention strategies at child-care centers has not been extensively researched. Results of a study conducted at six child care centers showed that conducting a nutrition education program was an attainable strategy for improving the nutritional content of parent-packed preschool lunches (Sweitzer et al., 2010). An increase in servings of vegetables and whole grains were seen in the intervention groups compared to the control groups. Fruits were already above the recommended one serving at both baseline and intervention. Another study found that intervention efforts may be most effective in the early years of infant and child feeding (Whaley et al., 2010). Several Women Infant Children (WIC) centers evaluated the impact of a supplemental nutrition program on the food and beverage intake and physical activity and found that it gave parents/caregivers a protective effect on their children under the age of two to
maintain healthful behaviors whereas the control group worsened. They found that the intervention had a significant effect on increasing water consumption, eating vegetables and had a marginal effect for fruit consumption versus children in control group who drank less water and fewer vegetables and fruit. Williams et al., (2002) wanted to see the longitudinal effect of a food service intervention which included training workshops for cooks in the preschool setting. This intervention was specifically aimed at decreasing the saturated fat content of meals provided to preschool children, ages two to five years old. After one year they found that the intervention group decreased saturated fat content. At the two year follow-up, the intervention strategies were still shown to have an effect on decreasing the saturated fat levels in preschool meals.

One study found that parents, child care center directors and health consultants believed that health promotion education and activities in child care centers would improve the health knowledge and behavior of preschool children. According to the directors, the major barriers of implementing these programs were the lack of funds and lack of resources for distribution of the education and information. However, 45 percent of parents reported already receiving some type of education or information regarding nutrition from child care staff and 83 percent of nurse or nurse practitioners said they would be willing to provide health education to preschoolers. In this study it was determined that the best intervention method would be to conduct an educational session on health topics by health care professionals (Gupta, Shuman, Taveras, Kuldorff, & Finkelstein, 2005). Another feasible intervention program was developed to improve the nutritional content of lunches parents pack for their preschool-aged children. An
educational intervention was placed to increase the prevalence of fruits, vegetables and whole grain products in preschool packed lunches. The results were a dramatic increase in vegetables, yet the average was still unable to reach the recommended serving, an increase to the recommended serving of whole grain products and a slight decrease in fruit products but the average did reach the recommended serving (Sweitzer et al., 2010). Another study aimed at studying the effectiveness of fruit and vegetable parenting practices found that the effective parenting practices included ones with structure, responsiveness, and were not controlling. The practices that were not effective and even counterproductive were those that were very controlled, restrictive and highly pressured (O’Connor et al., 2010).

**Summary**

The lunch intake of children attending child care or school has been extensively studied (Ball et al., 2007; Conway et al., 2002; Padget & Briley, 2005; Rogers et al., 2007; Sweitzer et al., 2009; Wilson, 2000). Results indicated children of all ages are not meeting the recommended intakes set forth by USDA’s MyPyramid or the CACFP.

Along with the poor dietary intake, childhood obesity has been on the rise (American Obesity Association, 2010; CDC, 2010). Childhood obesity can also be affected by other factors including socioeconomic status, gender of child, ethnicity, genetics, and physical activity (Baugchum et al., 2000; Gibson et al., 1998; Kiess et al., 2001; Manios et al., 2010; Moore et al., 1995; Polhamus et al., 2009). This rise in childhood obesity in the United States has only encouraged the need for early nutritional intervention during childhood. Poor nutrition cannot only lead to obesity but also
obesity-related diseases like type two diabetes, cardiovascular problems, and even psychological issues (Laur et al., 1988; Laur & Clark, 1989; Pinhas-Hamiel et al., 1996; Strauss & Pollack, 2003). Children may not meet all their nutrient needs due to food neophobia, child preferences and allergies (Carruth et al., 2004; Christie et al., 2002; Falciglia et al., 2000). It is especially imperative to begin healthy eating during the formative years to increase chances of lifelong healthy lifestyles (Ball et al., 2008).

However, at the preschool age these children rely on their parents to supply them with the proper nutrition and food items so they can grow up eating healthy nutritious food and decrease chances of nutrition related diseases. Parents can influence their child’s eating habits with their own intake of food, their control or pressure on the child during meal times, their perception of their child’s weight and health, and their nutrition knowledge (Clark et al., 2007; Cooke et al., 2003; Harnack et al., 2009; Wardle et al., 2005). Nutrition knowledge of parents has been found to affect the types of food their children eat and has shown to improve overall diet quality (Rasanen et al., 2003; Wardle et al., 2000). However, parents have shown they are not using their nutrition knowledge or placing it into practice in their child’s packed lunches (Healy, 2009). Many education interventions have been designed to increase nutrition knowledge of parents and teachers (Campbell et al., 2001; Rasanen et al., 2002; Sweitzer et al., 2010). Although, researchers have begun to look for other ways to promote healthy food intake to parents (Sweitzer et al., 2011).
CHAPTER III

METHODOLOGY

The purpose of this study was to measure if the level of nutrition knowledge of preschool parents reflects the frequency of fruits, vegetables, low-fat dairy, and whole grain food items while also observing the amount of calories, fat, saturated fat and fiber provided in preschooler’s packed lunches. The aims of the study were: (a) to compare the nutrition knowledge of parents and the food items packed in their lunches, specifically observing amount of fruits, vegetables, whole grains, low-fat dairy items, and the amount of calories, fat, saturated fat and fiber; (b) to compare the lunch contents to United States Department of Agriculture’s (USDA) MyPyramid and the Child and Adult Care Food Program’s (CACFP) lunch standards for preschool age children; (c) to report any significant demographic differences in the population when compared to the packed lunches and/or level of nutrition knowledge.

Study Design

The researcher collected quantitative data from the nutrition knowledge questionnaire and compared it to the quantitative data from the self-reported amount of fruits, vegetables, low-fat dairy and whole grain items and the amount of calories, fat, saturated fat and fiber parents packed in preschooler’s lunches and compared the packed lunches content of the preschool children in the low knowledge and high knowledge groups.

Data was collected and analyzed from a convenience sample of 27 parents of preschool age children from the Portage County area. Participants were recruited from
three preschools, two in Ravenna, OH and one in Mantua, OH. All preschools did not provide lunch and all the children brought packed lunches. The dependent variable was the amount of fruits, vegetables, low fat dairy and whole grains provided in the packed lunches and the independent variable was the nutrition knowledge of the parent.

The procedures for this research were approved by the International Review Board at Kent State University. Consent forms were obtained from all parents or legal guardians who chose to participate in the study.

**Selection of the Sample**

The subjects for this study were recruited through three Portage County preschools. Twenty-seven parents or other legal guardians participated in the study. Subjects qualified for the study if their children were between the ages of two and five years old on the day of data collection. However, there were no parents who participated with two year old children. Due to lack of participation of the parents after data collection, another round of data collection occurred five months later to increase the sample size. The first round of data collection involved packets including the written consent form (Appendix A), a nutrition questionnaire that includes knowledge and demographic questions (Appendix B) and a three day food log (Appendix C) being dropped off at each preschool in manila envelopes. A letter (Appendix D) to the parents explaining the purpose of the study and instructions for completion was taped on the front of the envelopes. The second round of data collection involved the researcher going to the preschools at pick up time and explaining to the qualified subjects the study and allowing them to fill out the aforementioned forms right there to increase the timeliness
of data being returned to the researcher. As an incentive to participate, qualified subjects who successfully completed all forms and turned the packet back in to the preschool director received a $10.00 gift card to Giant Eagle. Questions that were left blank on the knowledge section of the nutrition questionnaire were marked as a wrong answer. Three parents with two children under five were counted twice in the data analysis to increase the sample size.

**Procedure**

Parents were asked to answer basic nutritional questions on a multiple choice questionnaire. This questionnaire was developed by a previous researcher who studied differences in food intake, nutrition knowledge, and fitness assessment measurements in high school students who have completed a school-based physical activity and nutrition education program for adolescents and those students who have not (Blake, 2009). There are total of twenty nutrition knowledge questions, each question representing five percent. These questionnaires will be graded on a percent scale of 0-100 percent and a raw score was obtained. Parents who score 80 percent or higher on the quiz will be considered to have high nutrition knowledge. Parents who score below 80 percent will be considered to have low nutrition knowledge. The questionnaire will also include several demographic questions, family meal time questions and resources of knowledge questions.

A three day food log was given to the parents to report the food items they pack in their children’s lunches for three different days. To improve accuracy of reported items, parents were asked to provide amount of food and brand names of food products. Two
percent milk was served by the preschools and therefore added to each food log. Parents also marked which food group they believe each food item they packed belonged in to provide information on the frequency of packing different food group items from the USDA’s food guide pyramid. The occurrence of servings was then compared to the USDA’s food guide pyramid recommended servings for preschool children. The USDA’s MyPyramid plan has an average amount of calories for preschool aged children based on their age and gender. One-third of those calories were set as the standard for the amount of calories appropriate for lunch. Thirty-percent of these calories became the standard for total fat and ten percent of these calories became the standard for saturated fat. They were then converted to grams for consistency in the table. The recommended amount of fiber was calculated using the American Heart Association’s (AHA) average recommended amount for children ages three to five (American Heart Association, 2010). The daily servings of the USDA’s food groups and AHA’s daily recommended amount of fiber were divided by three to establish the lunch standard.

The study was confidential and parents were provided with manila envelopes to place their forms in, seal and return to the preschool director for both rounds of data collection to ensure only the researcher would be able to view their responses.

**Collection of the Data**

The nutrition knowledge questionnaire was graded against the answer key with each question representing five percent of the total score. A percentage score was given to each questionnaire from 0-100 percent. The food items in the three day food log were analyzed using The Food Processor SQL (version 10.8.0, 2010, ESHA research, Salem,
OR) by the researcher. Nutritional analysis results included the grouping of the packed food items into USDA’s MyPyramid food groups, total amount of calories, total amount of fiber, and total amount of fat and saturated for each food log. Data from the food logs and questionnaire were matched with an alphabetical letter representing each subject to ensure confidentiality.

**Statistical Analysis**

Data was analyzed using Statistical Package for the Social Sciences (version 12, 2010, SPSS Inc., Chicago, IL). Demographic data including parent test scores, gender of lunch packer, individual who does the grocery shopping, relationship status of the participant to the child, education level of parent and household income were analyzed using descriptive statistics (i.e., frequency distribution, mean). Frequency distributions were also used with the data gathered on sources of nutrition knowledge and parent eating style. Participants were grouped into two groups based on the test score they received on the nutrition knowledge test (i.e., 80 percent and above-high scorers and below 80 percent low scorers) that was administered. A univariate analysis of co-variance was used to compare differences in the two groups: parents with higher test scores (80 percent and above) and low test scores (scores below 80 percent) on the following variables: fruits, vegetables, low-fat dairy, whole grains, calories, fat, saturated fat and fiber found in packed lunches, meals eaten at home per week, meals eaten outside the home per week, and meals as a family per week. Analysis of co-variance was used because of the effect the dependent variables could have on one another. Statistical
significance was set at $p \leq 0.05$. Means and standard deviations of the comparison data to USDA and CACFP standards were also calculated.
CHAPTER IV
JOURNAL ARTICLE

Introduction

Young childhood is an opportune time to provide good nutrition and build healthy eating habits (Butte et al., 2010). In 2007, about 55 percent of children ages three to six years old, not yet in kindergarten, were enrolled in center-based care (ChildStats.gov). Child care can be an opportune setting for nutrition interventions to promote healthy dietary behaviors for young children (Gupta et al., 2005). Many child care centers and preschools provide lunch based on the Child and Adult Care Food Program (CACFP) meal pattern which is based off the USDA’s MyPyramid (USDA, 2011a). However, when lunch is not provided, parents are responsible for providing proper nutrition to their children. These packed lunches provide an opportunity for parents to increase their child’s exposure to fruits, vegetables, low-fat dairy and whole grains.

Previous research has found that parent packed lunches are providing less than the Child and Adult Care Food Program’s (CACFP) recommended servings of all the food groups and less than the Dietary Reference Intake (DRI) of important vitamins and minerals (Sweitzer et al., 2009). More specifically, less than the recommended one portion of fruits and vegetables each were consumed by children with the packed lunches. Also, the amount of calories and fiber did not meet their DRIs and the amount of fat and saturated fat had a higher mean intake in children consuming packed lunches when compared with school provided meals (Rogers et al., 2007; Sweitzer et al., 2009). Preschool aged children depend on their parents for providing them with proper nutrition.
and to help establish healthy eating habits. The nutrition knowledge of parents has been found to improve the overall quality of the diet (Rasanen et al., 2003). Parents with good nutrition knowledge are more likely to make healthy food choices and consume more fruits and vegetables (Clark et al., 2007; Wardle et al., 2000). However, parents are not always applying their nutrition knowledge to their child’s packed lunches. Healy (2009) found that parent nutrition knowledge was found to not reflect the foods they provided in their children’s packed lunches. Therefore, other factors may override nutrition knowledge when making dietary decisions. These can include child’s preferences, preparation time and higher cost of healthier items (Sweitzer et al., 2011).

A considerable amount of research has been done on children’s’ dietary intake during lunchtime. However, little research has examined the preschool population specifically. Furthermore, comparison of the nutritional content of preschool packed lunches and the parents’ nutrition knowledge has never been examined. The purpose of this study was to measure if the level of nutrition knowledge of preschool parents reflects the frequency of fruits, vegetables, low-fat dairy, and whole grain food items while also observing the amount of calories, fat, saturated fat and fiber provided in preschooler’s packed lunches. The aims of the study were: (a) to compare the nutrition knowledge of parents and the food items packed in their lunches, specifically observing amount of fruits, vegetables, whole grains, low-fat dairy items, and the amount of calories, fat, saturated fat and fiber; (b) to compare the lunch contents to United States Department of Agriculture’s (USDA) MyPyramid and the CACFP lunch standards for preschool age
children; and (c) to report any significant demographic differences in the population when compared to the packed lunches and/or level of nutrition knowledge.

Methodology

Sample

Twenty-seven parents or other legal guardians of children who completed the nutrition knowledge questionnaire with demographic questions and three day food log provided the sample for the study. Subjects qualified for the study if their children were between the ages of two and five years old on the day of data collection. However, no parents of two year old children participated in the study and therefore dietary guidelines for children age three to five were used. The subjects for this study were recruited through three Portage County preschools that did not provide lunches to their preschoolers.

Measures

Nutrition knowledge questionnaire. Parents were asked to answer basic nutritional questions on a multiple choice questionnaire. This questionnaire was developed by a previous researcher who studied differences in food intake, nutrition knowledge, and fitness assessment measurements in high school students who have completed a school-based physical activity and nutrition education program for adolescents and those students who have not (Blake, 2009). There were total of twenty nutrition knowledge questions, each question representing five percent. These questionnaires were graded on a percent scale of 0-100 and a percentage score was obtained. Parents who scored 80 percent or higher on the quiz were considered to have
high nutrition knowledge. Parents who scored below 80 percent were considered to have low nutrition knowledge. The questionnaire also included several demographic questions, family meal time questions and resources of knowledge questions.

**Three day food log.** A three day food log was given to the parents to report the food items they pack in their children’s lunches for three different days. To improve accuracy of reported items, parents were asked to provide amount of food and brand names of food products. Two percent milk was served by all preschools and was therefore added to each food log. The occurrence of servings was then compared to the USDA’s food guide pyramid recommended servings for preschool children. The first round of data collection the parents were asked to write down the food items packed over three days. The second round of data collection, parents were asked to recall what items they usually pack in their preschooler’s lunches for three different days to increase timeliness on returning information. The food items in the three day food log were analyzed using The Food Processor SQL (version 10.8.0, 2010, ESHA research, Salem, OR) by the researcher.

**Procedure**

Two rounds of data collection occurred to increase chances of enlarging the sample size. The first round of data collection involved packets including the written consent form, a nutrition questionnaire that included knowledge and demographic questions and a three day food log being dropped off at each preschool in manila envelopes. A letter to the parents explaining the purpose of the study and instructions for completion was taped on the front of the envelopes. The second round of data collection
involved the researcher going to the preschools at pick up time and explaining to the qualified subjects the study and allowing them to fill out the aforementioned forms right there or to take it home. As an incentive to participate, qualified subjects who successfully completed all forms and turned the packet back in to the preschool director received a $10.00 gift card to Giant Eagle. Questions that were left blank on the knowledge section of the nutrition questionnaire were marked as a wrong answer. There were three parents with two children under five and they were counted twice in the data analysis to increase sample size. The procedures for this research were approved by the International Review Board at Kent State University. Consent forms were obtained from all parents or legal guardians who chose to participate in the study.

Statistical Analysis

Demographic data including parent test scores, gender of lunch packer, individual who does the grocery shopping, relationship status of the participant to the child, education level of parent and household income were analyzed using descriptive statistics (i.e., frequency distribution, mean). Frequency distributions were also used with the data gathered on sources of nutrition knowledge and parent eating style. Participants were grouped into two groups based on the test score they received on the nutrition knowledge test (i.e., 80 percent and above-high scorers and below 80 percent low scorers) that was administered. A univariate analysis of co-variance was used to compare differences in the two groups: parents with higher test scores (80 percent and above) and low test scores (scores below 80 percent) on the following variables fruits, vegetables, low-fat dairy, whole grains, calories, fat, saturated fat and fiber found in packed lunches, meals eaten at
home per week, meals eaten outside the home per week, and meals as a family per week. Analysis of co-variance was used because of the effect the dependent variables could have on one another. Statistical significance was set a priori at $p \leq 0.05$ and were conducted using Statistical Package for the Social Sciences (version 12, 2010, SPSS Inc., Chicago, IL). Means and standard deviations of all comparison data were also calculated.

**Results**

The purpose of this study was to measure if the level of nutrition knowledge of preschool parents reflected the frequency of fruits, vegetables, low-fat dairy, and whole grain food items while also observing the amount of calories, fat, saturated fat and fiber provided in preschooler’s packed lunches. Participants included 27 parents that met the study inclusion criteria. Three parents with two children under the age of five or with twins were counted twice in the sample to increase total sample size. The study sample completed a nutrition knowledge questionnaire and several demographic questions as well as a three day food log on what they packed in their preschoolers’ lunches. Nutrition knowledge was based on test scores and categorized into low and high knowledge groups. More parents achieved a high score than a low score (Table 1). The grocery shopper was generally the mother (66.7 percent) and females were found to be the main packer of the lunches at 92.6 percent. Graduate school was found to be the most popular education level of the lunch packers at 37 percent. Most of the parents that completed the survey were married (66.7 percent) and the household income was split evenly three ways at 29.6 percent each for $<29,999$, $59,999 – 99,999$ and $>100,000$. 
Table 2 shows the comparison between parents’ test scores and the packed food group items they reported packing in their lunches. Parents’ test scores vs. the amount of food groups reported in packed lunches were analyzed by using descriptive statistics for the means and standard deviations and univariate analysis of variance for significance. Significant differences ($p \leq 0.05$) in the test scores of the parents and the food groups packed in the lunches were found in the grains and meat group. In these groups the parents with a low test score reported more grains and more meat than the parents that attained a high score on the nutrition knowledge questionnaire. The mean amount of grains packed in lunches for the low and high test scores were $2.25 \pm 1.06$ ounces and $0.10 \pm 0.32$ ounces, respectively. Meat mean consumption was estimated at $1.61 \pm 1.53$ ounces for the low test score group while the mean consumption of meat was $1.10 \pm 0.93$ ounces for the high test score group. The other food groups demonstrated no significant difference in the amount reportedly packed and the parents’ test scores.
Table 1. *Demographic data of preschoolers’ parents (N=27)*

<table>
<thead>
<tr>
<th>Demographic</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Score</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low(^a)</td>
<td>11</td>
<td>40.7</td>
</tr>
<tr>
<td>High(^b)</td>
<td>16</td>
<td>59.3</td>
</tr>
<tr>
<td><strong>Grocery Shopper</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>18</td>
<td>66.7</td>
</tr>
<tr>
<td>Father</td>
<td>1</td>
<td>3.7</td>
</tr>
<tr>
<td>Both</td>
<td>6</td>
<td>22.2</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>7.4</td>
</tr>
<tr>
<td><strong>Gender of Packer</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>25</td>
<td>92.6</td>
</tr>
<tr>
<td>Male</td>
<td>2</td>
<td>7.4</td>
</tr>
<tr>
<td><strong>Relationship Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>18</td>
<td>66.7</td>
</tr>
<tr>
<td>Unmarried</td>
<td>5</td>
<td>18.5</td>
</tr>
<tr>
<td>Divorced</td>
<td>2</td>
<td>7.4</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College</td>
<td>9</td>
<td>33.3</td>
</tr>
<tr>
<td>Graduate</td>
<td>10</td>
<td>37.0</td>
</tr>
<tr>
<td>High School</td>
<td>8</td>
<td>29.6</td>
</tr>
<tr>
<td><strong>Income Level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; $29,999</td>
<td>8</td>
<td>29.6</td>
</tr>
<tr>
<td>$30,000-$59,999</td>
<td>3</td>
<td>11.1</td>
</tr>
<tr>
<td>$60,000-$99,999</td>
<td>8</td>
<td>29.6</td>
</tr>
<tr>
<td>&gt; $100,000</td>
<td>8</td>
<td>29.6</td>
</tr>
</tbody>
</table>

\(^a\)Low test score/Low nutrition knowledge is defined as <80% on the nutrition knowledge questionnaire  
\(^b\)High test score/High nutrition knowledge is defined as ≥ 80% on the nutrition knowledge questionnaire
Table 2. Differences in packed food groups based on test score (N=27)

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Test Score</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit (cups)</td>
<td>Low</td>
<td>11</td>
<td>0.59</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>16</td>
<td>0.75</td>
<td>0.44</td>
<td>0.719</td>
</tr>
<tr>
<td>Vegetable (cups)</td>
<td>Low</td>
<td>11</td>
<td>0.14</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>16</td>
<td>0.15</td>
<td>0.20</td>
<td>0.399</td>
</tr>
<tr>
<td>Dairy (cups)</td>
<td>Low</td>
<td>11</td>
<td>1.08</td>
<td>0.43</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>16</td>
<td>1.00</td>
<td>0.32</td>
<td>0.474</td>
</tr>
<tr>
<td>Grain (ounces)</td>
<td>Low</td>
<td>11</td>
<td>2.25</td>
<td>1.06</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>16</td>
<td>1.96</td>
<td>0.32</td>
<td>0.048*</td>
</tr>
<tr>
<td>Meat &amp; Beans (ounces)</td>
<td>Low</td>
<td>11</td>
<td>1.61</td>
<td>1.53</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>16</td>
<td>1.10</td>
<td>0.93</td>
<td>0.038*</td>
</tr>
</tbody>
</table>

*aLow test score/Low nutrition knowledge is defined as <80% on the nutrition knowledge questionnaire and high test score/High nutrition knowledge is defined as ≥80% on the nutrition knowledge questionnaire

*p ≤ 0.05, significant

The preschool children’s packed lunch nutrition data is presented non-statistically in Table 3. The nutrition data was formulated from the parent-reported three day food log. The mean amount of calories, fat and saturated fat exceeded the amount recommended by the USDA MyPyramid for preschoolers, ages three to five years old, while the amount of fiber did not meet the American Heart Association’s (AHA) fiber recommendation for children. Amount of fruits, dairy, and grains were found to be...
packed more than the USDA’s MyPyramid preschool standard and the CACFP lunch requirements. However, the amount of vegetables and meat/beans were found to be packed less than the USDA’s MyPyramid preschool standards and the CACFP lunch requirements (USDA, 2011b; USDA. 2011f).

Table 4 presents the difference of the parents’ test scores and the amount of meals eaten at home, outside of home and as a family per week. Meal characteristics vs. parent test scores were analyzed using univariate analysis of variance with equal variances not assumed. A significance difference (p ≤ 0.05) of the test scores were found in the amount of meals outside of the home. Meals outside the home averaged 1.11 ± 0.54 in the low test score and 1.91 ± 1.07 in the high test score group. The other groups demonstrated no significant difference in meal characteristics and parents’ test score
Table 3. Nutrient content of packed lunches and the USDA’s MyPyramid and CACFP nutritional standards (N=27)

<table>
<thead>
<tr>
<th>Nutrition Data&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Sample Mean</th>
<th>USDA MyPyramid Standards&lt;sup&gt;b&lt;/sup&gt;</th>
<th>CACFP Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>621.32</td>
<td>463.33</td>
<td>N/A</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>21.01</td>
<td>15.44</td>
<td>N/A</td>
</tr>
<tr>
<td>Saturated Fat (g)</td>
<td>7.23</td>
<td>5.15</td>
<td>N/A</td>
</tr>
<tr>
<td>Fiber (g)</td>
<td>6.33</td>
<td>7.33&lt;sup&gt;c&lt;/sup&gt;</td>
<td>N/A</td>
</tr>
<tr>
<td>Fruit (cup)</td>
<td>0.69</td>
<td>0.50</td>
<td>0.50</td>
</tr>
<tr>
<td>Vegetables (cups)</td>
<td>0.14</td>
<td>0.58</td>
<td>0.50</td>
</tr>
<tr>
<td>Dairy (cups)</td>
<td>1.03</td>
<td>0.83</td>
<td>0.75</td>
</tr>
<tr>
<td>Grains (oz.)</td>
<td>2.08</td>
<td>1.33</td>
<td>2.00&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Meat &amp; Beans (oz.)</td>
<td>1.31</td>
<td>1.50</td>
<td>1.50</td>
</tr>
</tbody>
</table>

<sup>Note:</sup> USDA = United States Department of Agriculture; CACFP = Child and Adult Care Food Program
<sup>a</sup>Nutrition data reported based on Food Processor SQL (version 10.8.0, 2010, ESHA research, Salem, OR)
<sup>b</sup>MyPyramid recommended daily servings divided by three to represent amount at each meal
<sup>c</sup>Fiber recommendation was based off the American Heart Association recommendation
<sup>d</sup>The CACFP meal pattern presents grains in cups and therefore was converted to ounces to achieve table consistency
Table 4. *Difference of meal characteristics\(^1\) between parents’ test scores (\(N=27\))

<table>
<thead>
<tr>
<th>Test Score</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meals at home(^a)</td>
<td>Low</td>
<td>7.18</td>
<td>2.33</td>
</tr>
<tr>
<td></td>
<td>High</td>
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<td>2.71</td>
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<tr>
<td>Meals outside home(^a)</td>
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<td>0.54</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>1.91</td>
<td>1.07</td>
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<tr>
<td>Meals as a family(^a)</td>
<td>Low</td>
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<td>0.72</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>6.91</td>
<td>2.59</td>
</tr>
</tbody>
</table>

\(^a\) Per week
* \(p \leq 0.05\), significant

The nutrition knowledge questionnaire also included demographic questions. Figure 1 illustrates where the parents of preschool children included in this study acquire most of their nutrition information. There were a total of nine different options for the sources of nutrition information and the parents were permitted to select more than one option. Other parents and magazines (18 percent of responses, respectively) were the most used sources while courses/seminars (1 percent of responses) and registered dietitians (3 percent of responses) were the least used sources for nutrition information.

Figure 2 represents the eating style of the preschoolers’ parents. There were a total of six different eating styles and parents were permitted to choose more than one option. The most popular eating style was reported as health oriented (32 percent of total responses) while the least popular eating styles were based on using natural foods and being a vegetarian/vegan (2 percent of total responses, respectively).
Figure 1. Percentage of responses on sources of nutrition knowledge (N=27 parents, n = 78 responses)

Figure 2. Eating style of parents of preschool children (N = 27 parents, n = 78 responses)
Discussion

The purpose of this study was to measure if the level of nutrition knowledge of preschool parents reflects the frequency of fruits, vegetables, low-fat dairy, and whole grain food items while also observing the amount of calories, fat, saturated fat and fiber being provided in preschooler’s packed lunches. The study results indicated no significant difference in nutrition knowledge and the amount of fruits, vegetables, and dairy being served in the preschoolers’ packed lunches. Grains and dairy were served significantly more often in packed lunches of parents with low nutrition knowledge. The study also concluded no significant difference existed in the amount of calories, fat, saturated fat and fiber in packed lunches and the level of the parents’ nutrition knowledge. Differences between the amount of nutrients and food group items packed in preschool lunches than the standards set forth by the USDA’s MyPyramid and the CACFP were also revealed. Meals eaten outside the home were more frequent with parents of high nutrition knowledge. The demographic questions found that the mother was the main lunch packer and grocery shopper, the sources of nutrition knowledge were other parents and magazine and the most common eating style was reported as health oriented.

The amount of calories, fat and saturated fat offered in the preschoolers’ mean three day lunches provided more than the calculated USDA’s lunch recommendation of these nutrients. Past studies have found conflicting data in which the results showed that over half of the children’s packed lunches provided less than the 33 percent of the DRI for energy (Johnson, Bednar, Kwon, & Gustoff, 2009; Sweitzer et al., 2009). However,
Johnson et al. (2009) supported our finding that fat content was higher in packed lunches than the USDA standards for school lunches. In the present investigation, it is important to note that although the grams of fat and saturated fat did exceed the USDA standards, the percentage of total calories did not exceed the nutritional requirements set forth by the USDA standards for school lunches for both total fat and saturated fat (USDA, 2011d). Still, in another study the majority of student lunches were found to contain greater than the recommended fat content of less than or equal to 30 percent of energy from fat (Conway et al., 2002). In the present investigation, the amount of fiber was found to be served less than the AHA’s fiber recommendation for children. This finding supports past studies on the nutrition of young children in both daily intake and provided packed lunches (Devaney et al., 2004; Hovland et al., 2010; Sweitzer et al., 2009).

The amount of some of the food groups that were served in this study’s preschool lunches had dissimilar results from previous studies. In the present study, fruit, dairy, and grains were found to be provided over the CACFP lunch standards for preschoolers. The number of servings of fruits supports Sweitzer et al. (2010) findings that fruit being provided in packed lunches exceeded the recommended amount. However, studies have found that most parents were not packing the recommended servings of fruits in their children’s lunches (Johnson et al., 2009; Sweitzer et al., 2009). Furthermore, children with packed lunches were not consuming the recommended amount of fruit for lunch (Rogers et al., 2007). Also, two studies found that majority of packed lunches did not provide milk or dairy products like cheese or dairy to meet recommended and/or government standards (Johnson et al., 2009; Sweitzer et al., 2009). As stated earlier, the
preschools that participated in this study served two percent milk to the children during lunch and therefore may have contributed to the increased overall provided dairy. Also in this study, grains were measured but not whole grains. Therefore, it is difficult to assume what percentage were whole grains. However, since the amount of fiber did not meet the AHA’s fiber recommendation for children ages three to five it can be hypothesized that whole grains did not meet the recommended amount.

Past studies have found that whole grains are not being provided to or consumed by children (Butte et al., 2010; Sweitzer et al., 2010). The present study did agree with the Sweitzer et al. (2009) study that the majority of packed lunches met the standards for grain/bread foods. In line with the findings of previous research, vegetables presence in packed lunches was generally low (Conway et al., 2002; Johnson et al., 2009; Sweitzer et al., 2009). Evans et al. (2010) further found that parents were not only providing less vegetables than the school lunch standards, but the children were consuming less vegetables from their packed lunches than those children who were eating school provided lunches. Moreover, Sweitzer et al. (2009) and Johnson et al. (2009) found that due to the decreased amount of vegetables provided in lunches, vitamins, minerals and dietary fiber were deficient as well. The amount of meat and beans provided in the packed lunches did not meet USDA food guide pyramid standards or CACFP standards. However, yogurt and cheese are counted as a meat/meat alternative in the CACFP guidelines but were counted as dairy in the nutrient analysis process and therefore may contribute to falling short of the CACFP guidelines for meat.
The amounts of food groups and nutrients recommended by the USDA’s MyPyramid were based off the 2005 Dietary Guidelines for Americans. However, during the time this research was conducted the 2010 Dietary Guidelines for Americans came out with updated guidelines and a new food guidance system called MyPlate (USDA, 2011c). Although the basic nutritional guidelines for Americans did remain the same, MyPlate and MyPyramid do have differences. MyPlate created a visual on the emphasis of the overwhelming importance of fruits and vegetables in a healthful diet. However, MyPlate does not portray or mention how many servings one should eat of each food group, nor how big a serving actually is, but instead creates a visual serving on a nine inch plate. This plate template features five food groupings, each represented by their own color. The largest area is vegetables, followed by grains, then fruits and protein. Dairy is offset to the side of the plate. Additionally, the nutritional guidelines associated with the 2010 Dietary Guidelines for Americans and MyPlate include lowering the amount of sodium, avoiding oversized portions, making half of your plate fruit and vegetables, drinking more water and recommending switching to one percent or skim milk instead of two percent milk (USDA, 2011c). Overall, the MyPlate is a simple and uncomplicated guideline that focuses more on intake during meal time than overall daily intake. Future research must take into consideration these updates when using this data.

The nutrition knowledge questionnaire was developed and previously used for a Master’s thesis at Eastern Michigan University to evaluate a physical and nutrition education/intervention program for overweight/obese or “at-risk” students (Blake, 2009).
The questionnaire was used in this study to measure if the parents had a high or low level of nutrition knowledge and whether that affected the items they packed in their preschoolers’ lunches. Nutrition knowledge has been found to improve the overall quality of the diet (Rasanen et al., 2003). No significant differences were found between the test scores and the food groups’ of fruit, vegetables, or dairy. However, the amount of grains and meat/beans were significantly different between the two levels of nutrition knowledge, with parents who have a low nutrition knowledge providing more of each. No recent past studies have observed this finding. Although not significantly different, the fruit and vegetable data of this study supports a prior study’s findings that parents with high nutrition knowledge were more likely to pack more fruits and vegetables (Wardle et al., 2000). A similar study in Ireland found that parent nutrition knowledge did not reflect the food items provided (Healy, 2009). Therefore, it is hypothesized that parents were not using their nutrition knowledge and placing it into practice in their child’s packed lunches.

Many other factors can affect the food contents in lunches packed by parents than nutrition knowledge alone. Although parents understand that lunch is an important opportunity for their children to receive nutrients for the day they have reported that their children sometimes received less than three to five servings of fruits and vegetables per day and consumed more junk food items (Sweitzer et al., 2009). Challenges and barriers parents have reported facing in supporting healthy eating include food neophobia in children, child food preferences, lack of time and energy of parents to prepare healthy meals and snacks, and decreased availability of healthful, affordable, pre-packaged food
choices appropriate for children’s packed lunches (Dwyer, Needham, Simpson, & Heeney, 2008; Swetitzer et al., 2009; Sweitzer et al., 2011; Wardle et al., 2005). Furthermore, parents have reported that their children’s food preferences cause difficulty with consuming certain foods and often lead to conflict, in which they would rather avoid (Dwyer et al., 2008). It has been reported that parents only packed what they knew their children would eat at lunch perhaps to ensure their children had a chance at meeting their calorie needs. Sweitzer et al. (2010) indicated that fruit and whole grain items were served in packed lunches at or above the goal serving size because these food items were easy and safe to pack. Vegetables were provided in packed lunches less than the goal serving and the researchers hypothesized this was because parents considered vegetables too costly in both time and money to pack regularly for children, especially if their child may not eat them.

This study also found that the number of meals consumed outside the home were significantly associated with parents with high nutrition knowledge. However, the average number of meals eaten outside the home for parents with high nutrition knowledge was only two times per week. Also, the average number of meals eaten as a family per week was seven for parents in the high knowledge group. Therefore, we cannot assume that these meals were not positive experiences because they were still eating in a positive social environment and can still develop healthy attitudes and behaviors (Dwyer et al., 2008). Also, parents with high nutrition knowledge have been found to have a higher education level and better occupational category and therefore
may be able to afford more meals outside the home than parents in the low nutrition knowledge group (Wardle et al., 2000).

The demographics of the study’s sample correlated with other studies in that mothers were the predominant lunch packers and grocery shoppers (Sweitzer et al., 2009; Wardle et al., 2005). Previous research has found that the most influential part of young child’s environment may be attributed to the family and food-related behaviors of parents, especially the mothers (Wardle et al., 2005). The present study also found that “other” parents were involved in the lunch preparation of the children. These “other” parents were grandparents living in the household and only attributed to 11 percent of the total respondents in the study. The relationship status category of “unmarried” was defined as never married or part of an unmarried couple.

Limitations

This study does not come without limitations. The reliance of the parents’ self-reported food items packed over three days may not represent accurate amounts or items in the lunches. Many food logs did not include whether food items were low fat, lean or whole grain and therefore was left up to the researcher to distinguish. Also, this study focused on the contents being served in packed lunches and did not determine the children’s intake of these lunches. This is especially important to note since food neophobia is prevalent in preschooleers and has been found to affect the overall dietary intake of children (Birch et al., 1987; Wardle et al., 2003). Further investigations should include both of those aspects.
There were also limitations with the questionnaire process. Parents were not monitored while taking the nutrition questionnaire and therefore were free to research the correct answer. Also, the sources of nutrition knowledge did not have an internet option. Considering the internet is a well-known portal for information it would be highly likely to be one of the top sources of nutrition knowledge for parents. Another limitation of the study was the small sample size which was due to the area’s low availability of preschools that do not provide lunch. To help increase the sample size, three parents with two children under the age of five were counted twice in the analysis. Consequently, these parents’ demographics, nutrition knowledge, and overall nutrition content of their packed lunches impacted the final data results. Lastly, the variable income status of the sample provided a limitation to the study. Past research has found that socioeconomic status influenced dietary intake and because this sample of parents varied greatly in income status, perhaps a more cohesive group would have resulted in stronger correlation between nutrition knowledge and the packed food items (Baughcum et al., 2000; Gibson et al., 1998). However, this limitation can also be seen as strength with the wide range of income status being more representable of the actual population.

**Applications**

The results of this study provide future researchers and developers of nutrition interventions information on the effectiveness of nutrition knowledge in parents. Other factors besides increasing nutrition knowledge need to be considered when promoting healthy food intake. This study supports the idea found in a previous study that parents do not just want information but also want healthy lunch packing suggestions/recipes,
handouts, and interaction to increase ability to learn (Sweitzer et al., 2011). Furthermore, developers of nutrition intervention programs must consider and identify the barriers and challenges parents may experience with preschoolers when trying to promote healthy eating. These strategies includes increasing availability of packaged healthier food items to increase ease in packing, planning healthy meals and snacks before grocery shopping, and repeating exposure of fruits and vegetables to children with food neophobia or strong food preferences (Birch & Fisher, 1998). This study also opens a discussion on where the parents are eating meals outside the home and what they are consuming at these restaurants. Moreover, if parents understand the nutritional content of the average meals outside the home and the effect it has on young children. These topics are an area for future research. Lastly, only two percent of parents in this study reported obtaining their nutrition information from registered dietitians. Therefore, perhaps if registered dietitians were more visible with nutrition intervention programs and involved in the community, it would be beneficial and an increase in healthier food items may be found in preschool lunches in the future.

**Conclusion**

This study confirmed that high nutrition knowledge of parents did not have a significant effect on the amount of fruits, vegetables, calories, fat, saturated fat and fiber in preschoolers’ lunches. However, most of the parents in this study stated that their eating style was health oriented. Therefore, parents may understand the importance of healthy eating but may not apply it when it comes to their children’s packed lunches due to various barriers and challenges.
APPENDIX A

STUDY CONSENT FORM
Appendix A

Study Consent Form

Informed Consent to Participate in a Research Study

Study Title: Nutrition knowledge of parents and the packed lunches they provide their preschoolers.

Principal Investigator: Erin Buchanan

You are being invited to participate in a research study. This consent form will provide you with information on the research project, what you will need to do, and the associated risks and benefits of the research. Your participation is voluntary. Please read this form carefully. It is important that you ask questions and fully understand the research in order to make an informed decision. You will receive a copy of this document to take with you.

Purpose: The purpose of this study is to measure if the level of nutrition knowledge of preschool parents reflects the frequency of fruit, vegetable, low-fat dairy and whole grain food items provided in preschooler’s packed lunches.

Procedures
The requirement to participate in this study is to be a parent of a child who is in the age group of two to five years old. Participants will be asked to complete a three day food log detailing the food items they pack in their child’s lunches for three days and a nutrition knowledge questionnaire with demographic questions. These forms will be given to the parent through the main parent communication tool at each preschool. Each food log should take no more than 5 minutes and the nutrition knowledge questionnaire should only take 15-20 minutes. Therefore, participants must commit for at least 3 days in order to provide the food logs for each day. The data being collected will include the demographic questions, the nutrition knowledge answers from the questionnaire and the food groups listed in the food log forms.

Benefits
The potential benefits of participating in this study may include an educational handout on healthy food items for preschoolers and potential compensation. The benefits to society this research will bring include understanding the connection of nutrition knowledge to foods provided from parents and if the education interventions make a difference. On a larger scale, this will help decrease the childhood obesity epidemic by identifying that a high level of nutrition knowledge of parents increases the healthier items being consumed by children. On the other hand if the research finds that a high level of nutrition knowledge of parents does not increase healthier food items being consumed by children, researchers must find another approach to increase these healthier food items in child’s lunches besides nutrition education.

Risks and Discomforts
You may feel uncomfortable giving information on the items packed in your child’s lunches. Please remember you are not being judged or tested and it is important to the study that you are honest. You will be able to see the questions before deciding whether or not to participate in the study.
Study Title: Nutrition knowledge of parents and the packed lunches they provide their preschoolers.

Privacy and Confidentiality
Your study related information will be kept confidential within the limits of the law. Any identifying information will be kept in a secure location and only the researchers will have access to the data. Research participants will not be identified in any publication or presentation of research results; only aggregate data will be used.

Compensation
A potential compensation to the participants in this study will be a $10.00 gift card to a local grocery store. The gift cards will be given to the first 50 participants to complete the three day food log and nutrition knowledge questionnaire.

Voluntary Participation
Taking part in this research study is entirely up to you. You may choose not to participate or you may discontinue your participation at any time without penalty or loss of benefits to which you are otherwise entitled. You will be informed of any new, relevant information that may affect your health, welfare, or willingness to continue your study participation.

Contact Information
If you have any questions or concerns about this research, you may contact Erica Buchanan at 330-842-2120 or Natalie Caine-Bish at 330-672-2148. This project has been approved by the Kent State University Institutional Review Board. If you have any questions about your rights as a research participant or complaints about the research, you may call the IRB at 330.672.2704.

Consent Statement and Signature
I have read this consent form and have had the opportunity to have my questions answered to my satisfaction. I voluntarily agree to participate in this study. I understand that a copy of this consent will be provided to me for future reference.

Participant Signature ___________________________ Date ___________________________
APPENDIX B

NUTRITION KNOWLEDGE QUESTIONNAIRE WITH ANSWERS AND
DEMOGRAPHIC QUESTIONS
Appendix B

Nutrition Knowledge Questionnaire with Answers and Demographic Questions

NUTRITION QUESTIONNAIRE

Name: _____________________________________

Child’s Birthdate: __ / __ / ______

Please check the box to the one best answer to each question. Make sure the parent who packs the child’s lunch is the one filling out the questionnaire.

1. According to My Pyramid discretionary calories include foods such as:
   □ Breads, cereals, and pasta
   □ Fish, chicken and beans
   X Soda, candy, and dressings
   □ None of the above

2. Which of the following beverages contains the least amount of sugar?
   □ 1 cup orange juice
   □ 1 cup chocolate milk
   X 1 cup low-fat milk
   □ 1 cup soda

3. The following are all examples of lower-fat cooking methods EXCEPT:
   □ Baking
   X Frying
   □ Grilling
   □ Broiling

5. You should not eat starches at meals because
   □ They are too high in fat
   □ Even eating small amounts can cause weight gain
   □ They cause disease
   X None of the above

6. The definition of a serving size is:
   X A standard amount of food
   □ The amount of food a person serves themselves
   □ Both answers are correct
   □ Neither answers are correct

7. Examples of whole grains include the following:
8. High sodium foods include the following EXCEPT:
- Deli Meats and Cheeses
- Frozen Dinners
- Fruits
- Canned Soups

9. A food is considered low-fat if it has:
- < 10 grams of fat per serving
- > 5 grams of sugar per serving
- < 3 grams of fat per serving
- None of the above

10. A 3-ounce portion of meat best resembles:
- A ping-pong ball
- A deck of cards
- 4 dice
- None of the above

11. The three main components of food are
- Sugars, fat, salt
- Carbohydrates, protein, fat
- Glucose, fructose, lactose
- None of the above

12. Foods that contain natural sugar include the following EXCEPT
- Milk
- Whole fruits
- Soda
- None of the above

13. The following items are shown on a food label EXCEPT
- Calories
- Sugar
- Serving size
- None of the above
14. Which of these food groups IS included in the Food Guide Pyramid?
- Fruits
- Grains
- Milk
- All of the above

15. The following foods must not be eaten when trying to lose weight
- Bread and rice
- Meat and fish
- Fruit
- None of the above

16. Which of the following food choices is lowest in fat?
- Fish, chicken without skin, and lean meat
- Beef, sausage, bacon
- Fried fish, fried chicken
- All of the above

17. How much fruit does the average person need per day according to the Food Guide Pyramid?
- 1 cup
- Half a cup
- 2 cups
- 3 cups

18. Which foods contain a lot of fiber?
- White bread and rolls
- Oats, apples, beans
- Milk, yogurt, cheese
- All of the above

19. Which foods contain the most calcium?
- Chicken and eggs
- Milk, yogurt, cheese
- Breads and cereals
- Vegetables

20. What is a serving of cooked vegetables?
- 1 Tablespoon
- Half a cup
- 1 cup
- ¼ cup
Please check where you received most of your knowledge of nutrition (more than one answer is possible)

☐ Parents  ☐ School  ☐ Television
☐ Friends  ☐ Magazines  ☐ Courses/Seminars
☐ Physician/Nurse  ☐ Books  ☐ Registered Dietitian

How many times a week are meals cooked/made at home for your family? ______
How many times a week are meals consumed as a family (together/at the same time)? ______
How many times a week are meals consumed outside the home (restaurant/fast food)? ______
Who does the grocery shopping for your family? __________________________

Here is a variety of eating styles. Please check the one most applicable to your own style of eating. More than one answer is possible:

☐ Health oriented
☐ Price conscious
☐ Taste oriented
☐ Natural foods
☐ Health foods
☐ Vegetarian/Vegan

**Please answer the next set of questions about yourself (the lunch packer)**

Age: _______  Sex: ________  Relationship to child: _________

Are You:
☐ Married
☐ Divorced
☐ Widowed
☐ Separated
☐ Never been married
☐ A member of an unmarried couple
What is the highest grade or year of school you completed?

- Never attended school or only attended kindergarten
- Grades 1 through 8 (Elementary)
- Grades 9 through 11 (Some high school)
- Grade 12 or GED (High school graduate)
- College 1 year to 3 years (Some college of technical school)
- College 4 years (College graduate)
- Graduate School (Advance Degree)

What is your total household income?

- Less than $10,000
- $10,000 to $19,999
- $20,000 to $29,999
- $30,000 to $39,999
- $40,000 to $49,999
- $50,000 to $59,999
- $60,000 to $69,999
- $70,000 to $79,999
- $80,000 to $89,999
- $90,000 to $99,999
- $100,000 to $149,999
- $150,000 or more
Appendix C

Three Day Food Log

3 DAY FOOD LOG

Please fill this form out with the food items you pack in your child’s lunch. Be as specific as possible, naming food brand, noting if the item is whole grain, diet, low/reduced fat, or less. Also give an amount (1/2 cup, 2 slices of bread, 1 bar, 1 small banana etc.)

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<thead>
<tr>
<th>FOOD ITEM</th>
<th>BRAND</th>
<th>AMOUNT</th>
<th>FOOD GROUP (check one)</th>
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APPENDIX D

LETTER TO PARENTS
Hello, my name is Erica Buchanan and I am graduate student at Kent State University. I am collecting data on children’s packed lunches. I will be establishing a relationship between nutrition knowledge of parents and the variety of food items packed in preschool lunches. In order to participate you will need to fill out a 3 day food log describing the food items packed in your child’s lunch for each day, a general nutrition knowledge questionnaire and read and sign a consent form. It will only take up to 30 minutes total to complete the food logs and questionnaire and this information will be completely confidential. I am collecting data from 3 different preschools in Portage County. The first 50 parents to complete the food logs and nutrition questionnaire in its entirety will receive a $10.00 gift card to Giant Eagle. This project has been approved by the International Review Board.

Here are guidelines on how to successfully complete the study:

- Complete each food log while packing your child’s lunch for each day. This will help with accuracy on reporting brands and amounts of each food item and ensure that you do not forget to report any items. **If you have more than one child in the age range attending the preschool, please put both birthdates and separate their lunches in the food log either by different color ink or a dividing line.**

- To increase your chance of receiving the $10.00 gift card, fill out the questionnaire right away and the food logs stating what you packed in your
child’s lunch for the following three days and return it back to the preschool. This way, it can be finished and done in one week.

- To ensure confidentiality please return the completed questionnaire and food logs along with the signed consent form in the provided manila envelope. Seal the envelope and turn it into your child’s preschool director or preschool employee. They will be writing on the envelope the date and time you turned the packet in.

Thank you for your time and cooperation and I hope for your participation!

Sincerely,

Erica Buchanan
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