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Water Consumption of Children in Head Start Classrooms

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WATER CONSUMPTION OF CHILDREN IN HEAD START CLASSROOMS

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ABSTRACT

The Institute of Medicine (IOM) identifies the importance of water consumption and suggested that children need to consume water each day (IOM, 2011). Head Start Performance Standards requires that the children have free access to drinking water throughout the program day (DHHS, 2016a).

The first goal of this study was to identify the quantity of water consumed by children during the program day (8am-2pm). This study employed a person-centered approach to explore the water consumption of the children through observations and direct measurement to identify the amount of the water consumed during a program day. Four classrooms from a Head Start center in a southeastern school district were included in the study. A total of 80 children were observed during the program day (8am-2pm) over a period of 8 weeks. Each child was given a water bottle and instructed to drink freely from the water fountain or the water bottle. In the classroom, water intake from the water fountain and water bottles were recorded.

The second goal of this study is to examine profiles of the water consumption from both the school and at home. A person-centered approach combined the individual data of water consumption, from both observation and parental reports, to deepen our understanding of the issue. The 80 parents or legal guardians completed a brief survey to provide information on water consumption at home. No statistically significant differences across demographic characteristics were found. However, large to moderate effect size were discovered.

The third goal of the present study was to compare the usage of the sugary sweetened beverages (SSBs) with the national Head Start Faces data 2009 (DHHS, 2017). The current study group had statistically significant difference in consumption of those sugary sweetened beverages.

The current study concluded that the water consumption of the children in Head Start classrooms are far less that recommended level. Suggestions on how to increase water consumption were made based on observed behaviors of children across four classrooms. Policy changes regarding water consumption is suggested to increase the water consumption.

For my best friend

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CHAPTER ONE: INTRODUCTION

Introduction

American youth are facing a dire situation. It is estimated that these children will become the first generation in history to have a shorter life span than their parents' generation due to the current growth rate of obesity (Olshansky et al., 2005). There are many contributors to the rampant growth of childhood obesity. Based on Shan, Cheng, Hou, Wang and Mi (2009), reasons include: physical inactivity – "time of moderate and vigorous physical activity was less than that recommended by China's Education Committee" (p.386); less sleep duration; higher consumption of alcohol, snack food, and Western fast food; and more television and computer screen time.

Early childhood is a favorable and fundamental time to protect young children from childhood obesity (IOM, 2011; Nader et al., 2012). Previous research shows that water as a caloric-free beverage provides a healthy alternative to reduce sugar-sweetened beverages (SSBs) consumption and may lead to decrease in unwanted weight (Kenney et al., 2014; Pan et al., 2005; DHHS & USDA, 2015). Many intervention studies reduce sugary beverages to reduce obesity (Battista et al., 2014; Ritchie et al., 2015); however, water consumption as an alternative beverage is not measured directly.

We learn from other countries that their emphasis on water drinking behavior is associated with healthy living (De Craemer et al., 2013; Manz, Wentz, & Sichert-Hellert, 2002; DHHS & USDA, 2015) compared to other beverages. As the childhood obesity rates rapidly increase both globally and locally, a country like the United States should be leading a positive approach to dealing with obesity. This would include promoting water as a primary beverage choice for children. A first step is to find out how much young children consume water across the day, by observing their behaviors of when they drink, where they drink, and how much they drink.

This chapter is an overview of the dissertation study aimed at exploring how much water preschoolers consume during a program day. The key literature that guided this study includes the seriousness of childhood obesity, water consumption and obesity, water consumption and children's wellbeing, water policy in schools, measurements of water consumption, and parents' and schools' perceptions of water consumption. Included are the problem statement; purpose and significance of the study; specific research questions; assumptions; and a summary of the study.

Background

As reported by the Center for Disease Control (CDC), childhood obesity is defined as body mass index (BMI) equal to or greater than 95 percentiles (equivalent to age and gender difference) (CDC, 2015). The obesity rate for adolescence, which is from age 12 to 19, is as high as 25%, age six to eleven is 17.7% and for two to five years old, the obesity rate is 8.4% (CDC, 2015). Children who are obese at an early age have a higher risk of developing chronic diseases associated with excessive weight, both in current time and in their adulthood, including type 2 diabetes, cardiovascular disease, anxiety, and depression (Natale et al., 2013; Cluss, Fee, Culyba, Bhat, & Owen, 2014).

In addition to the health threat that obesity poses to society, the escalating financial cost of childhood obesity related to health care costs poses a challenge. An estimate of $150 billion annually is spent on obesity related health care costs which further encourages us to discover the short and long-term benefits of dealing with childhood obesity (National Conference of State Legislatures, 2014). By 2018, 25.8 million dollars will be spent on health care costs related to obesity in Florida (National Initiative for Children's Healthcare Quality, 2011).

Not one strategy can solve the childhood obesity problem unilaterally as has been observed in the process of this problem over the past decades (Lorentzen, Dyeremose & Larsen, 2011). Intervention and prevention programs have been utilized to eliminate childhood obesity. Even though there has been some success in slowing weight gain in a few evaluated interventions, more studies are needed to assess the issues surrounding childhood obesity (Ritchie et al., 2015).

Problem Statement

The problem this dissertation addresses is to explore whether young children drink water in the classroom and how much water they are drinking. While several studies exist with older children in elementary schools, there is a gap in the literature in terms of the water drinking behavior of children in preschool classrooms.

The problem is important because water drinking is being identified as a tool to decrease childhood obesity, and positively influence children's cognitive skills, memory skills, and physical health (Benton & Burgess, 2009; Edmonds & Burford, 2009; Stookey et al., 2014; Fuchs, Dohnke, Simpson, & Lührmann, 2014). Childhood obesity has been rampant and caused serious personal, social, and economic effect (Natale et al., 2013; Olshansky et al., 2005).

Purpose Statements

The purposes of this study are described as following:

1. to establish a baseline of how much water the children in Head Start drink during the program day measured by a water bottle and water fountain use.
2. to test the hypothesized associations between children's water consumption at school and their parents' perception of water consumption, as well as their teachers' perceptions of water consumption.
3. to compare parents' perceptions of their children's beverage consumption with the national data from the 2009 FACES interview (DHHS, 2017).

Significance

It is estimated that 34,869 children aged 3-5 years have access to Head Start programs in Florida (DHHS, 2016b). As per Head Start's mission, these children and their families engage in a partnership to seek self-sufficiency through education and job preparation and are provided with expertise in a variety of different areas such as education, transition, literacy, family services, health, and nutrition.

A core goal of Head Start is a focus on the nutritional needs of children and their families (DHHS, 2016a). The Head Start parent handbook points out that children need the healthy foods in their diets with low sugar content (DHHS, 2018). One reason for this focus on nutritional needs is the rising obesity rates of children in America.

Head Start programs have a high percentage of non-Hispanic, Black, and Mexican-American children. Ethnic disparities in obesity rates make it relevant to study the Head Start population's water consumption. Non-Hispanic white children and adolescents have lower rates of obesity in comparison to non-Hispanic black and Mexican-American children (Wang & Beydoun, 2007).

Schools are a primary target for research and prevention programs. Since children spend most of their time at school, the role of school is regarded as an important platform to influence practices to promote children's health and well-being (Mamedova & Redford, 2015).

Research has shown that Early Childhood Education (ECE) programs, especially Head Start programs, have a positive impact on health equity. For every $1.00 investment, the return is approximately $4.00 to the United States government (Ramon et al., 2017).

The findings of this research study may provide Head Start administrators and policy makers with insights as to whether the Head Start Performance Standards are helping Head Start to meet the goal of water consumption to promote children's health and wellbeing (DHHS, 2016a).

Research Questions

Based on the standards in the 2016 Head Start regulations, three research questions are addressed:

1. How much water do Head Start children drink during a school day?

2. What are the classifications of children's water consumption based on parent reported water consumption at home and observed water intake in the classrooms?

3. How do the parents' views of their children's sugary beverage intake differ from the national level based on the FACES data?

To assess the above research questions, research measurements focused on children, parents and teachers. The present research used (a) an observational behavior checklist to evaluate children's water drinking consumption, (b) a daily measurement of water consumption from an individualized water bottle, and (c) parent and teacher surveys to assess their perceptions regarding children's beverage selection and water drinking.

Assumptions

In the present study, one assumption is made. Since Head Start programs only enroll children who are 100% at or below the poverty line, it is assumed, based on the national obesity literature, that they are at higher risk of developing childhood obesity than children who are not low income (He, James, Merli & Zheng, 2014).

Summary

It is important to gain information on water consumption at the preschool age to fulfill the community and organizational needs of promoting healthy outcomes in children. As stated in the literature review, there is a gap in identifying factors about water consumption for preschool aged children. The current exploratory study of children's water consumption at a Head Start center found that many children do not drink very much water during the day. In addition, the analysis identifies environmental factors (parent and classroom) that interrelate with the child water consumption. The findings from this study provide a valuable foundation for future intervention studies to increase young children's water consumption.

In the current parent report, it appears that this set of Head Start parents differ from the 2009 FACES parents in the number of sugary beverages their children drink. Specifically, the parents in this study report less use of soda beverages than the parents did in 2009.

In the Chapter 2, a detailed analysis of the literature on the current childhood obesity research, water consumption and theoretical foundations of the research is presented. Chapter 3 presents the methodology and the design of the current study. In Chapter 4 contains the findings from the current study are presented. Chapter 5 includes the discussion, implications, recommendations, and conclusion of the study.

In conclusion, the present research study is timely in providing Head Start administrators and policy makers with insights on how much water children drink, and to identify the factors in that might increase the amount of child water consumption.

CHAPTER TWO: LITERATURE REVIEW

Introduction

Children in the United States are facing serious health concerns regarding obesity and consequently will be the first generation in the history of the United States to have a shorter life expectancy than their parents (Olshansky et al., 2005). The measure of obesity, called the Body Mass Index (BMI), is defined by a person's weight (in kilograms) divided by the square of this person's height (in centimeters), and has been used to measure the effects of water drinking on childhood obesity over time (Center of Disease Control, CDC, 2015). The CDC's 2011-2012 report indicated that obesity rates have doubled among two-to-five-year-old children and have tripled for children ages six-to-nineteen years in the past three decades (CDC, 2015). Obese pre-school children are five times as likely to become obese adolescents and are four times as likely to be obese adults (Natale et al., 2013). Compared to children who are average weight, children who are obese or overweight have a higher risk of developing chronic diseases both in childhood and adulthood. Excessive weight risks include onset of type 2 diabetes, cardiovascular disease, hypertension, stroke, asthma, anxiety, depression and certain cancers (Natale et al., 2013; Cluss et al., 2014).

Childhood obesity has both short-term and long-term impacts on the economy (Shan et al., 2010). An estimated $150 billion dollars annually is spent on obesity-related health care costs (National Conference of State Legislatures, 2014). Childhood obesity is accountable for a direct medical cost of 14.1 billion dollars (Segal, Rayburn, & Martin, 2016). Obesity attributed heath care costs will reach 25.8 million dollars by 2018 in Florida (National Initiative for Children's Healthcare Quality, 2011). In addition to health and economy, childhood obesity also impacts the effectiveness of children's learning and educational success (Bandura, 2004; Wagner, Senauer, & Runge, 2007).

Socioeconomic Status and Income Inequality

Childhood obesity across socioeconomic groups shows disparities. Chung et al. (2016) reviewed 30 studies from around the globe from 2000 and beyond to examine trends of childhood obesity across low and high socioeconomic groups. Chung et al. (2016) found the disparities between low socioeconomic groups and high social economical groups. One third of the studies demonstrate growth in overweight and obese children from low socioeconomic groups compared to one in ten studies for high socioeconomic groups.

Other research has indicated that family socioeconomic status is associated with childhood obesity (He et al., 2014). He et al. (2014) investigated factors that may impact obesity to include: income, energy-dense food price, physical inactivity, environment, awareness and incentive to prevent overweight and obesity. They found that the income inequality affects obesity at an overall level, and as the economic development increases the overweight and obesity increase the fastest of all factors. He el al. further explained that developed countries tend to have lower food prices and more readily available energy-dense food thus impacting the population which has undergone food insecurity thereby increasing the possibility of being overweight.

Sugar-sweetened Beverages

Since children spend a great deal of their time at school, the role of school is regarded as an important platform to influence practices to promote children's health and well-being. It is not surprising then that schools become the target for research studies on health programs.

Research indicates that schools provide and sell a wide range of unhealthy foods and drinks to students which contribute to health issues. For instances, schools sell sodas, sport drinks and high-calorie fruit drinks, which are referred to by the CDC (2011) as sugar-sweetened beverages. Many researchers suggest limiting access of SSBs as a tool to combat childhood obesity and promote health. A survey conducted in 2006 shows that schools have given easy access of high fat, sodium, and added sugary beverages in cafeterias, vending machines, and snack bars (O'Toole, Anderson, Miller, & Guthrie, 2007).

Kenney et al. (2014) conducted a group-randomized, controlled trial over a year at twenty afterschool programs focusing on system, policy, and nutritional and physical activity environmental changes. They adopted a community-based environmental assessment tool called Out of School Nutrition and Physical Activity (OSNAP). The environment assessment tool includes a set of standards. For instance, 30 minutes of physical activity each day combined with 20 minutes of vigorous physical activity three times per week, using water instead of SSBs as the beverage served at snack, the elimination of commercial broadcast TV/movies and limitation of recreational computer time to less than one hour per day. The results of the study demonstrated significant positive findings regarding the environmental changes.

While water intake replacing sugary drinks was a key variable in many obesity programs with adults and older children, there is not much research focused on the amount of water drinking solely to fight obesity and promote healthy BMIs in young children and (Ritchie et al., 2015; Battista et al., 2014)

Water Consumption and Children's Performance

Research shows water consumption has positive effects on preventing obesity, reducing dental cavities (under the effect of fluoridated tap water), and improving alertness among children (Patel et al., 2014; Popkin, D'Anci & Rosenberg, 2010). In addition, insufficient water drinking leads to dehydration.

Research has long demonstrated that dehydration can cause impairment to brain tissue especially in very young children (Popkin, D'Anci & Rosenberg, 2010) and increases morbidity (Manz et al., 2002). Further, dehydration leads to ineffective use of brain metabolic activity and exerts a higher level of neuronal activity in planning and visual space processing performance (Kempton et al., 2011). After a few hours of dehydration, children show a decrease in cognitive performance levels on recalling previously presented objects, and accurately performing visual attention tasks (Benton & Burgess, 2009; Edmonds & Burford, 2009; Booth, Taylor, & Edmonds, 2012). Fine motor skills of children tested by frequencies of finger taps and handwriting speed show significant increase when they had a drink of water (Booth et al., 2012).

Water Consumption Policies

United States Department of Agriculture (USDA)'s Healthy Hunger-Free Kids Act, suggested that free access to drinking water should be included during school lunch and breakfast programs (USDA, 2017). Patel et al. (2014) studied the accessibility of school drinking water among 240 public schools in California by using variables such as location, type, maintenance, and desirability of drinking water sources. They identified the characteristics of the schools which had excellent water access as well as barriers to improving the water drinking access. They suggest that raising awareness of the benefits of drinking water in school, along with funding, can help communities achieve excellence in accessing drinking water by providing free, potable, and appealing water drinking choices (Patel et al., 2014).

They also mention the role that parents and other community stakeholders should play to create free access to drinking water in schools and their local communities (Patel et al., 2014). Again, there is some level of awareness and regulations emerging; however, more in-depth information and variables need to be gathered and analyzed.

Head Start took water consumption into consideration when designing their new performance standards. The 2016 Head Start Program Performance Standards states to “Make safe drinking water available throughout the program day” under the nutrition service requirements (DHHS, 2016a, p. 38). Further, the new standards also connect water drinking to improved dental health.

Aside from the standards, Head Start Family and Child Experience Survey (FACES), guided by Inter-university Consortium for Political and Social Research (ICPSR), collected information on children’s beverage and energy intake from the Parent Interview and Teacher Interview (DHHS, 2017). The Head Start FACES is “a nationally representative descriptive study of Head Start programs, classrooms, and children, that provides information about program performance, including improvement efforts, quality, and outcomes for children and families.” (DHHS, 2017, para.1). The parent and teacher interviews collect information on the parents’ knowledge of their children’s food and drink consumption.

A recent thorough literature review reveals that there are no research studies that have collected data to analyze amount of water consumption for preschool children while considering parents’ and teachers’ perceptions. The uncover of water consumption research on pre-school children’s water consumption does not imply that there is absolutely aren’t any study on water consumption of young children.

Empirical Review of Literature on Water Consumption by Children

The CDC (2011) identifies the benefits of drinking water as the following: (a) keeps body temperature normal; (b) lubricates and cushions joints; (c) protects the spinal cord and other sensitive tissues; and (d) gets rid of body waste through urination, perspiration, and bowel movements. Research promotes substituting water for sugary beverages to reduce calorie intake per meal, thus preventing obesity, improving dental hygiene, and improving cognitive functioning (Patel et al., 2014). Stookey et al. (2014) found a significant association between water drinking and absolute weight loss in 25 children of nine-to-twelve years over an eight-week intervention.

Current literature has examined water consumption from both qualitative and quantitative perspectives. In efforts to measure water consumption by children, researchers have frequently adopted measures (e.g. checklists, scales) for quantitative analysis and showed considerable progress in managing factors and significant changes in measurements of beverage intake, BMIs, and weight loss (Battista et al., 2014; Caballero, 2004; Kenney et al., 2014; Ritchie et al., 2015). In addition, a self-reported twenty-four-hour recall questionnaire is another quantitative tool often used to measure water intake.

Following is a review based on the methodology of the study.

Questionnaires

Many studies carried out in elementary schools have relied on the children's memories of water consumption by using checklists and questionnaires (Muckelbauer et al., 2009). A randomized, controlled cluster study examined a combined environmental and educational intervention targeting the promotion of water drinking on 2,950 elementary school children (age

M = 8.3, *SD* = .7) in socially disadvantaged areas (Muckelbauer et al., 2009). The intervention group had water fountains installed and four lessons were presented to promote water drinking over one school year. Children were asked to evaluate their beverage intake on a 24-hour recall picture-based questionnaire administered by a teacher. The intervention group children also received a water bottle and teachers were motivated to oversee water refills each morning. Interviews and questionnaires were given to teachers to evaluate the process of intervention as to how water drinking impacted class routine and how water promotion lessons impacted water fountain uses. BMIs were calculated and water flow of the fountains were recorded. This study applied quantitative data analysis to answers of survey questions, which were coded into nominal categories. The combined educational and environmental study showed that the single focus on water drinking leads to an effective decrease in obesity risks for elementary school children (Muckelbauer et al., 2009).

Interviews and Focus Groups

Parents and teachers are frequently approached to provide information on children's water consumption. As indicated in the review of literature, parents' and teachers' perceptions provide a more complete view on children's water consumption of children 6-12 months old. Parents play an important role in reaching the health goal for their infants ages 6-12 months (Hoare et al., 2014). A qualitative study by Hoare et al., (2014) used interviews to explore 32 Australia parents' perceptions of water quality, fluoridation, water costs and other factors and the choices of beverages for their 6-12 months old infants. Five themes emerged as health, age appropriateness of drinks, child's temperament, drink preferences, and social influences derived from categories such as drink choice, fluoride, influences, consumption of sweetened drinks, and introduction of water. Water, especially tap water, was chosen as the healthy and economic choices for younger children, with recognition of the benefits of fluoridate water to dental health. Factors that influence the drinks provided to the child are: (a) child's preference (child likes it), (b) child's temperament (keep the peace), (c) parenting styles (conform or ignore request for sweet drinks, availability of sweetened drinks, and prior experience), (d) other family members (grandparents provide sweetened drinks despite the mothers' will), (e) own experiences (water drinking, dental decay experience), and (f) marketing and social settings (water bottle needs to be colorful).

De Craemer et al. (2013) conducted focus groups of parents (*N* = 122) and teachers' (*N* = 87) of 4-6-year old to explore their perceptions on the beverage intake and physical activity level of this group. Both parents and teachers, from 6 European countries, identified factors to increase water intake to include being a role model at home and reminding children to drink water in class (teachers). Parents also suggested decreasing preschoolers' sugary beverage intake by not buying those beverages and themselves not drinking soft drinks at home. Teachers also recommended that they not provide sugary beverages at school and only providing water as a drink to manage beverage consumption.

A study in the UK focused on 2nd and 5th grade teachers' belief about water intake and water access showed that 95% of the teachers (*N* = 85) agreed with the statements that: (a) when the children are not thirsty, they can focus better; and (b) children should be allowed to drink water during the day (Kaushik, Mullee, Bryant, & Hill, 2007).

Using qualitative methods, a school- and community-based intervention called "Water Campaign," targeted the sugar-sweetened beverage consumption combined with the promotion of tap water drinking in socially deprived communities (Blanchette, Van De Gaar, Raat, French, & Jansen, 2016). Interviews and focus groups with 6-12 years old children's parents, teachers, and community leaders provided insights as to their behaviors including daily activities, parenting practices and on lessons that helped to shift lifestyle. The findings confirmed the interventions effectiveness on increasing water consumption. Research shows that parents identified limiting sugary drinks as a crucial action to oral and general health for elementary school children.

A quasi-experimental study examined the effects of the use of a water jet machine on standardized BMI and obesity (Schwartz, Leardo, Aneja, & Elbel, 2016). A t-test was used to compare the children's mean standardized BMIs between 374 water jet schools and 482 non-water jet schools. The results showed that the schools that received water jet installations were significantly associated with the reduction on zBMI, and with reduced likelihood of both being overweight and obese. One of the limitations listed by the author was that the study used only interview and questionnaire data without any observational data on water jet usage in the cafeteria.

Observations

Observational tools, such as checklists to record children's water drinking frequency, were applied to generate data for quantitative analysis in a study by Patel et al. (2012). In addition, the researchers used telephone surveys to examine twenty-four public school administrators regarding the school's water access. Observational tools were developed to measure types of drinking water sources, and to record quality of drinking water clarity and flow strength. The children's drinking water intake was observed. The variable was calculated by counting the number of children drinking free water within one hundred feet of the meal service area (Patel et al., 2012). Audio-recorded surveys that averaged ten-to-twenty minutes were given to administrators to measure drinking water sources, policies and practices, and barriers to provide insights for schools that intend to implement water drinking policies. Findings show that only four percent of the 8-year-old children drank water; thus, the researchers suggested that a different delivery of free water access needs to be considered. Another finding suggests that half the schools had free water access before the regulation of installing water fountains was established. In this study, surveys generated qualitative data on the administrators' perceptions regarding the water drinking requirements.

Mixed Water Intake of Young Children

Even though recent research has shown the physical, cognitive and mental health benefits of water drinking for children (Muckelbauer et al., 2009), it is not clear if 3-5-year old children are drinking water, how much they are drinking, and what factors influence their consumption of water.

Petter, Hourihane, and Rolles (1995), conducted a study on young children's drinking habits focusing on water, other beverages, and related energy intake. The measures used were a dietary journal and a 48-hour recall questionnaire both completed by a parent or caregiver. The 2-4 years old preschool group (n = 39) were compared with the infant group (n = 66) in water intake. The preschool group had a higher percentage of "never drink water" (71.8%), but lower percentages of the following water consumption frequency: 4 times (2.6%), 3 times (5.1%), twice (5.1%), and once (15.4%) during the past 48 hours. The infant group had a lower percentage of never drink water (50%), followed by higher percentages of the following water consumption frequency: 4 times (12.1%), 3 times (7.6%), twice (13.6%), and once (16.7%) during the past 48 hours.

Northstone, Rogers, Emmett, and the ALSPAC Study Team (2002) investigated a total of 1026 children's beverage intake at 18 months with a 24-hour beverage recall survey completed by a parent or a caregiver. The researchers used analysis of variance (ANOVA) test and multivariable logistic regression to identify associations between water consumption and other beverages and demographical variables. The research revealed that the average water consumed at 18 months was 1.5 ounces. The water consumption was associated with demographic variables such as gender, education, ethnicity, and BMI. The results indicated that mothers with the highest educational degrees had a higher proportion of children consuming water than the ones without a degree. Other characteristics associated with higher proportion of water intake are the following: no major financial problems, rented household tenure type, mothers are at older age range (+30 years), longer duration of breastfeeding (+1 months), and the child had no older siblings.

Kant and Graubard (2010) examined the water intake from the 2005-2006 National Health and Nutrition Examination Survey (NHANES) data. The data were collected from parent 24-hour recall. The associations of the water intake with socio-demographical characteristics and lifestyles were analyzed. Key findings of the plain water consumption were: (a) the mean intake of plain water for 2-5 years old is about 302 grams or 10 ounces, lowest compared to the 6-11 and 12-19 years old group; (b) in terms of plain water intake of children 2-19 years old, boys reported higher water intake amount (624 grams or 22.0 ounces) than girls (540 grams or 19 ounces). (c) children 2-19 years old water intake was highest amongst family with poverty-income ratio higher than 2; (d) the lowest education level of household reference (less than 12 years) had the highest plain water intake amount among all 2-19 years old children; (e) children across 2-19 years old with highest BMI percentile had the highest amount of plain water intake; (f) of all children, the group had the highest water consumption amount also had a lot of physical activity. Sex, age, BMI, and physical activity were significantly associated with water consumption of children 2-19 years old.

Drewnowski et al. (2013) also investigated the 24-hour recalls from 3 cycles of NHANES data 2005-2010. They evaluated the water intake of the children aged 4-13 years old and compared that to the US Institute of Medicine (IOM, 2011) recommendation for water intake which is 57.48 ounces (1700 ml) per day for boys and girls ages 4-8 (IOM, 2011). The results indicated that children 4-8 years old drink a total of 12.34 ounces (364.9 ml) per day, tap water 7.67 ounces (226.8 ml) and bottled water 4.67 ounces (138.1 ml) respectively. When considering water consumption for all children ages 4 to 13 years old, girls consumed 14.8 ounces (439.0 ml), slightly higher than boys at 14.3 ounces (423.1 ml). They concluded that no children had met the recommendations of water intake and suggested close monitoring of children's water intake.

These findings can provide insights for the demographic variables; however, specific information is lacking to measure the association of children age 3-5 years old.

Theoretical Framework

After a review of theories in the field of early childhood, the two theories that guide this research study on water consumption are Social Learning Theory and Ecological Theory.

Social learning perspective. Bandura's social learning theory focuses on behavioral learning from parents' and teachers' modeling. Bandura's (1977) social learning theory presents a comprehensive human behavior framework and emphasizes the importance of cognitive processes and observational learning in the acquisition process. The process of observational learning conceptualized by Bandura contains four components: attention, retention, motor reproduction, and motivation. Learning phenomena occurs when people focus their attention, observe the retention from others, model behavior reproduction, and gain motivation. Bandura also explained the factors of interaction: reciprocal determinism, behavior, personal factors and environment factors and how they "operate as interlocking determinants" of each other (p. 10).

Social learning theory places learning behavior in a broader social context that interplays with other determinants beyond the environment. Modern Social Learning Theory acknowledges that environment, even though it creates a strong influence on behavior, is only one factor among many (Miller, 2002).

Bandura (2004) explained how social cognition transfers to behaviors thus habit changes in the health model. Social learning theory can be applied to the social phenomena of water consumption. If parents drink water and serve water to their children, the children observe this behavior, retain it, and reproduce it. The same is true of a teacher who drinks water and serves water. The child will reproduce the behavior when seeing important people in his or her life drinking water.

Ecological model. Bronfenbrenner's (1979) ecological model adds value to the conception of this research idea. Bronfenbrenner asserted human development as a "product of interaction between the growing human organism and its environment" (p. 16). Bronfenbrenner divided the ecological environments into four structures and their developmental impacts. Microsystem involves the immediate features of an environment that interacts with the person directly and how this person perceives those features. Mesosystem entails the relationship and interaction between microsystems, including home, school or peers. Exosystem is the interrelations between two or more environments that can impact a person indirectly, e.g. parents' places of work, siblings' classrooms and friends of parents. Macrosystem is the "intrasocietal contrasts" involving culture and subculture, belief systems or ideology that can be either different or alike from each other.

Bronfenbrenner's theory (1979) suggests the need to better understand children's behavior and activities in everyday settings--home and school settings among peers and others. It also proposes how preschool and day care settings can alter children's self-perceived behavior more than changes shown in intelligence and scores (Bronfenbrenner, 1979). Miller (2002) indicated that ecology interest can provide observational methods to collect descriptions of children's ongoing behavior at home or school environment.

Summary

In summary, the literature review indicates two findings: (a) there is very little research on water consumption among preschool aged children, and (b) parents' perceptions of water consumption may be impacting children's water consumption (Blanchette et al., 2016). Observational techniques are recommended as a more accurate measure of water consumption than questionnaires (Patel, 2012).

This present research was designed to examine water drinking through the models of Bandura's observational construct and the ecological model of Bronfenbrenner. Its purpose is to explore the awareness of parents/caregivers on water consumption and examine the broader ecological systems beyond the Head Start preschool classroom. It is important to examine environments through the theoretical frameworks of Bandura's modeling. Based on Bronfenbrenner's emphasis on mesosystem, the present study used measures including surveys to explore parents' and teachers' perceptions on water consumption in the home environment and the classroom environment respectively.

One can imagine that improving the development and growth of children involves multilevel impacts and influences from various environments in which children live and acquire knowledge. Based on exploring and examining children's behaviors in those settings, we can obtain an integral view of understanding the behavior of the children.

These findings support the necessity of exploring parents' perspectives when examining children's water consumption (Blanchette et al., 2016; De Craemer et al., 2013; Hoare et al., 2014; Kaushik et al., 2007). Although parents' and teachers' perceptions were presented in the above-mentioned research, there is a need to understand factors in parents' and teachers' perceptions that may impact preschoolers' water consumption in the United States.

CHAPTER THREE: METHODOLOGY

The purpose of this study is to explore the water consumption of head start children throughout the program day, the respective parents' and teachers' perception on children and their own water consumption, and the interdependent relationship among them.

In this chapter, the research design is delineated, the sample is defined, and the data collection methods, measures, and analysis are described and explained.

Research Design

A person-centered approach was adopted for this study to explore children's water consumption over an eight-week period and examine factors in parents' and teachers' perceptions that may impact healthy beverage selection.

Setting Up the Study

The researcher contacted the Head Start senior program manager in November 2016 for an initial meeting to discuss ideas about her doctoral dissertation on children's health and water consumption. The senior program manager overseen a large Head Start district in a southeastern state. The administrators of Head Start were very interested in knowing how much and how often the children are drinking water and approved the idea of the research study. After discussion, the senior program manager agreed to the study, selected one of the district's Head Start centers to be involved, and provided the researcher the site manager's contact information. The subsequent meeting with the site manager was also successful. The researcher established that the study was feasible to complete after several visits to the assigned Head Start program to meet the staff. Communication continued with both the senior program manager and the site manager via face-to-face meetings and email reports throughout the study.

Population and Sample

The initial study population included all Head Start centers across a large school district in a southeastern state in the United States. The county Head Start senior manager appointed one of those Head Start Centers to be the research site. The sample included children across four preschool classrooms.

In the Fall 2017, a convenience sample of four classrooms was selected by the site manager to participate in this study. The site manager had two considerations in deciding which classrooms would participate. One was to expand to classrooms that were not exposed to the pilot projects and the other was to select classrooms that had a normal teacher workload. One classroom was chosen at the beginning but was taken out because its teacher had administrative roles that might add too much stress to be involved in the study.

Participants of this study include children, their parents and teachers from the four selected classes out of seven classrooms in one Head Start program. Each classroom has a mix of 3-5-year old children and a maximum number of 20 children per classroom. The sample size was 80 children, 80 of their parents/guardians, 4 lead teachers, and 6 teaching assistants.

Protection of Human Subjects

The current research study was reviewed and approved by the University of Central Florida (UCF) Institutional Review Board (IRB) for potential harmful impact and risk for participants (Creswell, 2007) (see Appendix A). The IRB protocol required that the parent or legal guardian give informed consent before data was collected.

Process for Obtaining Consent to Participate

After approval by the researcher's dissertation committee and the UCF IRB, the researcher met with the on-site manager to discuss the strategies for obtaining consent to recruit participants. The teachers were asked to participate and all of them provided consent.

No incentives were provided to the site, teachers, children, or parents for participation in the study. However, at the end of the study, the children were given their own water bottle to take home as a souvenir. The four teachers and four teacher assistants were also given a water bottle as a token of appreciation.

Consents from the Parents

The consent forms and IRB approval letters were distributed to parents at the Meet the Teacher Day event. At the event, the researcher was introduced to the parents by the classroom teachers and given time for an introduction to the research project. The researcher discussed the information listed in the consent form that included: (1) the right of participation to voluntarily withdraw from the study at any time, (2) the purpose of the study and procedure of data collection, (3) confidentiality of the participants' data, (4) known risks associated with participation, and (5) the need for the signature of either the parent or the legal guardian. The parents were informed of the procedure as to how the water bottles and the water fountains would be cleaned, on a daily basis as required procedure by Head Start. Parents were informed that the research needed the following information including: (a) age, (b) demographic information, (c) attendance, and (d) height and weight. Lastly, the parents were informed that the teachers will provide the children's headshot photos to tape to the water bottles and create a code sheet for inter-rater reliability check.

Parents who were willing to have their children participate in the study, signed a consent form. During the drop-off time in the morning, the researcher contacted the parents who were not at the Meet the Teacher Event to ensure they received full details about the study.

Prior to the start of the study, the researcher met in-person with parents who had not returned the consent forms during morning drop-off time to confirm their non-participation status. Once the decision of non-participation was confirmed, the researcher made sure that the child was not included in any data collection procedure. This involved only two parents whose child was later dropped out of the Head Start program afterwards. One hundred percent of the 80 parents or legal guardians participating was finally confirmed.

On the day of the water bottles were introduced to the children, the teachers asked the children in their classrooms whether they agreed to be in the study and all children provided assent.

During the parent survey period (the 5 - 8 weeks of the study), by agreeing to complete the parent survey, parents confirmed their consent to participate in the study. A total of 80 parents completed the survey.

Consents from the Teachers

After the selection of the classroom, the researcher introduced herself and explained the study purpose design to the teachers, and after answering a few questions, asked them if they were willing to participate. All teachers agreed to be part of the research study. Oral consent was obtained from all teachers and teacher assistants.

All of the teachers who were involved in the study maintained positive communications and attended individual daily briefings and a weekly summary every Friday for eight weeks.

Recruitment and Training of Research Assistants

University of Central Florida (UCF) undergraduate students in the Early Childhood Development and Education (ECDE) program were contacted by email and received invitation with recruitment flyers attached to be research assistants for this study. After recommendations from faculty members, a group of three assistants were selected to help with data collection from a pool of five interested candidates. One Spanish-speaking research assistant was recruited and selected to conduct parent surveys for those Spanish-speaking parents.

The researcher has experience in training students to conduct observations and surveys (Zhang, 2017a; Zhang, 2017b). For the present study, the researcher, who had piloted the study in the previous semester, trained the team of three research assistants for a three-week period.

There were two phases in the training of the research assistants. Phase one involved understanding the conditions of the observations and identifying target behaviors for water fountain use and water bottle use. Through discussion, the research assistants acquired a solid understanding of the items on the checklist. They gained full understanding and felt comfortable with the checklist and during the practice in classrooms. They reached 100% of agreement on the frequency of the water fountain and bottle use. Based on (Mockovak, 2016), percent agreement provides measures for accuracy and agreement intuitively. Thus, strong inter-rater reliability was established.

During the second phase of the training, the researcher conducted observations simultaneously, yet independently, with each research assistant. After reviewing the observations with the research assistant, and noting the differences, the researcher and research assistant discussed the observations. The researcher input the scores and calculated correlations between the two observations conducted simultaneously by the researcher and each research assistant to check inter-rater reliability throughout the training session. When less than 100% agreement was obtained, a discussion ensured and a final decision was made as to whether to include the data. After consistently reaching 95% interrater reliability, the research assistants' training was concluded and the actual data collection process began.

Once each research assistant reached 95% agreement with the researcher, the research assistants were paired and located in the same classroom on randomly selected days to test for the inter-rater reliability among the three raters (included primary researcher). The training reliability percentage of agreement during the data collection phase was 100%.

Training reliability. The training reliability was conducted by the researcher by randomly visiting each classroom and conducting observations. Each classroom was visited twice daily. In addition to training the assistants on daily observations with the Water Fountain Visit Checklist, the researcher randomly drew a number representing the classroom to visit during the training weeks. The researcher continued the reliability check for the other three classrooms. During those visits, the researcher found a location next to the assistant with a clear view of the water fountain, and conducted observations on children's water consumption. After that data collection ended, the researcher met with the research assistant at the meeting location in the conference room in the administration building to compare the frequency counts with the research assistants' checklist for reliability. By the last week of the training, the training reliability was reached at the 100% agreement between the researcher and the research assistants consistently.

In cases where there was disagreement about the data collected during the random visit, discussion among the researcher and research assistant took place until 100% consensus was reached. Meanwhile, randomly selected observations during training were conducted by the researcher for a total of 90% of the observations.

The research assistant, recruited for Spanish-version parent survey (Appendix F), received training on the study background and purpose, the survey questions and characteristics of the parents. After two meetings with the researcher, the research assistant conducted two mock surveys, one with the researcher, and then with a teacher outside of the study classes.

Data Collection Procedures

The three research assistants conducted observations on children's classroom water consumption behavior in their assigned classrooms during the program day from 8am to 2pm for eight weeks. Every morning they used the following: (a) clipboard with the checklists and notes, (b) pen, (c) scale, and (d) a notebook for the data collection. The detailed data collection procedures on water fountain, water bottle, parent survey, and teacher survey are listed below.

Water Fountain Visits

All classrooms had operating water fountains connected to sinks. A water fountain was located in the cafeteria and the meeting room in the administration building. All the children and staff at the Head Start center have free access to all water fountains. The research assistants started data collection on children's visits to water fountains at 8am and concluded at 2pm. The observation area is about one meter behind the water fountain of each classroom and there is a bench for the research assistants to sit. This location, free from the children, and approved by the researcher during the pilot study (Zhang, 2017a), enabled the research assistants to be isolated from the main activity area. Here they observed and recorded children's visits to the fountain. This location also provided a good angle to ensure that the research assistants could observe the behavior during the water fountain use. The research assistants stayed in pre-determined areas to minimize the impact on the classroom environment.

The research assistants followed the children from their classrooms to the cafeteria during meal times and outdoor playtime. During the tooth brushing and story times (12:00pm - 12:20pm), the original observation bench area was occupied with the children's cots. Thus, the research assistants stood at the door area three meters away from the water fountain. A daily schedule is provided (Appendix B). At the end of each data collection period, the research assistants archived the data sheets in a locked file cabinet.

The research assistants memorized the children and their respective codes on the assigned sheets during the training week. The photographs of the children were provided to assist the process of familiarizing the children and the codes. The checklist included the assigned codes of each child for the research assistants to tally the frequency of water fountain use and space for notes on any environmental factors effecting water drinking (see Appendix C). At the beginning of the daily observation, the research assistants recorded the classroom number, time, and checked the water temperature and cleanness level. Throughout the program day, the research assistants made a check for every child's visit to the water fountain. At end of the day, the assistants recorded if a child was not attending the center.

During the research assistants' study period, they wrote a daily log with anecdotal notes on environmental factors such as weather, changes in the daily schedule, or other situations that could influence a child's water intake.

Study reliability. Throughout the study, two of the research assistants were paired to conduct the observation for the randomly assigned reliability check. After the data collection began, one of the research assistant was randomly assigned on every Wednesday to go into a different classroom for a reliability check. The research assistant was given a code sheet with the child's headshot and code to record the water consumption of the child. The inter-rater reliability was reached at 100% of agreement during the reliability check on the research assistants which was done 20% of the time.

Water Bottle Intake

Every morning from 7:30 to 7:45 each research assistant filled the children's water bottles. They weighed each one and recorded the water bottle amount on the daily water bottle reading log. The research assistants delivered the bottles to the classrooms on a cart by 8 a.m.

The research assistants placed the water bottles on the counter next to the water fountain area in either the red basket (for the girls) or the green basket (for the boys). The two baskets helped the children find their water bottles and avoided confusion. The researcher gave every teacher an outline of the list of things to explain to the children. For example, the teacher explained to the children to look for their own name and photo before using the water bottle. On the first day of introducing the water bottle to the children, the children were told not to play with the bottle. The teacher told the children to "drink water freely from the water bottle throughout the day" and that the "water bottle is to stay in the classroom, not go outside, to the cafeteria, or home".

The researcher taped the headshot and a name tag (first name, Initial of the last name) on every bottle so the children could identify their bottle. Research assistants oversaw the maintenance of the water bottle and helped children who could not recognize their own botte and offered assistance. They monitored and made sure no children took the bottle home at the end of the day.

The children used their water bottles within the first few days of the study starting. In cases when a child finished the water and requested a refill, the teacher collected the water bottle and handed it to the research assistant to refill the water bottle to the 12oz/350ml line. The research assistant weighed the bottle before the refill and recorded the weight. After each refill, the research assistant weighed the bottle again and recorded it on the daily log. At the end of the program day, the research assistants collected the bottles from the baskets and brought all the bottles to the research assistants' research study area, located in a portion of the teacher lounge. The research assistants used the digital scale to measure the water left in each bottle and recorded it on the daily log.

After the measurement of every bottle in teacher's lounge, the research assistants cleaned the bottles in the Head Start kitchen, brought bottles back to each classroom for refill, then brought the bottles back to the teachers' lounge, and stored them in the refrigerator to stay cool for the next day. The research assistants cleaned the water bottle according to the Head Start's sanitary procedure, including washing with hot, soapy water, rinsing and sanitizing, and allowing them to air dry. Head Start provided all materials involved in the sanitary process. After the cleaning process, the research assistants transported the water bottles to each assigned classroom to be refilled. This process ensured that the water children consumed from the bottle was from the same source as the water fountain.

Steps to support fidelity included: (a) researcher checking batteries of each scale every other Friday and (b) the researcher using a test weight to check the balance accuracy of the scale measurement every two weeks. The test weight was completed when the test weight placed on the operating scale displayed weight values that were exactly the value of the test weight (Morse & Baer, 2004). The calibration was reached during the study.

Study reliability. Throughout the study, two of the research assistants were paired to conduct the observation for the randomly assigned reliability check. After the data collection began, one of the research assistant was randomly assigned on every Wednesday to go into a different classroom for a reliability check. The research assistant was given a code sheet with the child's headshot and code to record the water consumption of the child. The inter-rater reliability was reached at 100% of agreement during the reliability check on the research assistants which was done 20% of the time.

Weight and Height of the Children

During the first month, the site nutritionist contacted the site manager for the measurement of height and weight. On the day of the measurement, the children from each classroom were brought to the meeting room in the administration building before breakfast. The children were instructed to line up and take off their shoes and jackets and stand on the digital scale. While the child stood on the scale, the school nutritionist operated the flip from the top of the machine and pressed on the top of the child's head to measure the height. For children who were absent on the day of the measurement, the school nutritionist made a follow-up visit to the site to collect information within a 2-4-week period.

Parents' Perceptions on Children's Water and Beverage Intake

The researcher contacted the parents/legal guardians and asked them to complete a ten minutes survey on their perceptions of beverage consumption in the home environment.

The researcher invited the parents/legal guardians to participate in the surveys in person during drop-off time of their children. Upon an agreed time and location, such as drop-off time or pick-up time, the researcher stayed at the gate of Head Start with chairs to conduct the parent surveys. A few other locations were used based on the parents' choice to complete the survey. The researcher conducted surveys only with parents who agreed to have their child participate in the study. The participants were asked to give oral consent again before the start of the survey and were reminded that the completion of the survey served as the consent for their participation.

After confirming the child's name, a 4-digit code was recorded on the survey. The researcher started with a short introduction of the study purpose and statement about the confidentiality. The researcher read the questions to the parents and recorded the answers. The researcher showed a sample water bottle for the parents to visualize the amount of children's water intake for questions related to the recommended water intake. The researcher made sure to be consistent in tone of voice and maintained a calm demeanor throughout the communication with the parents. The majority of the parents completed the survey in 5-7 minutes.

In cases where the parents asked for Spanish translation, the Spanish-speaking research assistant was scheduled to be on site. The researcher made arrangements with the parents as to their best available time. For parents who needed to reschedule, the researcher coordinated the time and location for the Spanish speaking research assistant and the parents to meet on site. All 80 participants completed the parent survey.

Teachers' Perceptions on Children's Water and Beverage Intake

The researcher gave a ten-minute survey to the 4 lead teachers, and 6 teacher assistants to share their perceptions on the water daily consumption in their environment.

The researcher explained the invitations to complete the survey to the teachers in person. Upon an agreed time, such as lunch break or children's rest time, teachers and teacher assistants met with the researcher to complete the survey. The researcher confirmed their willingness to participate in the survey before the introduction of the study and discussed the confidentiality. The teachers and the teacher assistants gave oral consent and provided answers for the survey. A 4-digit code was filled in by the researcher and no name or identifiers were captured on the survey.

By end of the study, the teachers and the teacher assistants were given a water bottle as a token of appreciation for their participation in the study.

Measures

The measures used in this study include (a) Water Fountain Visit Checklist, (b) Water Bottle Measure Log, (c) Parent Survey, and (d) Teacher Survey.

Water Fountain Visit Checklist

The researcher designed the checklist to document the children's water intake by the frequency of visits to the water fountain per child. The notion is very similar to a study by Schwartz et al. (2016) as a way to measure water intake.

The checklist identified each child in the classroom by listing assigned four-digit codes and protecting names. Each code corresponds with a line of boxes that represented the frequency of a water fountain visit. Based on a pilot study (Zhang, 2017), no child had more than 8 visits thus each code was followed by only ten boxes. The checklist also indicated whether the class had an outside playground activity. A pilot study conducted in Head Start classrooms by the researcher concluded that outdoor play time is an important time to collect water intake data (Zhang, 2017).

Water fountain cleanliness level (clean/rusty/dirty) and water temperature (cold/room temperature) were also listed on the checklist to record the environmental factors. Water fountain visits were recorded throughout the program day including meal times (breakfast and lunch). A similar research by Schwartz et al. (2016) also observed water fountain access during mealtime.

The water consumption checklist was piloted and tested during the summer of 2017. The checklist had space for the research assistants to take notes about anything that occurred out of the ordinary such as schedule change or the fountain being inoperable (see Appendix C).

Validity and reliability. The researcher has piloted the checklist; revised it and used it with research assistants at a neutral child care facility to validate the measure prior to using it at the study site (Zhang, 2017b). The researcher did not test the checklist on preschool children at the same site due to the concern that it may contaminate the sample population. Based on the 100% agreement inter-rater reliability between two research assistants during a four-week pilot study, the researcher was comfortable with the final version of the checklist to be a reliable tool to observe children's water consumption (Zhang, 2017b).

The inter-rater reliability was obtained during the period that the research assistants were trained by the researcher. After the training, the inter-rater reliability evidence was continued to be collected during the study.

Water Bottle Daily Log

The research assistants documented children's daily water intake amount via a 12oz/350ml water bottle on the Water Bottle Daily Log (Appendix D). The log listed children's names and four-digit codes and two columns (AM for morning and PM for afternoon) indicating time of each measurement and the corresponding amount. The checklist also included columns to record number of spills and refills.

The researcher reviewer various water bottles, and UZSPACE Water Bottle was selected because of these child-friendly features:

- 100% food grade
- 100% Tritan material, can pass the very strict inspection
- Bottle has leak and spill proof design
- Comfortable texture for comfortable hand grip

A digital kitchen food scale was assigned to each research assistant to measure the water bottles' weight throughout the day.

Body Mass Index (BMI)

Body Mass Index (BMIs) were used to screen for four different weight related health categories based on the age and gender equivalency of the children (CDC, 2015). It is calculated by the height and weight of the child. The ChildPlus software used by Head Start computed the BMI and produced age appropriate BMI values.

Parents Surveys

The FACES 2009 structured Parent Questionnaire was used as a model to construct the parent survey (DHHS, 2017). The length of the original FACES 2009 structured Parent

Questionnaire is 220 pages in length (Meadows, 2003) but only one question on beverage intake was used for this study in addition to eight demographical questions. Adjustment to the selected items from the 2009 FACES Parent Questionnaire (DHHS, 2017) was also used.

The question taken from the FACES (2009) was as following: During the past 7 days, how many times did [CHILD] drink Soda pop (for example, Coke, Pepsi, or Mountain Dew), sports drinks (for example, Gatorade), or fruit drinks that are not 100% fruit juice (for example, Kool-Aid, Sunny Delight, Hi-C, Fruitopia, or Fruitworks)? (Appendix E).

An added question on water was "During the past 7 days, how many times did your child drink water?". The question format was also used for the intake of the 100% fruit juice for the current study. Other similar patterns of questions were asked regarding parents' soda, 100% juice and water consumption frequencies.

Identical questions on the juice and soda consumption were taken from the parent survey to compare the parents' views on their children's beverage consumption with the national data.

The format of the answers of the beverage intake questions consisted of multiple choices. A list of choices was taken from the FACES Parent Questionnaire. For instance, the frequency questions on beverages shared the same set of answers include (a) ≥ 4 times a day, (b) 2-3 times a day, (c) once a day, (d) almost every day, (e) 1 to 3 times during the past 7 days, (f) I do not drink these, and (g) other (Appendix E).

There were also additional questions used to investigate the water consumption of both the child and their parents or legal guardian. These questions include: (a) what was your child's favorite drink choice when he/she was thirsty; (b) what was your favorite drink choice when you are thirsty? The set of answers for these two questions include: (a) Milk (e.g., Cow's Milk, Chocolate Milk, Soy Milk); (b) Soda Pops (e.g., Coke, Pepsi, or Mountain Dew); (c) Sports Drinks (e.g., Gatorade); (d) Fruit Drink (not 100% fruit juice, for example, Kool-Aid, Sunny Delight, HI-C, Fruitopia, or Fruitworks); (e) Water; and (f) Other.

The researcher asked parents to report children's water intake amount at home to compare it with the recommended daily water intake of 3-5 years old. Similar questions were asked to obtain information on parents' water intake as well. Examples included (a) The daily suggestion for children's water intake is about 5 cups (3.5 bottles). Do you think your child meets the recommended level? and (b) The daily suggestion for adult's water intake is about 13 cups (10 bottles) for adult males and 11 cups (8 bottles) for adult females. Do you think you meet the recommended level? The answers were yes or no.

Demographic questions such as gender, race, education level and income were taken directly from the FACES Interview. For instance, for the question on education level: what is the highest grade or year of school that you completed?, the choices include: (a) Up to 8th grade; (b) 9th to 11th grade; (c) 12th grade but no diploma; (d) High school diploma/equivalent; (e) Voc/Tech program after high school but no diploma after high school; (f) Some college but no degree; (g) Associate's degree; (h) Bachelor's degree; (i) Graduate or professional school but no degree, (j) Bachelor's degree (Medicine/MD; Dentistry/DDS; Law/JD/LLB; etc.); (k) Master's degree (MA, MS); and (l) Other. The household income was asked: what's the range of monthly income for your household? The choices are: (a) $500 a month or less; (b) $900-$1250 a month; (c) $1250-$1700/month; (d) $1700-$2000 a month; (e) $2000-$2500/month; (f) $2500-$2900/month; and (g) More than $3000/month.

Due to the large Spanish-speaking community in Head Start, the survey was translated into Spanish. The current research study adopted Brislin's (1970) forward-backward translation procedure. Two bilingual translators conducted the translation. Forward translation from English to Spanish and back translation from Spanish to English were the first step. Then the translators discussed results to reach "satisfactory equivalence."

The researcher included the date and the 4-digit code of the child on the survey to identify the parents and the initial of the researcher or the Spanish speaking research assistant, whoever conducted the survey.

Validity and reliability. Based on FACES technical report (O'Brien et al., 2002) and user guide (Malone et al, 2013), mode of administration, question content, wording and sequencing, response categories, question sequencing and the format were all taken into consideration to ensure validity. Nonetheless, no specific information was provided for the Parent Questionnaire.

The reliability for survey questions was tested and the added questions together with the established questions were tested for validity and reliability. The researcher conducted a pilot study in July and research assistants and parents were given the survey (Zhang, 2017b). Based on the parent feedback, strong evidence of validity and reliability was gathered.

Teacher Surveys

The FACES 2009 structured Teacher Questionnaire was used as a model to construct the teacher surveys (DHHS, 2017) for this study. The length of the original FACES 2009 structured teacher interview protocol is 48 pages (Meadows, 2003) but only one questions on the beverage intake was used for this study besides the demographical questions. The question directly taken from the FACES Interview is "During the past 7 days, how many times did the children in (ONE CLASS) your class/(MORNING CLASS) your morning class/(AFTERNOON CLASS) your afternoon class drink Soda pop (for example, Coke, Pepsi, or Mountain Dew), sports drinks (for example, Gatorade), or fruit drinks that are not 100% fruit juice (for example, Kool-Aid, Sunny Delight, Hi-C, Fruitopia, or Fruitworks)? Was it . . ." (p.28).

The researcher added questions specific to water consumption since that information was not asked in previous FACES interviews. Both the teacher and the children's water consumption were investigated. The researcher edited the selected question from the Teacher Questionnaire from the 2009 FACES (DHHS, 2017) and formed questions including: (a) During the past 7 days, how many times did the children in your class drink 100% fruit juices such as orange juice, apple juice, or grape juice? Do not count punch, Sunny Delight, Kool-Aid, sports drinks, or other fruit flavored drinks. Was it...; and (b) During the past 7 days, how many times did the children in your class drink water (from water fountain, water bottle or other)? Was it… (Appendix G).

The format of the answers of the beverage intake questions consisted of multiple choices. A list of choices was taken from the FACES Teacher Questionnaire, for instance, the frequency questions on beverages shared the same set of answers: include (a) ≥ 4 times a day, (b) 2-3 times a day, (c) Once a day, (d) Almost every day, (e) 1 to 3 times during the past 7 days, (f) I do not drink these, and (g) Other (Appendix G).

The research added additional questions. These questions included: (a) what was the children in your class's favorite drink choice when they were thirsty? (b) what was your favorite drink choice when you are thirsty? The answer for these two questions include: (a) Milk (e.g., Cow's Milk, Chocolate Milk, Soy Milk); (b) Soda Pops (e.g., Coke, Pepsi, or Mountain Dew);

(c) Sports Drinks (e.g., Gatorade); (d) Fruit Drink (not 100% fruit juice, For example, Kool-Aid, Sunny Delight, HI-C, Fruitopia, or Fruitworks); (e) Water; and (f) Other.

Demographic questions such as gender, race, education level and income were taken from the FACES interview protocol.

Validity and reliability. Based on FACES technical report (O'Brien et al., 2002) and user guide (Malone et al, 2013), no direct information on validity and reliability was provided on the teacher questionnaire. The site manager and the dissertation committee members were consulted on the survey questions. The survey was piloted on two site classroom teachers that were not part of the research study and showed evidence of validity and reliability (Zhang, 2017a).

Data Analysis Procedures

All data were input into Excel by research assistants on a password protected laptop by the end of each day. The laptop was stored in a locked cabinet at the researcher's office and the key remained in the possession of the researcher at all times. When the research assistants entered data, they entered it in the research study area, on-site with the guidance of the researcher and handed the hard copies to the researcher to store in the locked cabinet. The researcher built an excel file for research assistants to conduct the data entry. Data included the children's checklist and water bottle logs and surveys. All participants were assigned a four-digit code and all identifiers were removed for the security of the data and confidentiality. Once all data were entered into the Excel file the research assistants checked for accuracy.

Research Questions and Data Analysis

The purpose of the present study was to identify the water consumption of children at Head Start. Parents and teachers provided information on their own water and beverage intake. Water consumption of the children was analyzed and reviewed to gain an understanding of the preschoolers' water behavior.

Research Question One: How much water do Head Start children drink during a school day?

For research question 1, descriptive statistics, including frequencies, percentages, means, standard deviations, minimum, and maximum, were reported.

The purpose of research question one was to examine the current water consumption of preschool aged children. The data on the water bottle measures from the Water Fountain Checklist (Appendix C) and the Water Bottle Measure Log (Appendix D) were entered into SPSS version 23. Data presented here are descriptive statistics, and included means, standard deviations, minimum, maximum, and the range.

For each child, the daily water bottle measure was analyzed and compared with demographic characteristics. The water fountain visit frequency was analyzed and reported.

Research question 2: What are the classifications of children's water consumption based on parent reported water consumption at home and observed water intake in the classrooms?

For research question 2, data were inputted and analyzed using Mplus 7 (Muthén & Muthén, 1998-2017). A Latent Variable Mixture Model (LVMM) was applied to identify homogeneous profiles of children based on water consumption. Assumptions were tested.

Water consumption classes were analyzed based on related indicators (categorical variables). The binary categorical variables used in the LVMM include: (a) children's water consumption in the classroom measured by the water bottle; (b) children's water consumption in the classroom measured by the water fountain; (c) parent reports whether the children's water intake meet the recommended level; (d) the water consumption frequency of the children; and (e) whether the children's favorite drink choice is water when thirsty.

All participants were included in the model based on the missing data inclusion featured by this model. The analysis of the LVMM produced a few selections of models, for example, two-class, three-class, and four-class solutions. The models were compared based on model fit statistics to select the best model fitting solution. The indices used to identify the best model-fit selection included Information Criteria (ICs), comprised of Akaike information criteria (AIC), Bayesian information criteria (BIC), sample-size adjusted BIC (SABIC). The adjusted Lo-Mendell-Rubin likelihood ratio test (LMR LRT; Lo, Mendell, & Rubin, 2001), the bootstrapped likelihood ratio test (BLRT), entropy, theoretical and practical considerations were part of the decision-making process to help the researcher evaluate the best-fitting model.

After the classes were selected, the demographic characteristics, beverage consumption, and classroom characteristics were examined. SPSS (Version 23) was used to conduct chi-square analyses to describe each latent class. The analyses also examined the influence of those characteristics on each class in the LVMM model.

Research Question 3: How do the current study's parents' views of their children's sugary beverage intake differ from the parents in the 2009 national level based on the FACES data?

For research question 3, a chi-square goodness of fit was selected to answer the research question, "is the mean sugary beverage consumption of children different from the mean sugary consumption of the national level based on the FACES data?" Because the FACES records sugary beverage consumption as a categorical variable, Head Start parents' perception on children's sugary beverage consumption in this study was also coded as categorical variable when compared with national FACES data with a chi-square goodness of fit test. Data were inputted in SPSS version 23 and comparisons were conducted (Lomax & Hahs-Vaughn, 2012) at an alpha level of .05. The null hypothesis stated that mean sugary beverage consumption of children do not differ from the mean sugary consumption of the national level (FACES data). The alternative hypothesis stated that the mean sugary beverage consumption of children differs from the mean sugary consumption of the national level (FACES data).

Summary

This chapter provided an outline of the methodology and steps for conducting the present study. A person-centered research design with observational and parent-report measures was used to answer the research questions. This chapter included a discussion of the sample of Head Start classrooms and the characteristics of the sample. Protection of human subjects and its procedures were provided along with measures and data collection procedures throughout the study. Finally, the analytical plan for the research questions was provided. Chapter 4 describes the findings of the data analysis plan described in this chapter.

CHAPTER FOUR: FINDINGS

Introduction

This study utilized a person-centered approached to identify patterns of water consumption of children in Head Start classroom. The purpose of this study was to find out how much water preschool aged children consume. A secondary purpose was to examine the water consumption both from teachers and parents' perspective. Lastly, the non-sugary beverage consumption was compared with the national FACES data (2009). This chapter first introduces the descriptive statistics of the sample characteristics, then presents the procedure and results of the statistical analysis.

Sample

In total, 82 three to five years old children in four classrooms at a Head Start center in the southeastern U.S. were observed during an 8-week period throughout the program day. Water consumption was recorded by the weight difference of water bottle, water fountain visits, and length of time for the fountain drinks. By the end of the study, two children had dropped from the Head Start program thus their water consumption data were excluded from the data analysis. All 80 children's parents or legal guardian completed a voluntary survey (100% response rate) and the BMIs and BMI status of each child was provided by the Head Start office. Other demographic data. including age and sex of the child and information about beverage intake at home, were collected through the parent survey. Teacher data was also collected.

Children

Characteristics of the children are presented in table 1. Among the 80 children, 50% were female (n = 40), with a mean age of 3.8 years (SD = .62). The mean BMI was 14.26 (SD =

2.3365, range = 20.2). Out of 80 children, 35 children were identified as underweight (43.8%), 38 children were identified as healthy weight (47.5%), 3 children were identified as overweight (3.8%) and 4 children were identified as obese (4%).

Parents

At least one parent or legal guardian agreed to complete the survey for each child (100%). Out of 80 parents or legal guardians that completed the survey, 16% were male (*n* =13) and 84% were female (*n* = 67); 81.3% (*n* = 65) were mothers, 15% (*n* = 12) were fathers, and legal guardians made up the remaining 3.8% (*n* = 3). They were mostly Hispanic (62.5%), followed by White (17.5%), Black or African American (15%), Asian (2.5%), and Brazilian (2.5%). Almost 69% of parents were employed. There was an almost equal distribution between two-income (45%) and one-income families (43.8%). A small percentage of the parents (10%) held graduate degrees, while 18.8% of parents held Bachelor's degree. Some of the parents held Associate's degrees (13.8%) and some of the parents (16.3%) had attended some college but did not hold a college degree. Additionally, 6.3% had vocational/technical education after High School but no degree, 13.8% had attained a High School diploma, and 11.3% had a 12th grade education but had not attained a high school diploma, 8.8% had completed 9th-11th grade, and 1.3% had completed up to 8th grade. When asked about water consumption issues, 46% of parents or legal guardian did not have any concern with the water quality at home. See Table 1.

Teachers

All four teachers, four teacher assistants, and two senior volunteers from the four participating classrooms agreed to complete a teacher survey. All teachers were females. Of ten teaching staff in the classrooms, six (60%) self-identified as Hispanic, two (20%) as Black or

African American, one White, and one Asian. One-half of the teaching staff held teaching certificates. One-half (50%) of the teaching team had a CDA credential. About 70% (*n* = 7) of teaching staff were currently enrolled in teacher-related training or education, including post-secondary school programs and graduate programs.

Table 1
Frequencies of Individual Characteristics of Children and Parents

Characteristic	*n*	Percentage
Age		
3	24	30
4	46	57.5
5	10	12.6
Gender of Child		
Female	40	50
Male	40	50
Gender of Parent		
Female	67	83.8
Male	13	16.3
Work		
Yes	47	58.8
No	25	31.3
Self-Employment	6	7.5
Missing	2	2.5
Race		
White	14	17.5
Black or African American	12	15
Asian	2	2.5
Spanish	50	62.5
Other- Brazilian	2	2.5
Income		
$500/month or less	7	8.8
$500-$900/month	3	3.8
$900-$1250/month	11	13.8
$1250-$1700/month	9	11.3
$1700-$2000/month	12	15
$2000-$2500/month	13	16.3
$2500-$2900/month	15	18.8
More than $3000/month	5	6.3
Didn't know	5	6.3

Characteristic	*n*	Percentage
Education		
Up to 8th grade	1	1.3
9th - 11th grade	7	8.8
12th grade but no diploma	9	11.3
High school diploma/equivalent	11	13.8
Voc/Tech program after high school but no diploma after high school	5	6.3
Some college but no degree	13	16.3
Associate's degree	11	13.8
Bachelor's degree	15	18.8
Graduate degree	8	10

Research Question 1

Research question one asked: How much water do Head Start children drink during a school day? For each water bottle measured daily, the bottle weight difference was calculated by subtracting the morning weight measure from the end of program day weight measure. In cases where refills were required, the weight difference was added to the calculation. Data on water bottle intake was measured only on days when the classrooms had direct observation from the research assistants (*n* = 17 days). In cases where there might be a spill, the child's water bottle measure was marked as missing to ensure the accuracy of the measured water consumption. There were 26 spill incidents that marked as missing.

Water Consumption Measured by Water Bottle

Average daily water consumption per child was 1.82 ounces (*SD* = 1.75 ounces). The maximum water consumption of a single child during a program day was 25.28 ounces (*range* = 0.0 ounces to 25.28 ounces).

As shown in Figure 1, water intake by bottles ranged from 0 ounces to 7.21 ounces, with more children drinking 1.31 ounces than any other amount (3.7%). Figure 1 shows that the distribution of water consumption was positively skewed, with the most frequent intake amount being at the lower end of the distribution. Skewness was also evident as the quartiles were not equally spaced, as shown in Figure 1. Thus, overall the sample of children tended to drink a lower amount of water, although a few high water consumption (as 3.7% was triple the mean) should be encouraging.

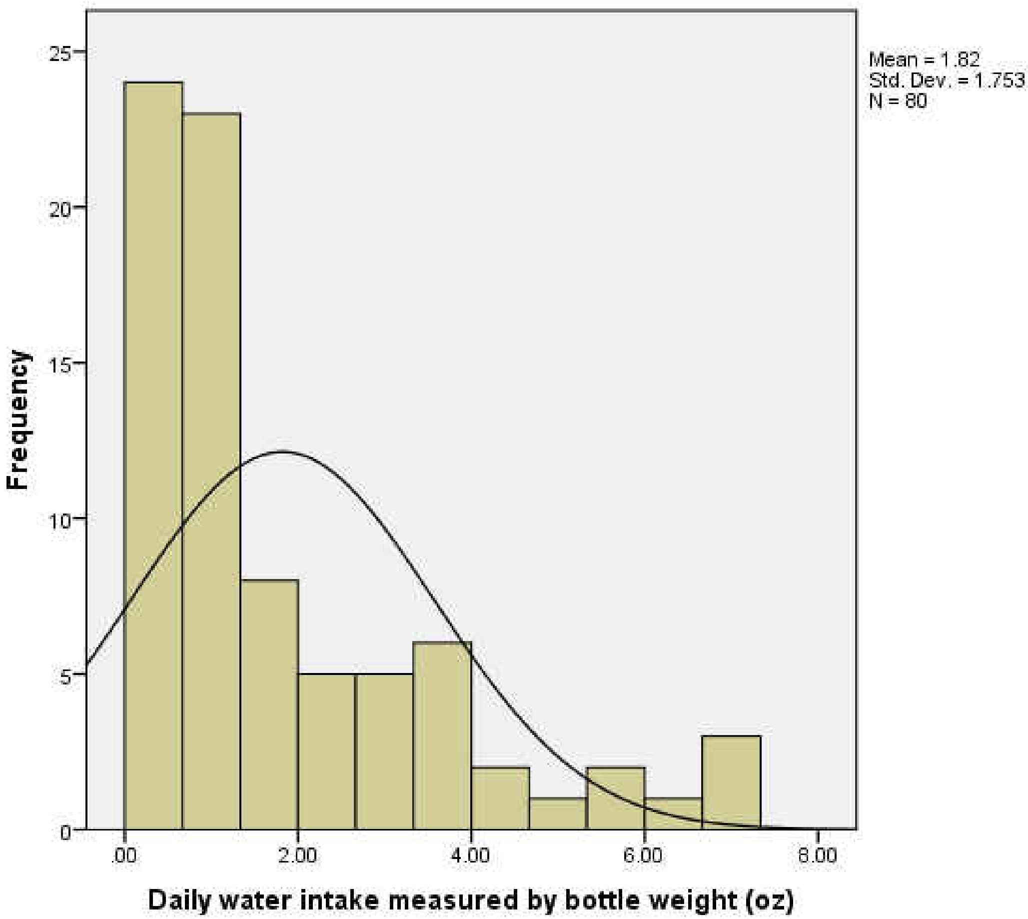

Figure 1 Water Bottle Consumption of Children

Water consumption was explored based on a number of factors including gender, BMI, race, parents' education level, and classroom (see Figures 2- 6). Girls (M = 1.91, SD = 1.79, n = 40) had slightly more average water consumption than boys (M = 1.73, SD = 1.73, n = 40). Based on Figure 2, the middle horizontal line in the box represents the 50th percentile. Boys and girls were very similar in water intake for children that were in the lower 50% of the distribution. Excluding outliers, the upper 50% of the distribution was slightly more spread out for girls as compared to boys. Excluding outliers, the whiskers on the end showed the girls had higher water intakes than boys. A few extreme values of water intake were identified for both the girls and the boys.

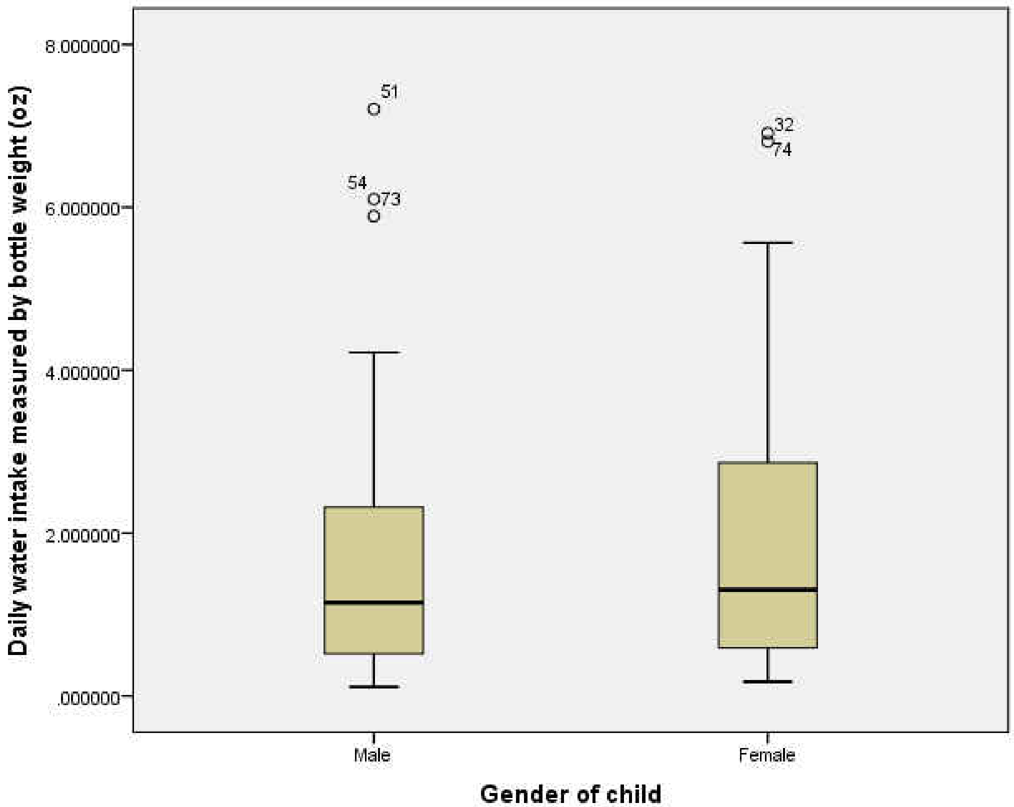

Figure 2 Water Bottle Consumption by Child's Gender

The children's BMI status indicated that children who were overweight had the highest average water consumption (*M* = 4.36, *SD* = 2.23, *n* = 3), while children who were reported as obese had the lowest (*M* = 1.29, *SD* = 1.53, *n* = 4). Reviewing boxplots of water intake by BMI status (see Figure 3), the middle horizontal line in the box representing the 50 percentiles of the water intake, displayed the lowest for children who were obese, second to the last for the children who were underweight, second for the children who were healthy, and the highest for the children who were overweight. The middle 50% of water intake distribution were somewhat equal for both children who were healthy and obese, and were higher than the children who were underweight. In the boxplot (see Figure 3), the middle horizontal line of the box for children who were overweight is higher than the upper end whisker for the children who were underweight. In other words, excluding outliers, approximately 50% of overweight children had more water intake than all other children. Additionally, overweight children in the top 25% of water intake had more water intake than all other children in the sample with the exception of a handful of outliers. Only the children who were underweight and healthy weight had extreme high water intake values represented as outliers.

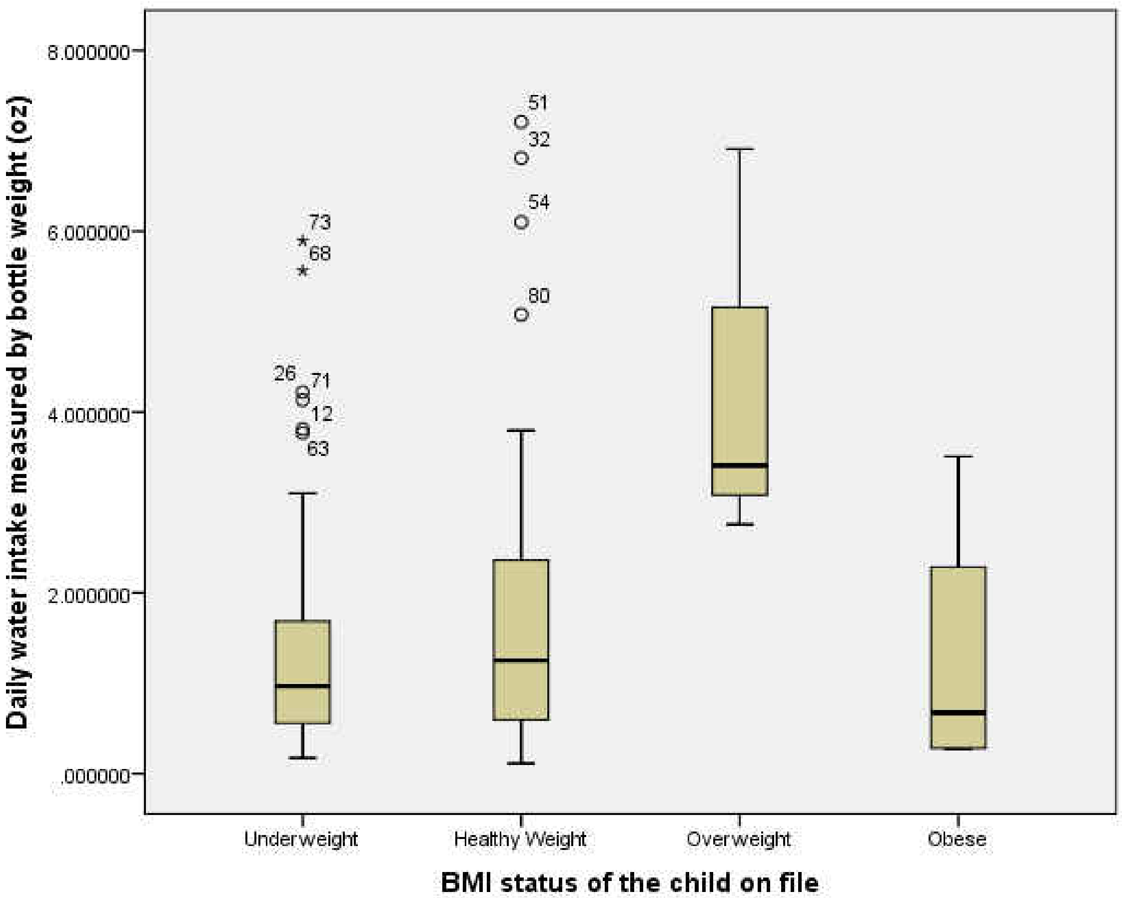

Figure 3 Water Bottle Consumption by Child's BMI Status

Based on Figure 4, even though there were only 2 Asian children, they had very similar amounts of water intake, and that water intake was higher than 75% or more children in all other racial categories (*M* = 3.30, *SD* = .27, *n* = 2). Children whose parents were Brazilian had higher water intake (*M* = 2.14, *SD* = 1.17, *n* = 2) than about 75% of children whose parents identified as Black (*M* = 1.19, *SD* = 1.10, *n* = 12). The largest range of water intake was for children whose parents were Spanish (*M* = 2.02, *SD* = 1.97, *n* = 50).

The upper 50% of children who are White (*M* = 1.39, *SD* = 1.37, *n* = 14) had higher water intake than those whose parents identified as Black or African American, Brazilian or Asian.

There were extreme water intake values for the children whose parents are Black or African American, and Spanish represented as outliers.

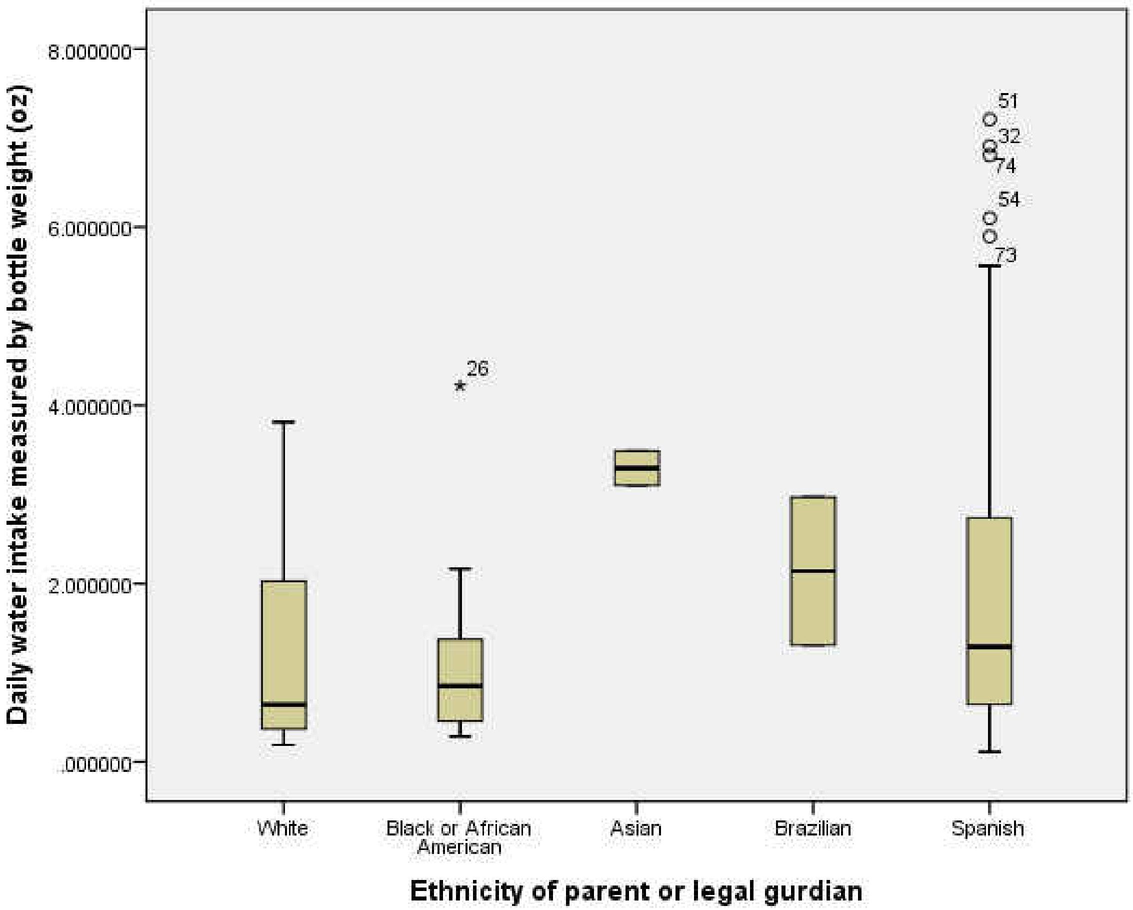

Figure 4 Water Consumption by Parent's Ethnicity

Children whose parents had a graduate degree or higher had the highest amount of average water intake (M = 2.64, SD = 1.49, n = 8), followed by children whose parents had a Bachelor's degree (M = 2.35, SD = 2.35, n = 15). There is only one child whose parents completed up to 8th grade had the lowest average water intake of .50 ounces. Reviewing boxplots of water intake by parent's education (see Figure 5), the children whose parents held Bachelor's degrees had the widest range of water intake followed by the children whose parents held Graduate degrees. Excluding outliers, the water intake for the upper 50% of children whose parents had a graduate degree was higher than all children whose parent had a 9th-11th grade education (M = 1.81, SD = 2.04, n = 7), a vocational/technical diploma (M = 1.56, SD =2.01, n = 5), some college but no degree (M = 1.33, SD = 1.44, n = 13), and an associate's degree (M = 1.73, SD = 1.94, n = 11) and higher than 75% or more of children whose parent held a 9th-11th grade education, 12th grade education (M = 1.81, SD = 1.26, n = 9), and high school diploma (M =1.43, SD =1.30, n = 11).There were extreme water intake values for children whose parents had completed 9^{th}-11^{th} grade, vocational/technical education after High School but no degree, some college but did not hold a college degree, and those held an Associate's degrees.

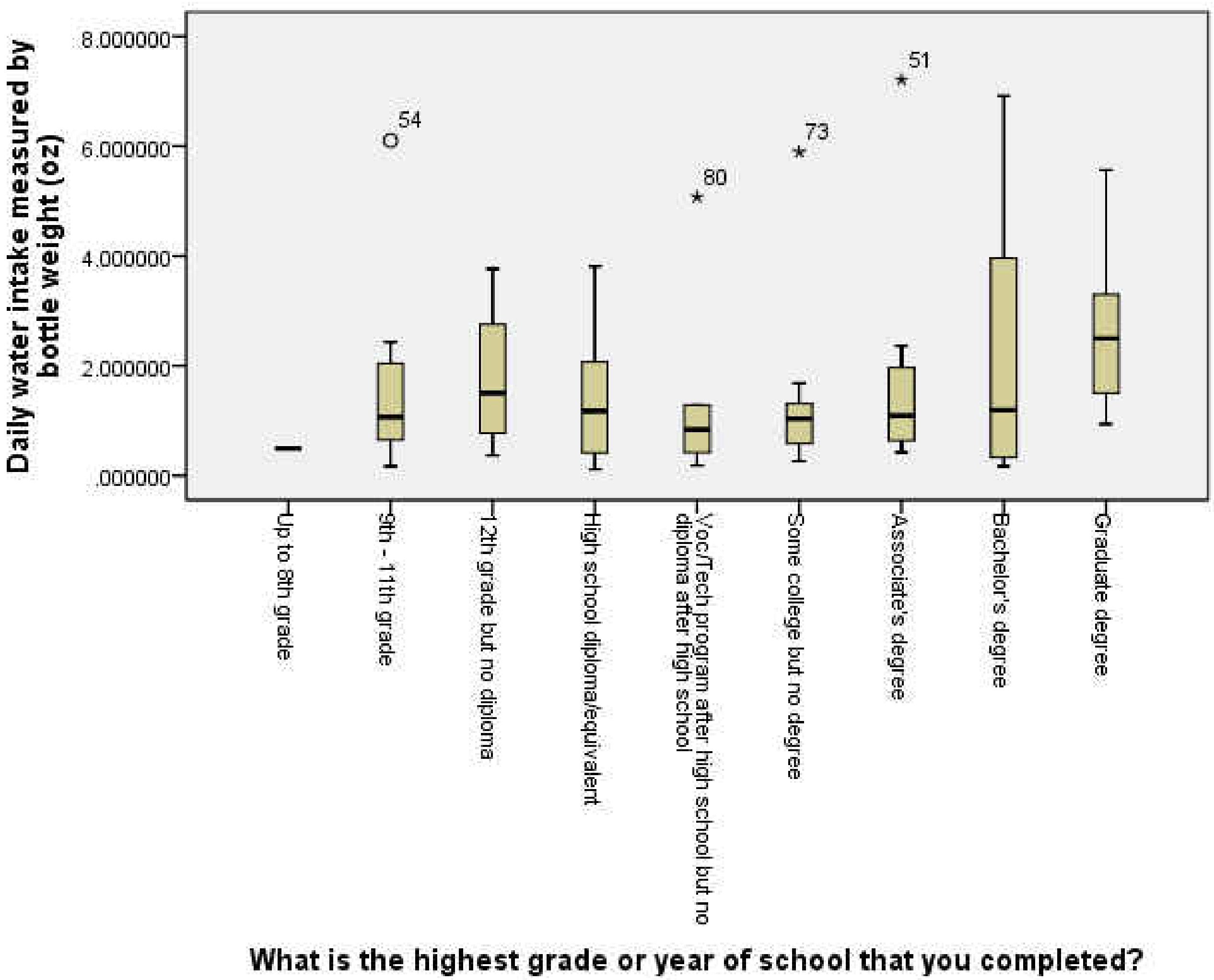

Figure 5 Water Consumption by Parents' Education Level.

In addition to individual child differences, there were differences among classrooms in water consumption. Classroom 1 had the lowest average water consumption per child per at .78 ounces (*SD* = .842, *n* = 20), while classroom 2 had the highest water consumption per child at 4.2 ounces (*SD* = 1.752, *n* = 20). Classroom 3 and 4 were at 1.22 ounces (*SD* = .725, *n* = 20) and 1.07 ounces (*SD* = .605, *n* = 20), respectively. Reviewing boxplots of water intake by classroom environment (see Figure 6), Classroom 2 had the highest range of water intake, followed by classroom 3, classroom 4, and classroom 1 respectively. Only Classroom 1 had extreme values for water intake. The largest middle 50 percentile of water intake distribution displayed were for classroom 2 and the smallest for classroom 1. Children in the upper 75% of water intake in classroom 2 had greater water intake than all children in the other classes with the exception of one child that was an outlier.

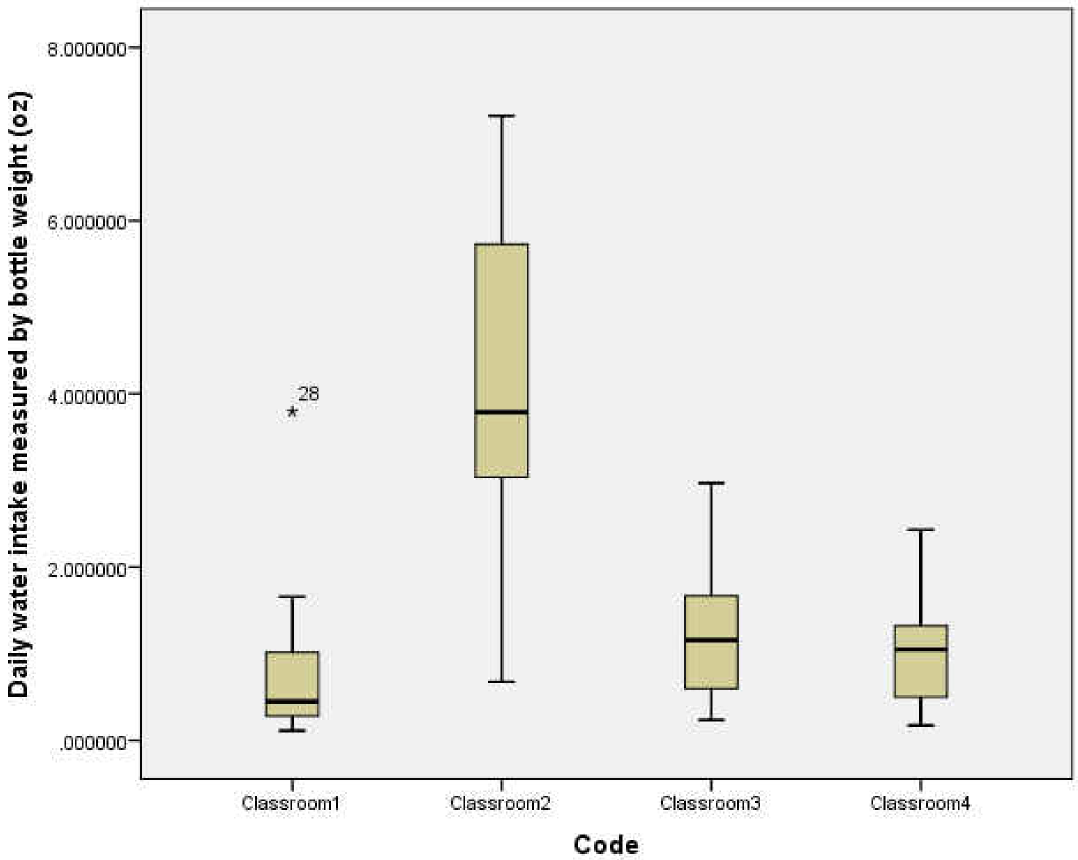

Figure 6 Water Bottle Consumption by Classroom

Water Consumption Frequency from Water Fountain

Water foundation frequency was observed an average of 18 days. Of the 80 participating children, 41 (51.25%) never used the water fountain and 39 (48.75%) used the water fountain. The number of water fountain visits per child ranged from 0 to 1.2 (*M* =.098, *SD* = 1.20). The highest water fountain visit frequency of a single child during a program day was 5 times (*range* = 0 time to 5 times).

Research Question 2

Research question two asked: What are the classifications of children's water consumption based on parent reported water consumption at home and observed water intake in the classrooms? Latent variable mixture modeling (LVMM) was selected to determine patterns of data and to what extent the patterns associate with the variables with a focus on similarities and differences between human subjects rather than relations among variables (Berlin, Williams, & Parra, 2013; Muthén & Muthén, 1998-2017). This study aims to explore latent classes among cross-sectional collected data so the LVMM model was conducted to identify profiles of children's water consumption. The statistical package used was Mplus version 7 (Muthén & Muthén, 1998-2017). For research question 2, there are two parts of analysis: first, a latent class analysis and then analysis of features that may associate with water behavior latent classes. All missing data were included in this model under the missing data theory using robust maximum likelihood estimation (Little et al., 2014).

Latent Class Analysis

The latent variable mixture model analysis aims to identify subgroups or latent classes of children who had similar profiles on their beverage consumption across several indicators. The indicators used to create subgroups or latent classes included: children's water intake during program day (water intake above mean = 1; water intake below mean = 0), children's water fountain visit during program day (at least one fountain use = 1; never = 0), parent rated child's water intake frequency (more than once a day = 1; less than once a day =0), parent rated child's favorite beverage choice when thirsty (water = 1; other beverages = 0), and parent rated child meet the recommended water level (yes = 1; no = 0).

One to four latent class models were examined to determine the best fit of the model. To select the best model, model fit indices were compared including Akaike information criteria (AIC), Bayesian information criteria (BIC), sample-size adjusted BIC (SSABIC), adjusted Lo-Mendell-Rubin likelihood ratio test (LMR LRT; Lo, Mendell, & Rubin, 2001), and the bootstrapped likelihood ratio test (BLRT). Among those indices, lower IC indices indicate a better model fit while entropy (range: 0-1) higher than .70 is recommended for indicating better classification (Ansari & Purtell, 2017). Sample size, theoretical concepts, and interpretability of the latent classes were also used for determining the best-fitting model (Berlin et al., 2014; Geiser, 2012). Lower log likelihood and IC indices suggest better model selection. LRT and BLRT were used to identify the ideal class selection between *k* class and *k*-1 class, a significant $p<.05$ indicating *k* model is a favorable selection when compared to *k*-1 class (Hu et al., 2016).

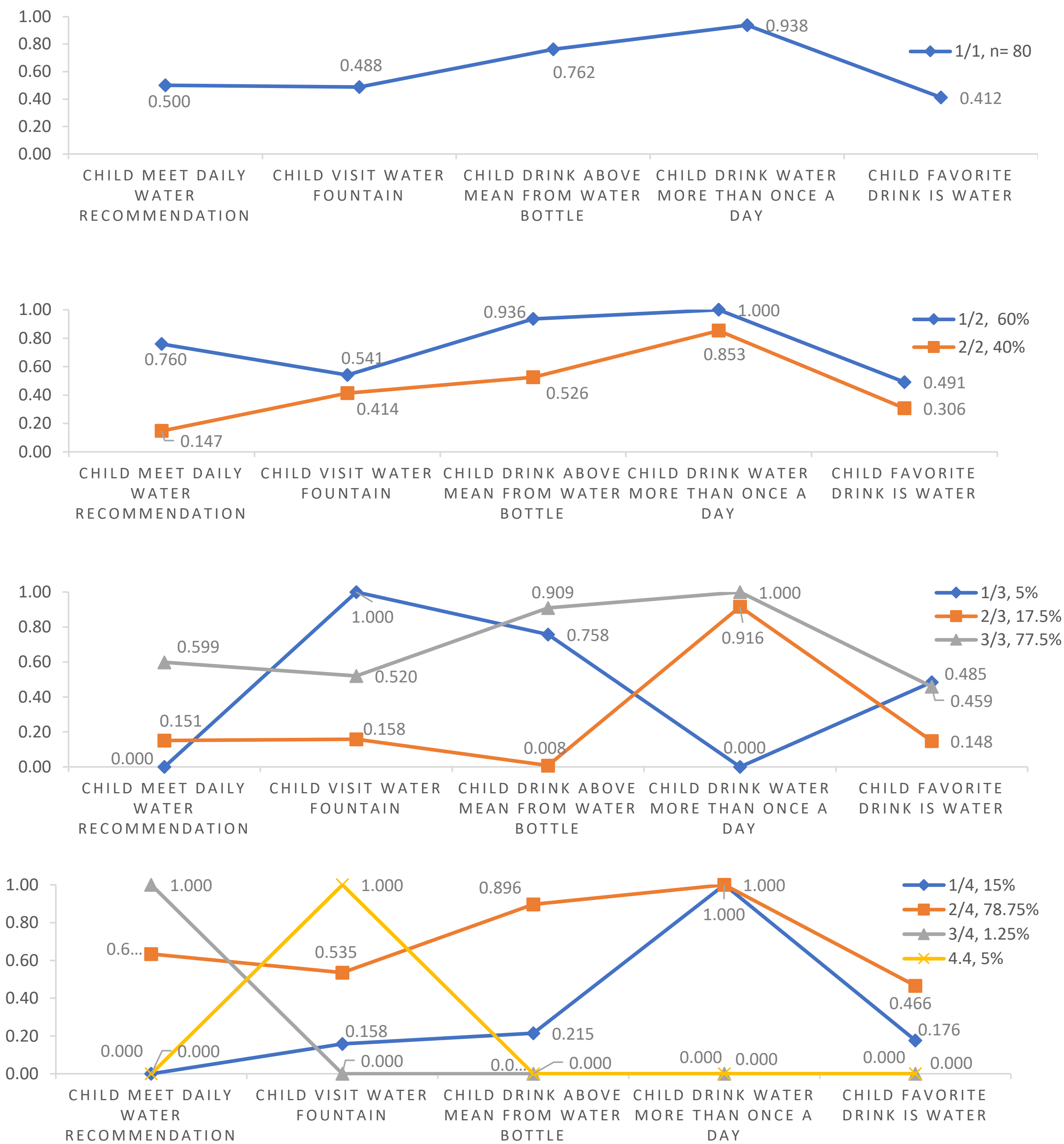

Figure 7 One, Two-, Three- and Four-class model of water consumption

Identification of Water Consumption Classes

Two class solution. The two-class solution is described as high-frequency water consumption and low-frequency water consumption. The high-frequency water consumption class comprised 53.75% of the sample, and the low-frequency water consumption class included the remaining 46.25% of the sample. The high-frequency water consumption class was identified by high proportions of children meeting the recommended water intake (88%), high frequency of visits to the water fountain (*M* =.11, *SD* = .025), and higher water intake from the water bottle (*M* = 2.23, *SD* = 1.81). The children in the high-frequency water consumption class also drank water more than once daily at home (100%) and had a high proportion of children selecting water as their favorite drink choice (53.5%).

Based on estimated probability (Figure 7), the probability of a child in the high-frequency water consumption class meeting the daily water recommendation was .760, and the probability of a child visiting the water fountain was .541. The estimated probability of a child in the high-frequency water consumption class drinking more than the mean from their water bottle was .936, and the probability of a child drinking water more than once a day was 1.00. In addition, the probability of a child in the high-frequency water consumption class having water as their favorite choice of drink was only .491.

The low-frequency water consumption class was identified by lower levels of children meeting the recommended water intake (5.4%) and lower frequency of visiting the water fountain (*M* = .08, *SD* = .36). In addition, the children in this class had lower intake from their water bottle (*M* = 1.33, *SD* = 1.58). The proportion of children in the low-frequency water consumption class drinking water more than once daily at home was 86.5%, with the proportion having water as their favorite drink being only 27%.

Compared to the high-frequency water consumption class, a child in the low-frequency water consumption class had a lower probability in all five of the aforementioned indicators. The estimated probability of a child in the low-frequency water consumption class meeting the recommended water intake was .147, visiting the water fountain was .414, and drinking above the mean from their water bottle was .526. Regards to the child drinking water more than once a day and having water as their favorite drink, the probability was .853 and .306 respectively.

Three class solution. In addition to the high- (77.5%)- and low- (17.5%) frequency water consumption classes, a moderate-frequency water consumption class, comprising 5% of the sample, emerged in the three-class solution.

Among the children in the high-frequency water consumption class in the three-class solution, the probability of meeting the daily water recommendation was .599, and the probability of a child visiting the water fountain was .520. The estimated probability of a child drinking above the mean from their water bottle was .909 and drinking water more than once a day is 1.00, while the probability of a child selecting water as their favorite drink choice was only .459.

A child in the low-frequency water consumption class had a lower probability in all five above-mentioned indicators. The estimated probability of a child in the low-frequency water consumption class meeting the recommended water intake was .151; for visiting the water fountain, .158; and for drinking above the mean from the water bottle, .008, extremely unlikely probability. The probability that a child drinks water more than once a day and whose favorite drink is water is .916 and .148, respectively. Interestingly, the probability of children meeting the daily water recommendation and drinking water more than once a day has increased when compared with a two-class solution.

The third water consumption class was uniquely identified by a mixture of high and low water behavior, with extremely low water frequency at home but moderate water consumption at school, and thus was labeled as mixed high/low-frequency water consumption. In this class, a child had zero probability of meeting the recommended water intake but had the highest probability of visiting the water fountain. The probability of a child drinking above the mean from water bottle falls between the two classes at .758. There is zero probability of a child drinking water more than once a day, but the probability of a child's favorite drink being water is even higher than the high-frequency water consumption class at .485.

Four class solution. The four-class solution included the previous mentioned three classes: a high-frequency water consumption class (78.75%), low-frequency water consumption class (15%), mix high/low-frequency classroom water consumption class (5%), and the emergence of a fourth class which comprised of 1.25% of the sample labelled as mix high/low-frequency home water consumption class.

Among the children in the high-frequency water consumption class in the-four class solution, the probability of a child meeting the daily water recommendation was .634, and the probability of a child visiting the water fountain was .535. The estimated probability of a child in the high-frequency water consumption class drinking above the mean from the water bottle was .896, and the probability of a child drinking water more than once a day is 1.00, while the probability of a child having water as their favorite drink choice was only .466.

A child in the low-frequency water consumption class had a lower probability in all five above-mentioned indicators. The estimated probability of a child in this class meeting the recommended water intake is zero; for visits to the water fountain, .158; and for drinking above the mean from the water bottle, .215. The probability a child drinks water more than once a day and the selects water as their favorite drink is 1 and .176, respectively. Interestingly, the probability of a child meeting the daily water recommendation and selecting water as their favorite drink choice had a huge decrease when compared with a three-class solution.

The mixed high/low-frequency classroom water consumption class was uniquely identified by a mixture of high and low water consumption frequency and behavior. Same as the three-class solution, a child had zero probability of meeting the recommended water intake but had the highest probability of visiting the water fountain. However, the probability for a child drinking above the mean from the water bottle, drinking water more than once a day, and selecting water as their favorite drink of choice all fell to zero in the four-class solution. Since this class was rated as extremely low for water frequency both at home and school (besides the water fountain visit), it was labeled mix high/low-frequency classroom water consumption class.

The fourth class was characterized as the highest probability of a child meeting the daily water recommendation but zero probability in the rest of the four indicators. Thus, this class was labeled as mix high/low-frequency home water consumption class.

Model Selection

The models were evaluated and model fit statistics are provided in table 2. The selection of the optimal number of classes was based in part on IC indices (AIC, BIC, and SSA-BIC), LMT and BLRT (Schwarz, 1978; Ansari & Purtell, 2017). Other statistics such as entropy, sample size, theoretical considerations and interpretability of the class solution were also considered. The current study utilized the aforementioned indices to examine the model fit of two-class, three-class, and four-class solutions. In examine of AIC, BIC and AAS-BIC statistics, the two-class and three-class model was shown to have the highest values. The LMR test suggests a four-class model is preferred. Regarding the BLRT value, the one-class, two-class, and three-class were suggested.

As presented in Table 2, model fit statistics suggested that the best model fit could be one of two models: two-class or three-class. Further analysis of model fit indices was required to identify the best fit model. All entropy values were compared between classes, and the three-class solution had the highest value of .912. In table 2, the diagonal class probabilities were acceptable, averaging .827, .936, and .951, with off diagonals averages of .173, .277, and 0, respectively. On investigation of models in table 2 and figure 7, the four-class model contributes to an additional class and was excluded for it consist of 5% or less of the sample. Even though the two and three class models are both statistically sufficient, the three-class model was selected.

Table 2
Latent Class Example: Information Criteria, Entropy, Likelihood Ratio Tests, and Tests of Mean Differences across Classes, Average Class Probabilities for Most Likely Class Membership by Latent Class

Fit statistics	1 Class	2 Class	3 Class	4 Class
Number of Free Parameters	5	11	17	23
Log-likelihood (number of replications)	-227.657	-221.746	-217.004	-214.037
AIC	465.314	465.492	468.007	474.073
BIC	477.224	491.694	508.502	528.86
SSA-BIC	461.457	457.007	454.895	456.333
Entropy	N/A	0.486	0.912	0.886
LMR test	N/A	11.388	9.137	5.716
LMR, *p-value*	N/A	0.1283	0.514	0.0002
BLRT test	N/A	-227.657	221.746	-217.004
BLRT *p*-value for	N/A	0.3333	0.2143	1
Best loglikelihood value has been replicated	N/A	Yes	Yes	Yes
Two-class model	1	2		
1, *n* = 43, 53.75 %	0.878	0.122		
2, *n* = 37, 46.25%	0.224	0.776		
Three-class model	1	2	3	
1, *n* = 4, 5%	0.989	0.011	0.000	
2, *n* = 14, 17.5%	0.000	0.832	0.168	
3, *n* = 62, 77.5%	0.000	0.011	0.989	
Four-class model	1	2	3	4
1, *n* = 12, 15 %	0.856	0.144	0.000	0.000
2, *n* = 63, 78.75 %	0.052	0.948	0.000	0.000
3, *n* = 1, 1.25 %	0.000	0.000	1.000	0.000
4, *n* = 4, 5%	0.000	0.000	0.000	1.000

Note. AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; SSA-BIC = Sample-Size Adjusted BIC, LMR = Lo-Mendell-Rubin test; BLRT = Bootstrap Likelihood Ratio Test. $N = 80$.

Predictors and Correlates of Water Intake Profiles

As seen in Table 3, the three-class solution was examined to see whether the water consumption varied between the demographic characteristics such as age, sex, income, and education descriptively. Children in the high-frequency water consumption class had an equal percentage of boys (50%, *n* = 31) and girls (50%, *n* =31) and a high percentage of parents who self-identified as Spanish (66.13%, *n* = 41), White (14.52%, *n* = 9), Black or African American (12.90%, *n* = 8), and followed by Asian (3.23%, *n* = 2), and Other-Brazilian (3.23%, *n* = 2). The high-frequency water consumption class also had the highest household income level of $2500-$2900 a month (17.74%, *n* = 11), $2000-$2500 a month (17.74%, *n* = 11), and followed by $1700-$2000 (11.29%, *n* = 7) The high-frequency water consumption class also had a high percentage of parents who held Associate's degree (16.13%, *n* = 10) and Bachelor's degree (16.13%, *n* =10), and completed some college but no degree (14.52%, *n* =9).

The low-frequency water consumption class had more boys (57.14%, *n* = 8) than girls (42.86%, *n* = 6). The children in the low-frequency water consumption class consisted of parents self-identified as Spanish (50%, *n* = 7), Black or African American (28.57%, *n* = 4), and White (21.43%, *n* = 3). The majority household income was $1700-$2000 (35.71%, *n* = 5) a month and $900-$2350 (28.57%, *n* = 4) a month. In terms of education level for low-frequency water consumption class, the breakdown was as follows: parents who completed a Bachelor's degree (28.57%, *n* = 4), earned a High School diploma (28.57%, *n* = 4), followed by those who had some college but no degree (21.43%, *n* = 3).

The mixed-high/low water consumption class comprised of children that had a higher number of girls (75%, *n* = 3) than boys (25%, *n* = 1), Parents who identified as Spanish (50%, *n* = 2) and White (50%, *n* = 2), did not report income level (100%, *n* = 4), and a mixture of education level as follows parents who completed a Graduate degree (25%, *n* = 1), a Bachelor's degree (25%, n = 1), completed some college but no degree (25%, n = 1), and completed 12^{th} grade but no diploma (25%, n = 1).

Table 3
Means, Standard Deviations, Frequencies, and Percentage for Demographic Factors for Three-Class Solution in Reference to Water Consumption

		Class		
	Total	High-Frequency Water Consumption	Low-Frequency Water Consumption	Mixed High/Low-Frequency Water Consumption
N (% of Sample)		62 (77.5)	14 (17.5)	4 (5)
Demographic Factor		*Mean/n* (*SD/%*)	*Mean/n* (*SD/%*)	*Mean/n* (*SD/%*)
Age		3.8 (*SD* =.63)	3.75 (*SD* = .70)	4 (*SD* = 0)
Sex				
Male	40 (50%)	31 (50%)	8 (57.14%)	1 (25%)
Female	40 (50%)	31 (50%)	6 (42.86%)	3 (75%)
Race				
White	14 (17.5%)	9 (14.52%)	3 (21.43%)	2 (50%)
Black or African American	12 (15%)	8 (12.90%)	4 (28.57%)	0 (0.00)
Asian	2 (0.25%)	2 (3.23%)	0 (0.00)	0 (0.00)
Spanish	50 (62.5%)	41 (66.13%)	7 (50%)	2 (50%)
Other- Brazilian	2 (0.25%)	2 (3.23%)	0 (0.00)	0 (0.00)
Income				
$500/month or less	6 (7.5%)	6 (9.7%)	0 (0.00)	0 (0.00)
$500-$900/month	3 (3.75%)	3 (4.84%)	0 (0.00)	0 (0.00)
$900-$1250/month	11 (13.75%)	7 (11.29%)	4 (28.57%)	0 (0.00)
$1250-$1700/month	9 (11.25%)	8 (12.90%)	1 (7.14%)	0 (0.00)
$1700-$2000/month	14 (17.5%)	7 (11.29%)	5 (35.71%)	0 (0.00)
$2000-$2500/month	13 (16.25%)	11 (17.74%)	2 (14.29%)	0 (0.00)
$2500-$2900/month	13 (16.25%)	11 (17.74%)	2 (14.29%)	0 (0.00)
More than $3000/month	4 (5%)	4 (6.45%)	0 (0.00%)	0 (0.00)
Didn't know	4 (5%)	0 (0.00)	0 (0.00%)	4 (100%)
Education				
Up to 8th grade	1 (1.25%)	0 (0.00)	1 (7.14%)	0 (0.00)
9th - 11th grade	7 (8.75%)	6 (9.7%)	1 (7.14%)	0 (0.00)

	Class			
	Total	High-Frequency Water Consumption	Low-Frequency Water Consumption	Mixed High/Low-Frequency Water Consumption
12th grade but no diploma	9 (11.25%)	8 (12.90%)	0 (0.00)	1 (25%)
High school diploma/equivalent	11 (13.75%)	7 (11.29%)	4 (28.57%)	0 (0.00)
Voc/Tech program after high school but no diploma after high school	5 (6.25%)	5 (8.06%)	0 (0.00)	0 (0.00)
Some college but no degree	13 (16.25%)	9 (14.52%)	3(21.43%)	1 (25%)
Associate's degree	11 (13.75%)	10 (16.13%)	1 (7.14%)	0 (0.00)
Bachelor's degree	15 (18.75%)	10 (16.13%)	4 (28.57%)	1 (25%)
Graduate degree	8 (10%)	7 (11.29%)	0 (0.00)	1 (25%)

Next, Chi-square tests of association were used to investigate the association that might exist between class membership and other characteristics including demographics, parental, and classrooms (Table 4). The assumptions for the Chi-square test of association were examined. The assumption of an expected frequency of at least 5 per cell was not met which presents a limitation of the study (Bradley, Bradley, McGrath, & Cutcomb, 1979). The second assumption of independence was also not met since the sample were not randomly selected; thus, there is an increased probability of a Type I error (Lomax & Hahs-Vaughn, 2012).

There were no statistical associations between latent classes and demographic characteristics, children's other beverage intake, parents water and other beverage consumption, and classrooms ($p>.05$, see Table 4).

Table 4
Children's other beverages, parents' beverages, and classroom teacher characteristics by latent classes.

	Class							
	Mixed-High/Low Frequency Water Consumption (%)	Low-Frequency Water Consumption (%)	High-Frequency Water Consumption (%)	*n*	χ^2	*df*	φ	Contingency coefficient
Children's characteristics								
Soda								
Soda less than once a day	100.0	85.7	85.5	69	0.67[a]	2	0.09	0.09
Soda more than once a day	0.00	14.30	14.50	11				
Juice								
Drink juice less than once a day	50.00	28.60	22.60	20	1.62[a]	2	0.14	0.14
Drink juice more than once a day	50.00	71.40	77.40	60				
BMI status								
Underweight	75.00	42.90	41.90	35	11.03[a]	6	.371	.35
Healthy Weight	0.00	42.90	51.60	38				
Overweight	0.00	0.00	4.80	3				
Obese	25.00	14.30	1.60	4				
Parents' characteristics								
Soda								
Soda less than once a day	75.00	50.00	64.50	50	1.31[a]	2	0.13	0.127
Soda more than once a day	25.00	50.00	35.50	30				

	Class							
	Mixed-High/Low Frequency Water Consumption (%)	Low-Frequency Water Consumption (%)	High-Frequency Water Consumption (%)	*n*	χ^2	df	φ	Contingency coefficient
Juice								
Drink juice less than once a day	25.00	64.30	50.00	41	2.094[a]	2	0.16	0.16
Drink juice more than once a day	75.00	35.70	50.00	39				
Water								
Water more than once a day	100.00	78.60	88.70	70	1.68	2	0.15	0.14
Water less than once a day	0.00	21.40	11.30	10				
Favorite Drink								
Favorite drink is water	75.00	35.70	59.70	45	3.27[a]	2	0.20	0.20
Favorite drink is not water	25.00	64.30	40.30	35				
Meet Recommend Water Intake								
Yes	50.00	42.90	56.50	43	.87[a]	2	0.10	0.10
No	50.00	57.10	43.50	37				
Quality of water Concerns								
Current at home	25.00	57.10	37.10	32	2.31[a]	2	0.17	0.17
Not current at home	75.00	42.90	62.90	48				

	Class							
	Mixed-High/Low Frequency Water Consumption (%)	Low-Frequency Water Consumption (%)	High-Frequency Water Consumption (%)	*n*	χ^2	df	φ	Contingency coefficient
Classroom								
4	50.00	28.60	22.60	20	12.24[a]	6	0.28	0.36
3	0.00	21.40	27.40	20				
2	50.00	0.00	29.00	20				
1	0.00	50.00	21.00	20				

Research Question 3

Research question three asked: How do the current study's parents' views of their children's sugary beverage intake differ from the parents in the 2009 national level based on the FACES data? To answer this, the sample proportion of children who drank no 100%-juice, no soda, and no sports drinks was compared to the proportion of Head Start children using FACES 2009 data. The null hypothesis is that there is no significant difference in the proportions.

The 2009 FACES Head Start report (Hulsey et al., 2011) indicated that 23.8% of children consumed no 100% juice, no soda, or no sports drinks. A Chi-square goodness of fit test was generated to determine whether the observed proportion of children who do not drink 100% juice, soda, or sports drinks differed from the expected proportion. In this study, it is 23.8%, representing the proportion of FACES 2009 children who do not drink 100% juice, soda, or sports drinks. The test was conducted using an alpha of .05. The assumption of expected frequency of at least 5 per cell was met.

As shown in Table 5, there was a statistically significant relationship between the proportion of children who do not drink 100% juice, soda, and sports drinks and the proportion of children reported in FACES 2009 (χ^2 = 46.450, df = 1, p = .000). Thus, the null hypothesis that the proportion of children who drink no 100% juice, no soda, and no sports drinks parallel those expected at the national level was rejected at the .05 level of significance. The effect size ($\chi2/[N(J-1)]$) was .5806, and interpreted using Cohen's guide (1988) as a large effect.

The standardized residual for children who drank soda, sports drink, or non 100%-juice drink was −3.329. This suggests this group is contributing most to the statistically significant chi-square statistic. There were substantially fewer children that drank soda, sports drinks, or non-100% juice than expected.

Table 5
Chi-Square Statistics

	Observed *N*	Expected *N*	Residual
Drink no soda, sports drink, or non 100%-juice drinks	45	19.0	26.0
Drink soda, sports drink, or non 100%-juice drinks	35	61.0	-26.0
Total	80		

Summary

In this chapter, the results were presented. For the first research question, the water consumption during the program day measured by water bottle weight were analyzed. Additional information on water consumption from the water fountain was provided. The average daily water intake consumption per child, based on water bottle intake, is 1.82 ounces with a range from .11 to 7.21 ounces (*SD* =1.75).

For the second research question, water consumption classifications were analyzed based on water consumption both at home and school, as reported from parents and teachers. Profiles of water consumption of Head Start children were generated using latent variable mixture modeling.

For the third research questions, the percentage of children who drink no 100%-juice, no soda, and no sports drinks were compared to the national proportion using 2009 FACES data via computation of a Chi-square test. The results show there is a statistically significant association between the sample and the 2009 FACES children.

Chapter 5 contains a discussion of the findings along with implications for practice based on the current literature. Limitations and suggestions about future research directions are also offered.

CHAPTER 5: DISCUSSION

Overview of the Study

The purpose of this study was threefold: 1) to assess preschool children's water consumption in their classrooms; 2) to examine parents' and teachers' perceptions of children's beverage selection and water consumption; and 3) to investigate whether the healthy beverage choices of the participants differ from a national sample. This chapter provides a discussion of the findings, the implications for practice, limitations of the study, recommendations for future research, and conclusions and contributions made.

Water consumption plays an important part in managing weight and childhood obesity prevention (Ritchie et al., 2015). However, limited information is available in the literature on water consumption of preschool children. The purpose of this study was to explore the water consumption of Head Start preschool aged children to begin to close the gap.

This study posted three questions in order to understand the status of the water consumption of young children in Head Start. Research question one examined the classroom water fountain use and the water bottle intake amount. Research question two looked at the three subgroups (high-, low-, and mixed high/low- frequency water consumption) of children based on both their water consumption in Head Start and at home. Research question three compared the participants in the current study with a national Head Start sample on the beverage intake. Below is a detailed discussion of the findings.

The research design is people-centered and exploratory in nature hypothesizing that these factors may affect child water drinking behavior. Below is a detailed discussion of the findings.

Discussion of the Findings

Research Question 1

How much water do Head Start children drink during a school day?

The daily (8am-2pm) water intake of 3-5-year old children in Head Start measured by a water bottle had a mean of 1.82 ounces (*SD* = 1.75 ounces). These findings provided a baseline of the water consumption of these children in Head Start. Even though every child drank water from the bottle during the study, the minimum water intake was .11 ounces which indicated that there is a large group of children who barely drank or drank a very low amount during the program day. These findings on children's water intake were consistent with the prior research that children do not drink enough water when compared to the estimated national water intake or IOM reported level (Kant & Graubard, 2010; FNB, 2004, Kaushik et al., 2007).

Consequences of dehydration revealed by prior research include: ineffectiveness of brain metabolic activity, lower level of neuron activities related to visual space processing, decrease in fine motor skills and recalling, increases in morbidity (Kempton et al., 2011; Booth et al., 2015, Manz et al., 2002).

The findings also reveal that some of those children go through the whole day without any direct water intake (Petter et al., 1995). Considering the consequences of dehydration, the findings in the current study raises the concern for the low water intake and supports the need to promote water consumption in young children.

In this study, the upper range of child water intake was 7.21 ounces, almost 4 times of the mean. And there were a small number of children who consistently consumed water from the bottle every day. This might indicate that these children were in the habit of drinking water daily, a very positive finding. Analyses of these children's water consumption may provide insights on how to increase water consumption.

Compared to Gregory's (2000) study in UK that showed average school children drink less than half of the recommended intake, the current study shows that children at young age also consume less than 10% of the recommended intake, which is of concern.

When compared to the BMI status, the water consumption analyses in the current study showed that the children identified as overweight had the highest water consumption ($N = 80$). This supports prior findings that the higher water intake contributed to higher weight status (Kant & Graubard, 2010). However, difference lay in the category of the BMI status when considering the highest water intake. The current study indicated that the children (3-5 years) who were identified as overweight had the highest water consumption while the Kant and Graubard (2010) study revealed that the children who were identified as obese (greater than overweight) had the highest water consumption. This could be differences in the age in both samples. In current study, the children were 3-5 years old while the Kant and Graubard (2010) sample included children from 2 to 19 years old.

One surprising difference from this study and prior research findings is gender composition. Previously it was found that boys consume more than girls (Kant & Graubard, 2010; Manz et al., 2002). However, Drewnowski et al. (2013) found that the boys and girls drank similar amount of plain water with a slightly higher intake for girls. The findings from the current study indicated that the girls and boys were comparable in their water consumption with higher intake for girls which support Drewnowski et al. (2013) study. This may suggest that the there was an increase in water consumption over the years. Future research is needed to investigate this issue.

The water consumption was analyzed based on the ethnicity of the parents. These findings are complicated when compared with the prior studies. The national data showed that children who were identified as White had higher water intake than Black and other ethnic groups. However, in the current study, the Hispanic population had the highest water intake. The children who were Black had higher water intake than the children who were White even though the spread of the water intake was small. This might be the small sample of White (n = 14) and large sample of Hispanic (n = 50). Also, the national data compared children's water consumption across a wide age range (age group 2-19) while the current study focused only on the association between ethnicity and water consumption for children 3-5 years old.

There were different water consumption patterns across the Head Start classrooms. The children in classroom 2 had the highest water intake averaging 4.21 ounces (*SD* = 1.752). This could be the influence of the teacher or the frequency of outdoor physical activities, or a combination of those factors. Classroom 1 had the lowest average water consumption per child per at .78oz (*SD* = .842). This could be due to the influence of the teacher or the amount of outside play because classroom 1 almost never went outside during outside play time. Other reasons could be due to poor time management, such as the activity prior to the outdoor play time extended too long and the outdoor activity time was shortened, or poor classroom management, such as it took too long to line up after a round of bathrooms. Classroom 3 had the second-highest level of water consumption per child at 1.22 ounces (*SD* = .725). This could be the influence of a mixed low level of outdoor activities with no permission required to use bottle representing relaxed classroom environment. Classroom 4 had the third highest average for water intake at .07 ounces (*SD* = .605). Making for an interesting complexity for interpretation because they had high frequency of outside play but the teacher tends to limit time on water drinking after outdoor play. This strongly suggests that water consumption opportunities in classrooms may influence water consumption.

The researcher analyzed water fountain drinking to provide another measure of water consumption in the classrooms and showed a positive high incidence of usage when compared to prior studies. Petter et al. (1995) found that about 75% of preschoolers never drank water during a 48-recall parent questionnaire period. For the current study, about 51% of the children never used the water fountain. Patel et al. (2012) indicated that the children barely drank from the water fountain (only 4%) which was supported by the current study that there was almost no water consumption during the meal time even though the water fountain was accessible which is lower than the current study's fountain use. The percentage of the fountain use in this study maybe lower due to the additional use of water bottle in the classrooms. There are a group of children who used their bottle but would not use the water fountain.

Overall, the current research provided some difference in water consumption during the program day for preschool age children. The water intake findings of these children indicate a need of establishing some policies in the centers as indicated by the national Head Start requirements. The findings also indicate the need for future studies which would include intervention strategies with teachers.

Research Question 2

What are the classifications of children's water consumption based on parent reported water consumption at home and observed water intake in the classrooms?

Research question two investigated the subgroups of children’s water consumption behavior based on the analysis of water consumption variables and identified the group characteristics. The variables used to identify the subgroups of the children’s water consumption included the water consumption in the classrooms as well as parent reported water consumption behavior at home. After the evaluation of the model statistics and the conceptual meaning of each model, a three-class solution was identified. The identified three latent classes of the water consumption including a high-frequency water consumption class, low-frequency water consumption class, and a mixed high/low-frequency water consumption class. Demographic and classroom characteristics were evaluated to investigate whether the water consumption of a three-class solution was associated with these factors.

Description of the three-class solution

The largest class is defined as the high-frequency water consumption in the three-class solution (77%). The characteristics of children’s water consumption in this high-frequency water consumption class included: (a) the water intake amount is above the mean at school and (b) they drink water more than once a day at home. Other characteristics are the children were moderately likely to meet the recommended water consumption, to visit the fountain, and the favorite drink choice was water when thirsty. This could suggest that the children who had high water intake amounts in the classroom were also accompanied with frequent water drinking at home. Interestingly, one-half of the children in the high-frequency water consumption class had water as their favorite choice of drink or met daily recommendations. Because the majority of the children's favorite choice was juice (Zhang, 2017a), it is understandable to see the lower probability.

The second largest class (17.5%) is the low-frequency water consumption class in the three-class solution. In contrast, the low-frequency water consumption class was comprised of children with extreme low probability of water intake above the mean. Other low probability for children in this class are: (a) child met the daily-recommended water intake level, (b) child visited the water fountain, and (c) child's favorite drink of choice is water. An interesting observation is that the children in this low-frequency water consumption class had a similar probability compared with the high-frequency water consumption class in drinking water more than once a day. This surprising characteristic may explain that even though their parents perceived the children's home water consumption frequency as high, the children in this class did not exhibit behaviors that produced high amount of water consumption both in school. It could also be that the frequency of more than once a day does not suggest a high quantity of intake at home.

The third class, a mixed high/low-frequency water consumption class (5% of the children), suggested that these children had fluctuating probabilities among water consumption behaviors. The characteristics of their water behavior do not meet recommended water consumption but all used water fountain. Even though with a relatively high probability of drinking above the mean for water intake, the children in this class drink water less than once a day at home but all the children used the water fountain. Even though with a relatively high probability of drinking above the mean for water intake, the children in this class drank water less than once a day at home. Interestingly, the parents reported water as their child's favorite drink choice. This could be the result of a small sample in class three ($n = 5$).

The three-class solution analysis suggests that the children who drank a high intake of water in their classrooms also consumed water frequently in their homes. Other children who had lower water consumption in their classrooms may or may not show the behavior at home. The parents' reports of the water consumption frequency of their children were consistent with the water consumption in the classroom.

The latent classes were also analyzed to test whether there were associations with the BMI status, age, gender, parent education, ethnicity, income, classroom characteristics, as well as other beverages of children and their parents. The current study found no statistically significant associations between the three latent classes of water consumption with the above-mentioned factors. There was a gap in existing literature on the associations with these characteristics for children 3-5 years old. Prior research conducted by Northstone et al. (2002) indicated the water consumption of 18 months old children significantly associated with gender, education, ethnicity, and BMI. However, Kant and Graubard (2010) found significance in children 2-19 years old's water consumption with age, ethnicity, sex, BMI, and physical activity. Future research is needed to evaluate these associations.

Research Question 3

How do the current study's parents' views of their children's sugary beverage intake differ from the parents in the 2009 national level based on the FACES data?

Research question three explored the parents' perceptions of their children's proportions of non- sugary beverage intake compared to the national Head Start FACES (2009) data. The questions asked for intake excluded beverages such as soda, non-100% juice, and sports drinks. The national FACES data on children who consume no soda, no 100%-juice and no sports drinks was 23.8%. The current study showed that about 56% of the children did not drink any soda, sports drink, or non 100%-juice drinks. This may suggest an improvement in the choices of drinks for children and there was a statistical significant difference between the FACES data and participants in this study (p < .001).

The findings of this study highlighted the various types of water consumption behavior in both school and home settings. By introducing the bottle, actual water intake amount was measured precisely. An important fact the three-class model provided important discoveries of children’s water intake in Head Start and their corresponding water consumption behaviors at home. The latent classes can provide insights on understanding the behaviors of the children who had high water intake and assess associations that might exist with the behaviors of high water intake children in Head Start and at home. The significance regarding children's non-sugary beverages suggested some level of improvement in the healthy choices of drinks for children.

Overall, the findings of the water intake measurement revealed a concern because of the observed low water intake. The first research question involves a focus on water consumption and concerns about obesity and other health issues such as dehydration. Using the person-centered approach, the second research question focusing on an analysis of clustered water consumption behaviors, revealed three descriptive patterns of water consumption behaviors and the differences among those patterns. The third research question findings, revealed that, while improvements, there are still large groups of children that consume sugary beverages to excess rather than water.

Implications for Practice

The Head Start Performance Standards (DHHS, 2016a) made water drinking available in Head Start classrooms but there was scarce literature as to whether the children actually drank water during the program day and how much. Water intake was frequently investigated from self-reported data of children in elementary level to adults to interpret how it benefits physical health, cognitive performance, and psychological wellness (Benton & Burgess, 2009; Edmonds & Burford, 2009; Booth, Taylor, & Edmonds, 2012; Patel et al., 2014; Popkin, D'Anci & Rosenberg, 2010). However, the water consumption, especially for preschool aged children, was not as popular given the difficulty in measurements tools. Further limitations existed for the measurement of water consumption of young children previously. The findings of the current study offer practical and critical implications for different stakeholders to facilitate the development of young children. Based on the findings, the children in Head Start may benefit from more water intake during the program day in order to keep the body temperature normal, stay focused, lower obesity risks, and improve cognitive functioning (CDC, 2011; Kaushik et al., 2007; Muckelbauer et al., 2009; Patel et al., 2014). The implications mentioned below focused on those stakeholders in the environments of the child including the Head Start, the teachers, and the parents.

Head Start

As suggested by Patel et al. (2012), providing freely available water from various sources is necessary to promote water consumption. Based on the current study findings, the low water intake amount may suggest that the children could benefit significantly from other sources for available drinking water than the sole source of the water fountain. A reusable water bottle either brought from home or provided by Head Start may facilitate the increase of water drinking. The water bottle can be carried around throughout the program day which would provide more opportunity for the children to consume water such as in the playground and during meal times. During the pilot study, one of the classroom volunteer assistants consistently put out disposable water cups filled with water for children after the daily outdoor activity and it was observed that most child then consumed all the water from the cup.

Different mechanisms to promote water consumption may be crucial to increase water intake based on the environment around the children and the interaction level among those ecological environments. Head Start center, the school environment, may change the water intake environment of the child during the program day by requiring the teachers to implement explicit instructions promoting water drinking. In addition, the children can be active in deciding water stations in their own classrooms. When children invest in the decision making, they might "own" the responsibility of drinking water. A policy to ensure water drinking after every outdoor play time could serve as a reminder to make sure water promotion is on the agenda. This may also suggest that Head Start needs to continue research and evaluate the water consumption of their children to develop strategies to promote water consumption.

Teachers

The findings also suggest that some guidance on classroom routine may provide opportunities to increase the water consumption of the children in Head Start. One of the higher water intake classroom teachers made sure to remind children to drink water after coming in from outside. The findings of the current study suggested the need to follow a specific guideline to develop a water drinking mindset is important and influenced by practice. This suggests that providing training for teachers to insert a few reminders of water drinking may increase water consumption. By strengthening the teachers' understanding of the important benefits of water consumption for the young children, the teacher can practice creating opportunities into the classroom routine.

Considering teachers' potential impact within the framework of social learning theory, the social phenomena of water drinking could be established if teachers started to drink water with the child. This would provide opportunities for the teacher to benefit from maintaining the hydration level and stay healthy as much as the child. Moreover, the teachers' attitudes and behavior toward water drinking could also motivate water consumption of the children.

Parents

The parents, if equipped with adequate information on benefits of water drinking, may pay specific attention to the water intake of their children and promote water intake at home. Again, based on the latent class analysis, the children who drank more at school also had reported high water consumption at home. The Head Start parent committee could organize center-based activities to share with all the parents and the children to celebrate water drinking.

The current study provided insights into children's beverage intake when compared to the national FACES 2009 data. The children participated in the current study had a higher proportion of no sugary beverages consumption. The benefits of such behavior include protecting dental hygiene, preventing obesity, and reducing caloric intake (Patel et al., 2014).

The findings could be encouraging for the parents to enhance their practices and promote a healthy drink choice for the children.

The current study fills a gap in the literature. Previous to 2018, there were no studies conducted that directly observed preschool age children's actual water intake. The children were allowed to manage their own water bottles and they quickly adapted to using them.

Limitations

The findings of the present study should be interpreted with caution due to six limitations. First, due to practical issues at Head Start, the assignment of the classrooms was not random. Second, most of the children were Hispanic. These two facts limit the generalization of findings to Head Start centers who serve families who are Hispanic.

Third, a person-centered data analysis approach has its own limitations: subjectivity, and sensitivity to sample size and characteristics (Masyn, 2013). Because no research had used the LVMM (Berlin et al., 2013) to look at the water consumption of preschool children, the best model fit selection made by the researcher was the three-class solution. Due to scarcity in water intake for preschool aged children and the under-used LVMM, the current findings of the latent class could not be compared to prior findings. There were non-significant associations between the water consumption class with age, gender, and BMIs that could be the impact of a small sample even though it met the model requirements of a minimum of 5% cases per class.

Fourth, one of the original objectives was to consider both parents and teacher perceptions of children's water consumption. Unfortunately, teachers' perceptions on children's water consumption were not included in the model directly. Here the classroom factor was categorized as 1, 2, 3, 4 representing the four types of teacher characteristics, rather than the teachers' answers to the questionnaire.

Fifth, although the direct measure of the water bottle weight is a strength, there is no doubt that this measurement has a limitation. Even though the data collection did not start until the water bottle became a norm during the observation (3 weeks after the first introduction), it is possible that some children who usually drank from the water fountain, chose instead to drink from their own water bottle (in essence replacing the water fountain with the water bottle, rather than using the water bottle in addition to the water fountain). It is possible that children were attracted by their photo and name on the water bottle and consume more than they would had the bottle been plain.

While the research assistants observed from 8 am to 2 pm, there were some children who stayed in after school program. If those children drank water, the research assistants did not collect the data.

Finally, the self-report data from parents or legal guardians could introduce bias (Goodman & Gotlib, 1999). The researcher carefully selected the water consumption variables from direct observation to mediate the potential risk to the model, however, there was no guarantee that the parents or the legal guardians were attentive to all of the water consumption behaviors of their children at home.

These limitations should be considered for future studies to either replicate or extend the current research.

Recommendation for Future Research

Following are a few notions about future research. Replication of this study with a larger sample is highly recommended. Randomized sampling will require time and resources; however, it should be considered to enhance the current study. By doing this, random selected centers can be assessed with a center-wide participation to increase the generalizability of findings. Among other things, insights may be gained from subgroups of children who drink high or low water intake across various centers and across classrooms.

The water bottles were brought in and introduced in the current study the second week of the semester. The children had a 3-week period to familiarize themselves with them. A future study may suggest that Head Start providing a unified water bottle so it will be incorporated into their daily routine and assess the water intake. By doing this, any of the potential influences of the water bottle could be eliminated.

The variables were carefully selected in the current study to identify correct membership of children's water consumption. However, based on the findings, the teachers' reports on the water consumption of the entire class was analyzed but it did not contribute to the model. An important improvement to the current study might be to assess teacher report of water frequency of each child in the classroom, rather than the group of children.

In a future study, it may be beneficial to have both mother and father provide perspectives and information about the water consumption of their child and then identify the major caregiver of the child, comparing and contrasting each in the LVMM model.

Measuring the water consumption of the children beyond the school environment would add considerably to answering the key questions. This may become practical if water bottles had high-tech features that would automatically measure the fluctuation of the bottle weight. Using this method to measure water intake, researchers could assess the actual water intake of the child and compare with the parents' reported frequency.

The current findings provide evidence that may be used for future intervention studies that aim to increase water consumption. For example, outdoor activities have been proven to be associated with the water intake of children (Kant & Graubard, 2010). In the current study, the findings supported the notion that the highest water intake classroom had the most frequent outdoor activities. The unexpected influence of teachers' impact combined with high outside playtime may be further studied to understand the water behavior of preschool children.

Future studies can also focus on assessing the impact of teachers' verbal and non-verbal behaviors in the classroom and how they may influence the water consumption behavior of the children. Based on the findings, research targeting training programs can be used to evaluate the effectiveness of strategies to help teachers to infuse water drinking routine and the impact on water consumption of young children.

Conclusion and Contributions

This study contributed to the current early childhood literature in a number of ways. Previous studies suggested that preschoolers do not use water fountains and drink less than half of the recommended daily water intake (Schwartz et al., 2016). The findings in this study revealed that children in Head Start classrooms drinks less than 10% of the IOM recommended level (Kant & Graubard, 2010). The current study supported the low quantity of water intake but discovered a higher incidence of water fountain use compared to the Schwartz study. The findings also indicated that children who had a higher intake of water in the classroom tend to drink water more often reported at home and tend to choose water when they are thirsty. Though supported by prior research, the current study did not find associations among formerly approved characteristics such as age, gender, and BMI. What's more, there was no association between the water consumption with the water intake of parents and other characteristics. Future studies are needed to test the water intake classes on a larger sample to illustrate the associations among different factors.

The current study contributed to the literature by implementing the direct and objective observational measurement of the water consumption of preschool children in Head Start classrooms using a water bottle, and classifying a group of water consumption behaviors and its association with other characteristics. Overall, the results of previous studies using parent-report questionnaire to estimate the water intake of preschool age children were supported. One contribution to the literature provided by the current study is the measurement of water through the use of a combined direct measure of water intake, checklist, and parent-reported water frequency measure to examine the water consumption.

Finally, another contribution to the literature is the analysis with latent classes using the mixture model to identify subgroups of children based on their water consumption. The three-class solution revealed the behaviors that the children of high water intake had in common among this sample. Thus, it provides a novel statistical method for future researcher to explore behaviors of water consumption.

APPENDIX A
IRB APPROVAL LETTER

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138
To: **Bingbing Zhang**
Date: **September 20, 2017**

Dear Researcher:

On 09/20/2017 the IRB approved the following human participant research until 09/19/2018 inclusive:

Type of Review:	UCF Initial Review Submission Form Expedited Review
Project Title:	Water Consumption of Head Start Children: A Factor Analysis with Teacher and Parent Perception of Children' s Health and Water Consumption
Investigator:	Bingbing Zhang
IRB Number:	SBE-17-13371
Funding Agency:	
Grant Title:	
Research ID:	N/A

The scientific merit of the research was considered during the IRB review. The Continuing Review Application must be submitted 30days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form **cannot** be used to extend the approval period of a study. All forms may be completed and submitted online at https://iris.research.ucf.edu .

If continuing review approval is not granted before the expiration date of 09/19/2018, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s).

All data, including signed consent forms if applicable, must be retained and secured per protocol for a minimum of five years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained and secured per protocol. Additional requirements may be imposed by your funding agency, your department, or other entities. Access to data is limited to authorized individuals listed as key study personnel.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

IRB Chair

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APPENDIX B
HEAD START DAILY SCHEDULE

Head Start

Teacher names/

Classroom # __

<u>DAILY SCHEDULE</u>

8:00-8:20	Arrival/Story Time
8:20-8:30	*Hand washing
8:30-9:00	Breakfast
9:00-9:15	Clean-up/Music and Movement
9:15-9:30	Circle Time
9:30-9:50	Small Group
9:50-10:40	Interest Areas (Plan, Do, Review)
10:40-11:15	Outside Time
11:20-11:30	*Hand washing/Story Time
11:30-12:00	**Lunch
12:00-12:20	Tooth Brushing/Story Time
12:20-1:20	Rest Time/Quiet Time
1:20-1:30	***Handwashing/Bathroom
1:30-1:45	Snack
1:45-2:00	Dismissal (nonextended Day)
2:00-2:30	Story Time/Table Toys/Bathroom
2:30-2:50	Circle Time
2:50-3:50	Interest Areas
3:50-4:10	Small Group
4:10-4:25	Clean-up/Bathroom
4:30-5:00	Everyone gather in classroom 1/Outside Time
5:00-5:15	Washing Hands/Bathroom
5:15-5:30	Dismissal

***Hand Washing: 1st Data Collection period for Checklist Practice/ Validation**

****Lunch: 2nd Data Collection period for Checklist Practice/Validation**

***** Hand Washing: 3rd Extended Data Collection period for Checklist Practice/Validation**

APPENDIX C
WATER FOUNTAIN VISIT CHECKLIST

Water Fountain Visit Checklist

Location: CLRM#_/Cafeteria   # of Attendance: ____   Date: ________   Outdoor: Y__/N__ _____
Observer: ______   Start time: ______   End time: _______

Student #	Please check 1 box/visit					Envir.: T/TA/Vo		V/B		
1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
15	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
16	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
17	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
18	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
19	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
20	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Water Fountain: Clean__/Rusty__/Dirty__   Water Temp.: Cold__/Room Temp.__

Notes: ____

APPENDIX D
WATER BOTTLE MEASURE LOG

Water Bottle Measure Log

Location: CLRM#____ # of Attendance:______ Date:_____ ________
Recorder: AM________Time:_______/PM________Time:_______

Student #	Scale readings (AM/PM) in (oz).		# of Spill	# of Refill
1	AM _______	PM_______	_____	_____
2	AM _______	PM_______	_____	_____
3	AM _______	PM_______	_____	_____
4	AM _______	PM_______	_____	_____
5	AM _______	PM_______	_____	_____
6	AM _______	PM_______	_____	_____
7	AM _______	PM_______	_____	_____
8	AM _______	PM_______	_____	_____
9	AM _______	PM_______	_____	_____
10	AM _______	PM_______	_____	_____
11	AM _______	PM_______	_____	_____
12	AM _______	PM_______	_____	_____
13	AM _______	PM_______	_____	_____
14	AM _______	PM_______	_____	_____
15	AM _______	PM_______	_____	_____
16	AM _______	PM_______	_____	_____
17	AM _______	PM_______	_____	_____
18	AM _______	PM_______	_____	_____
19	AM _______	PM_______	_____	_____
20	AM _______	PM_______	_____	_____

Notes: ____

APPENDIX E
PARENT SURVEY ENGLISH

Beverage Consumption - Parent Survey

Thank you for agreeing to participate in a study about what you and your children drink. Your answers will be confidential and will not be shared with parents or other staff in your center. The survey is voluntary and will take about 5-10 minutes of your time. Your completion of this survey serves as your consent to participate in this research project.

Now, I'd like to ask you about your child's and your own beverage intake. I want to know about the beverages your child and you drank during the past 7 days. Think about all the meals and beverages your child and you had from the time (he/she) got up until (he/she) went to bed. Be sure to include beverages your child and you drunk at home, Head Start, restaurants, play dates, anywhere else, and over the weekend.

➢ **Section A Please consider the beverage intake in general for <u>your child</u> in the past 7 days when you answer the following questions.**

1. **<u>During the past 7 days, how many times did your child drink 100% fruit juices such as orange juice, apple juice, or grape juice? Do not count punch, Sunny Delight, Kool-Aid, sports drinks, or other fruit flavored drinks. Was it . . .</u>**

   ___≥ 4 times a day ___2-3 times a day ___Once a day ___Almost every day

   ___1 to 3 times during the past 7 days ___He/she does not drink juice

   Other_____

2. **<u>During the past 7 days, how many times did your child drink Soda pop (for example, Coke, Pepsi, or Mountain Dew), sports drinks (for example, Gatorade), or fruit drinks that are not 100% fruit juice (for example, Kool-Aid, Sunny Delight, Hi-C, Fruitopia, or Fruitworks)? Was it . . .</u>**

   ___≥ 4 times a day ___2-3 times a day ___Once a day ___Almost every day

   ___1 to 3 times during the past 7 days ___He/she does not drink these

   Other_____

3. **<u>During the past 7 days, how many times did your child drink water? Was it . . .</u>**

   ___≥ 4 times a day ___2-3 times a day ___Once a day ___Almost every day

   ___1 to 3 times during the past 7 days ___He/she does not drink water Other_____

4. **<u>During the past 7 days, what was your child's favorite drink choice when he/she was thirsty? Was it ...</u>**

   ___Milk (e.g., Cow's Milk, Chocolate Milk, Soy Milk) ___Soda Pops (e.g., Coke, Pepsi, or Mountain Dew) ___Sports Drinks (e.g., Gatorade)

   ___Fruit Drink (not 100% fruit juice, for example, Kool-Aid, Sunny Delight, HI-C, Fruitopia, or Fruitworks) ___Water Other______

➢ **Section <u>B Now</u> please consider <u>yourself and your own</u> beverage intake in the past week.**

5. **<u>During the past 7 days, how many times did you drink 100% fruit juices such as orange juice, apple juice, or grape juice? Do not count punch, Sunny Delight, Kool-Aid, sports drinks, or other fruit flavored drinks. Was it . . .</u>**

   ___≥ 4 times a day ___2-3 times a day ___Once a day ___Almost every day

   ___1 to 3 times during the past 7 days ___I do not drink juice Other ____

6. **During the past 7 days, how many times did you drink Soda pop (for example, Coke, Pepsi, or Mountain Dew), sports drinks (for example, Gatorade), or fruit drinks that are not 100% fruit juice (for example, Kool-Aid, Sunny Delight, Hi-C, Fruitopia, or Fruitworks)? Was it . . .**
   ___≥ 4 times a day ___2-3 times a day ___Once a day ___Almost every day
   ___1 to 3 times during the past 7 days ___I do not drink these Other_____
7. **During the past 7 days, how many times did you drink water? Was it . . .**
   ___≥ 4 times a day ___2-3 times a day ___Once a day ___Almost every day
   ___1 to 3 times during the past 7 days ___I do not drink water Other_____
8. **What was your favorite drink choice when you are thirsty? Was it . . .**
   ___Milk (e.g., Cow's Milk, Chocolate Milk, Soy Milk) ___Soda Pops (e.g., Coke, Pepsi, or Mountain Dew) ___Sports Drinks (e.g., Gatorade) ___Fruit Drink (not 100% fruit juice, For example, Kool-Aid, Sunny Delight, HI-C, ___Fruitopia, or Fruitworks) ___Water Other _____

➢ **Section C Now please consider your child and your own beverage intake in general.**

9. **The daily suggestion for children's water intake is about 5 cups (3.5 bottles). Do you think your child meets the recommended level?** ___Yes ___No
10. **The daily suggestion for adult's water intake is about 13 cups (10 bottles) for adult males and 11 cups (8 bottles) for adult females. Do you think you meet the recommended level?** ___Yes ___No
11. **Have you ever had any concerns about the quality of water?**
    ___No ___Only when I was growing up, as a child ___Currently in my home
    ___In the past in my home ___Other, please specify _____________

Demographical Information

We are not sharing this information with anyone. Bingbing needs it to describe the sample of children participating in the study. It will be reported as a group of children, not individual children or families. Are you comfortable answering some questions such as ethnicity and income?

12. **Gender:** ___Female ___Male _*(Don't ask this question, just mark it)*
13. **Relationship to child:** ___ Mother ___Father ____Legal Guardian:_________
14. **Age of your child at Head Start:** ___
15. **Ages of your other children:** _______
16. **Ethnicity**
    ___White ___Black or African American ___American Indian or Alaska Native
    ___Asian ___Other ________
17. **Do you work at a job or self-employment?** ___Yes ___No ____ Job ____ Self-employment
18. **Including yourself, how many adults contribute to your household income?** _1 _2 Other______
19. **What is the annual or monthly income for your household?**

___ more than $3000.00 a month
___ $2500.00 - $2900.00 a month approximately
___$2000.00 - $2500.00 a month approximately
___$1700.00 - $2000.00 a month approximately
___$1250.00 - $1700.00 a month approximately
___$900.00 - $1250.00 a month approximately
___$500.00 - $900.00 a month approximately
___$500.00 a month or less

20. Education Activity - What is the highest grade or year of school that you completed:

___Up to 8th grade ___9th to 11th grade ___12th grade but no diploma

___High school diploma/equivalent ___Voc/Tech program after high school but no diploma after high school ___Some college but no degree ___Associate's degree ___Bachelor's degree ___Graduate or professional school but no degree ___Graduate degree

Thank you for your participation! Notes:

APPENDIX F
PARENT SURVEY SPANISH

Consumo de Bebidas – La Encuesta Para Padres

Gracias por formar parte de nuestra encuesta la cual es parte de un estudio del consumo de bebidas del programa "Head Start". Las respuestas son totalmente confidenciales y solo serán analizadas por el equipo que forma parte de esta investigación. Esta encuesta es totalmente voluntaria y durará entre 5 a 10 minutos. Al completar esta encuesta usted está accediendo a participar en esta investigación.

Ahora me gustaría hacerle algunas preguntas acerca de los hábitos alimenticios de su hijo/hija. Quiero saber acerca de los alimentos que su hijo/hija comió o tomó en los últimos 7 días. Piense en todas las cenas, almuerzos y snacks que su hijo/hija comió desde que se levantó hasta que se acostó. Asegúrese de incluir los alimentos que comió en el hogar, en la escuela (Head Start), en los restaurantes, cuando juega con los amigos o en cualquier otro lugar y durante las actividades del fin de semana.

- **Sección A Cuando responda estas preguntas por favor considere todo el consumo de bebidas de su hijo/hija durante los últimos 7 días.**

21. **Durante los últimos 7 días ¿Cuantas veces al día su hijo/hija ingirió *100% jugo* de frutas como por ejemplo jugo de naranja, de manzana o de uva? No incluir jugos tales como fruit punch, Sunny Delight, Kool-Aid, bebidas deportivas o cualquier bebida saborizante. Usted diría que…**

____cuatro veces al día o más ____dos o tres veces al día ____una vez al día casi todos los días,
____de 1 a 3 veces en los últimos 7 días ____no tomó estas bebidas ____Otra respuesta

22. **Durante los últimos 7 días, ¿Cuántas veces su hijo/hija *tomó gaseosas o refrescos* (por ejemplo Coca Cola, Pepsi, o Mountain Dew), bebidas deportivas (por ejemplo Gatorade), o bebidas de frutas que no contienen 100% jugo de frutas (por ejemplo Kool-Aid, Sunny Delight, Hi-C, Fruitopia, o Fruitworks)? Usted diría que . . .**

____cuatro veces al día o más ____dos o tres veces al día ____una vez al día casi todos los días,
____de 1 a 3 veces en los últimos 7 días ____no tomó estas bebidas ____Otra respuesta

23. **Durante los últimos 7 días, ¿Cuantas veces al día su hijo/hija ingirió *agua*? Usted diría que . . .**

____cuatro veces al día o más ____dos o tres veces al día ____una vez al día casi todos los días,
____de 1 a 3 veces en los últimos 7 días ____no toma agua ____Otra respuesta

24. **¿Cual es la bebida favorita de su hijo/hija cuando tiene sed?**

___Leche (por ejemplo: Leche de vaca, chocolatada, leche de soya) ___Bebida gasificada (por ejemplo: Coca-Cola, Pepsi o Mountain Dew) ___Bebida deportiva (por ejemplo: Gatorade) ___Bebidas con saborizante (por ejemplo Kool-Aid, Sunny Delight, HI-C, Fruitopia, o Fruitworks) ___Agua ___Otra bebida

- **Sección B Ahora considere su consumo de bebidas y actividades físicas realizadas durante la semana pasada.**

25. **Durante los últimos 7 días ¿Cuantas veces al día usted ingirió *100% jugo* de frutas como por ejemplo jugo de naranja, de manzana o de uva? No incluir jugos tales como fruit**

punch, Sunny Delight, Kool-Aid, bebidas deportivas o cualquier bebida saborizante. Usted diría que…

____cuatro veces al dia o más ____dos o tres veces al dia ____una vez al dia casi todos los dias
____de 1 a 3 veces en los últimos 7 dias ____no tomó estas bebidas ____Otra respuesta

26. **Durante los últimos 7 días, ¿Cuántas veces usted tomó *gaseosas o refrescos* (por ejemplo Coca Cola, Pepsi, o Mountain Dew), bebidas deportivas (por ejemplo Gatorade), o bebidas de frutas que no contienen 100% jugo de frutas (por ejemplo Kool-Aid, Sunny Delight, Hi-C, Fruitopia, o Fruitworks)? Usted diría que . . .**

____cuatro veces al dia o más ____dos o tres veces al dia ____una vez al dia ____casi todos los dias ________de 1 a 3 veces en los últimos 7 dias ____no tomó estas bebidas ____Otra respuesta

27. **Durante los últimos 7 días, ¿Cuantas veces al día consumió *agua*?**

____cuatro veces al dia o más ____dos o tres veces al dia ____una vez al dia ____casi todos los dias ________de 1 a 3 veces en los últimos 7 dias ____no toma agua ____Otra respuesta

28. **¿Cual es su bebida favorita cuando tiene sed?**

___Leche (por ejemplo: Leche de vaca, chocolatada, leche de soya) ___Bebida gasificada (por ejemplo: Coca-Cola, Pepsi o Mountain Dew) ___Bebida deportiva (por ejemplo: Gatorade)
___Bebidas con saborizante (por ejemplo Kool-Aid, Sunny Delight, HI-C, Fruitopia, o Fruitworks) ___Agua ___Otra bebida

- **Sección C**

Ahora en general considere el consumo de bebidas de usted y de su hijo/hija.

29. **Se recomienda que un niño ingiera aproximadamente 1 litro y medio o 5 vasos (2 bottles) de agua al día. ¿Usted cree que su hijo/hija consumen esta cantidad de agua?**
___Si ___No

30. **Se recomienda que un adulto ingiera diariamente 3 litros o 13 vasos (2 bottles) de agua para los hombres y 11 vasos (4 bottles) de agua para las mujeres. ¿Usted cree que consume esta cantidad de agua?** __Si __No

31. **¿Alguna vez usted ha tenido alguna inquietud sobre la calidad del agua?**

___No ___Cuando era niño/niña ___En mi hogar
___En mi hogar anterior ___Otra respuesta

Información Demográfica ---- Esta información no se compartirá con nadie. Bingbing necesita describer la cantidad de niños que participaron en el estudio a wal se **reportar niños colectivamente, y no individualmente. ¿Tiene algun inconceniente en** contester **preguntas acerca de su ingreso y raze.**

32. **Genero:** _Femenino__Masculino (Do not ask. Just circle it)

33. **Parentesco**: ____ Mama ___Papa ____Guardia Legal:_________

34. **Edad del niño:** _____

35. **Edades de sus otros niños:** ______

36. **Raza** ___Caucásico(blanco) ___Negro y/o Afroamericano ___Indio Americano o Nativo de Alaska
___Asiático ___Otro

37. **¿Usted tiene trabajo en un centro laboral o su propio negocio?** __Si _No __El trabajo __Autoempleo

38. **Incluyéndose usted, ¿Cuantos adultos mas contribuyen con los ingresos del hogar?** _1 __2 Otros__

39. **¿Cuál es el ingreso mensual de su hogar?**
(Mas de $3000.00)
($2500.00 - $2900.00 por mes)
($2000.00 - $2500.00 por mes)
($1700.00 - $2000.00 por mes)
($1250.00 - $1700.00 por mes)
($900.00 - $1250.00 por mes)
($500.00 - $900.00 por mes)
($500.00 mensualeso menos)

40. **Nivel Educativo - ¿Cual es el nivel educativo mas alto que ha completado?**
___Hasta a 8vo grado. ___De 9no a 11vo grado.
___12do grado pero sin diploma ___Diploma de Secundaria y/o su equivalente
___Escuela Técnica (por ejemplo: Programas técnicos y/o vocacionales)
___Algo de Universidad pero sin titulo ___ Diploma de Asociado
___ Bachiller ___ Escuela profesional sin diploma
___Maestria (MA, MS) Otro__________________

Muchas gracias por su participación!

Notes:

APPENDIX G
TEACHER SURVEY

Beverage Consumption - Teacher Survey

This survey is part of a study of families and children's experiences with the Head Start program. We obtained permission from the director of the center to talk with you about your experiences in Head Start. Your completion of these surveys serves as your consent to participate in this research project.

We appreciate your time and effort in completing this survey. Your participation in the study is voluntary and you may refuse to answer any questions you are not comfortable answering. Your answers will be completely confidential and will not be shared with parents or other staff in your center, or anybody else not working on this study. The survey will take about 5-10 minutes of your time to complete. Do you have any questions before we begin?

Now, I'd like to ask you about [CHILDREN]'s beverage intake in your class. I want to know about the food [CHILDREN] drank during the past 7 days. Think about all the beverages they had from the time they arrived until they were picked up.

- **Section A**

Now please consider the beverage intake in general for the children in your class when you answer the following questions.

1. **During the past 7 days, how many times did the children in your class drink 100% fruit juices such as orange juice, apple juice, or grape juice? Do not count punch, Sunny Delight, Kool-Aid, sports drinks, or other fruit flavored drinks. Was it . . .**
   ≥ 4 times a day 2-3 times a day Once a day Almost every day
   1 to 3 times during the past 7 days They did not drink juice Didn't know Refused
2. **During the past 7 days, how many times did the children in your class drink Soda pops (for example, Coke, Pepsi, or Mountain Dew), sports drinks (for example, Gatorade), or fruit drinks that are not 100% fruit juice (for example, Kool-Aid, Sunny Delight, Hi-C, Fruitopia, or Fruitworks)? Was it . . .**
   ≥ 4 times a day 2-3 times a day Once a day Almost every day
   1 to 3 times during the past 7 days They did not drink soda pops, sports and fruit drinks
   Don't know Refused
3. **During the past 7 days, how many times did the children in your class drink water (from water fountain, water bottle or other)? Was it . . .**
   ≥ 4 times a day 2-3 times a day Once a day Almost every day
   1 to 3 times during the past 7 days They did not drink water Don't know Refused
4. **What was the favorite drink choice of the children in your class's when they all thirsty? Was it ...**
   ___Milk (e.g., Cow's Milk, Chocolate Milk, Soy Milk) ___Soda Pops (e.g., Coke, Pepsi, or Mountain Dew) ___Sports Drinks (e.g., Gatorade) ___Fruit Drink (not 100% fruit juice, For example, Kool-Aid, Sunny Delight, HI-C, Fruitopia, or Fruitworks)
   ___Water Other______

- **Section B**

Now please consider your own beverage intake in the past week.

5. **During the past 7 days, how many times did you drink 100% fruit juices such as orange juice, apple juice, or grape juice? Do not count punch, Sunny Delight, Kool-Aid, sports drinks, or other fruit flavored drinks. Was it . . .**
   ≥ 4 times a day 2-3 times a day Once a day Almost every day
   1 to 3 times during the past 7 days I do not drink juice Other___
6. **During the past 7 days, how many times did you drink Soda pop (for example, Coke, Pepsi, or Mountain Dew), sports drinks (for example, Gatorade), or fruit drinks that are not 100% fruit juice (for example, Kool-Aid, Sunny Delight, Hi-C, Fruitopia, or Fruitworks)? Was it . . .**
   ≥ 4 times a day 2-3 times a day Once a day Almost every day
   1 to 3 times during the past 7 days I do not drink these Other_____
7. **During the past week, how many times did you drink water? Was it . . .**
   ≥ 4 times a day 2-3 times a day Once a day Almost every day
   1 to 3 times during the past 7 days I do not drink water Other_____
8. **What was your favorite drink choice when you are thirsty? Was it . . .**
   Milk (e.g., Cow's Milk, Chocolate Milk, Soy Milk) Soda Pops (e.g., Coke, Pepsi, or Mountain Dew)
   Sports Drinks (e.g., Gatorade) Fruit Frink (not 100% fruit juice, For example, Kool-Aid, Sunny Delight, HI-C, Fruitopia, or Fruitworks) Water Other _____

➢ **Section C**

Now please consider the children in your class and your own beverage intake in general.

9. **The daily suggestion for children's water intake is about 11, 000 ml (6.5 cups or 3.5 bottles). Do you think the children in your class meet the recommended level?** Yes No
10. **The daily suggestion for adult's water intake is about 3 Liters (13 cups or 10 bottles) for male and 2.2 Liters for female (11 cups or 8 bottles). Do you think you meet the recommended level?** Yes No

Demographical Information

11. **Gender:** Female Male
12. **What is the name of the college or university (you attended/where you completed your highest degree)?**
    Name of College/University Don't know Refused
13. **Do you have a Child Development Associate (CDA) credential?** Yes No Don't know Refused
14. **Do you have a state-awarded preschool certificate?** Yes No Don't know Refused
15. **Do you have a teaching certificate or license?** Yes No Don't know Refused
16. **Including post-secondary school degrees, graduate degrees, etc., are you currently enrolled in any additional <u>teacher-related training or education</u>?** Yes No Don't know Refused
17. **What kind of training or education program are you enrolled in?**
    Child Development Associate (CDA) Degree Program
    Teaching Certificate Program Special Education Teaching Degree Program

Bachelor's Degree Program

18. What is your race? You may name more than one if you like.

White Black or African American American Indian or Alaska Native (Specify)__ Asian Indian
Chinese Filipino Japanese Korean Vietnamese Asian (Not further specified)
Other Pacific Islander (Specify)__ Another Race _____ Don't know Refused

19. Are you of Spanish, Hispanic, or Latino origin? Yes No Don't know Refused

20. Which one of these best describes you. . .

Mexican Mexican American Chicano Puerto Rican__ Cuban, or another Spanish/Hispanic/Latino group? (Specify)__ Don't know Refused

Thank you for your participation!

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