

THE ASSOCIATION BETWEEN CAREGIVER PERCEPTION OF CHILD WEIGHT  
STATUS AND FREQUENCY OF FAST FOOD CONSUMPTION IN CHILDREN

by

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A thesis submitted to the faculty of  
The University of North Carolina at Charlotte  
in partial fulfillment of the requirements  
for the degree of Master of Science in  
Public Health

Charlotte

2015

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## ABSTRACT

CANDACE MARIE BUTLER. The association between caregiver perception of child weight status and frequency of fast food consumption in children. (Under the direction of DR. ELIZABETH RACINE).

Childhood obesity is a persistent health issue in the United States. There has been an increase in the number of meals purchased away from home as the presence of fast food establishments has risen. Previous studies suggest that children who frequently consume meals away from home, specifically fast food meals, are at higher risk of being overweight or obese. The present study examined the association between caregiver perception of child weight status and frequency of fast food consumption in children. This is a secondary analysis of 1,905 children ages 4 to 17; information was self-reported from the child's caregiver. Data were collected from the 2009 North Carolina Child Health Assessment and Monitoring Program (NC CHAMP) and the 2009 Behavioral Risk Factor Surveillance System (BRFSS). To analyze the data, simple and multivariate logistic regression were used to produce odds ratios (ORs) and 95% confidence intervals (CIs). In the unadjusted and adjusted analyses, no association was found between caregivers; perception of children's weight status and children's eating fast food two or more times per week. To study this relationship in more detail, future research looking at this relationship stratifying by actual weight status, as racial/ethnicity, or caregivers' relationship to the child (i.e., grandparent or guardian) is warranted. The present study found that cultural implications, such as race or ethnic background, have the potential to influence rate of fast food consumption in children. Moreover, it was found that a large percentage of North Carolina children consume fast food more than two times a week

compared to other children from the United States, further indicating that public health professionals should research the factors associated with increased fast food consumption and provide counseling to families, considering those factors, to improve diet quality in children.

## ACKNOWLEDGEMENTS

Thank you to my chair, Dr. Elizabeth Racine, for guiding, encouraging and assisting me throughout this entire process. I would also like to thank Dr. Andrew Harver and Dr. Sharon Portwood for their advising and thoughtful evaluation of my research. To conclude, I would like to thank my loved ones for their patience and continued support.

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## INTRODUCTION

### Public Health Significance

The consumption of meals purchased away from home has steadily increased over the past three decades. By 2012, 43.1% of meals were consumed away from home (i.e., fast food and full-service restaurants) compared to 16% in the late 1970's (United States Department of Agriculture, 2014; Alviola IV, Nayga, Thomsen, Danforth, & Smartt, 2014). With more than 50,000 fast food restaurants across the United States, almost 25% of adults consume fast food more than two times a week, with 30% of American children consuming fast food at least one day a week (Palo Alto Medical Foundation, 2014; United States Healthful Food Council, 2014; Hearst, Harnack, Bauer, Earnest, & French, 2013; Schlosser, 2002). Numerous items sold at fast food restaurants are high in saturated and total fat, sugar, sodium, and cholesterol, and low in nutritional vitamins (e.g., A and C), fiber, folic acid, and calcium (Demory-Luce D. , 2005).

It is important to understand the factors associated with child dietary behaviors. Oftentimes, child eating patterns are heavily influenced by parent food choices at home (Demory-Luce, Baranowski, Saker, & Bereson, 2004); children model their parents' preferences (Golan & Crow, 2004). In addition, parental messages about obesity and thinness influence child eating habits (Thomas, Olds, Pettigrew, Randle, & Lewis, 2014; Chen, Binns, Maycock, Zhao, & Liu, 2014). Interventions that consider parents' perceptions of their children's weight status have been useful in addressing childhood obesity (Lundahl, Kidwell, & Nelson, 2014) because parents of overweight children often underestimate their child's weight status (Taylor, Williams, Dawson, Haszard, & Brown, 2013; Miller, Grant, Drummond, Williams, Taylor, Goulding, 2007; Doolen, Alpert,

Miller, 2009). To change the behaviors of children who are overweight, it is important that parents and other caregivers recognize and accurately assess their child's weight status (Eckstein, et al., 2006). It is plausible that a disconnect between parents' and caregivers' perceptions and their child's weight status can promote the continuation of unhealthy dietary behaviors (Doolen, et al., 2009). It is also important to consider the race/ethnicity of the child since research has found that parental perceptions of child weight status may vary by racial/ethnic group in the United States (Young-Hyman, Herman, Scott, Schlundt, 2000). For example, African-American mothers of overweight children were less likely to place dietary limits on their children or to emphasize weight loss, as they viewed their children as normal weight (Young-Hyman, et al., 2000; Molloy & Herzberger, 1998). Moreover, messages and caregiver perceptions' about childhood obesity and prevention strategies to target obesity in children vary culturally (Vollmer & Mobley, 2013; Guendelman, Fernald, Neufeld, & Fuentes-Afflick, 2013). For example, Non-Hispanic White mothers used techniques to control a child's weight more so than other race/ethnicities (Guendelman, Fernald, Neufeld, & Fuentes-Afflick, 2013). Researchers also found that Hispanic and Non-Hispanic Black mothers were more likely to cater to their child's preference for certain food choices.

While there are indications that parent perception of child weight is associated with child dietary patterns, no research has examined the relationship between parent or caregiver perception of child weight status and frequency of child fast food consumption among children in North Carolina. Accordingly, the purpose of this study was to increase our understanding of parents' and other caregivers' perceptions of child weight status and their relationship to the child's frequency of fast food consumption. Findings

will aid in the development of interventions that focus on childhood obesity, while considering caregiver's perception of child's weight as a potential factor in continued unhealthy dietary behaviors in children. Moreover, the current study fills gaps in literature regarding caregiver perceptions of child's weight and their influence on food purchases away from home, specifically the purchase of items offered at fast food restaurants.

## LITERATURE REVIEW

This literature review focuses on three areas: (1) the factors associated with fast food consumption in children; (2) the relationship between fast food consumption among children and weight status, and (3) the relationship between parent or caregiver perception of child weight and child diet.

### Factors Associated with Fast food Consumption Among Children

Fast food is defined as foods that can be served and prepared quickly, with modest consideration to quality (Merriam-Webster, 2015). Examples of fast foods offered in the United States include, pizza chains (Domino's and Pizza Hut), hamburger chains (Burger King and McDonalds), and fried chicken chains (Bojangles and KFC) (Angell, Cobb, Curtis, Konty, & Silver, 2012). It is important to understand factors that facilitate fast food consumption among children. With a shift in the dietary behaviors of children toward increased consumption of food away-from-home, large portion sizes and sweetened beverages, it is important to examine the factors influencing these behaviors (Demory-Luce, 2005).

In a cross-sectional analysis of Costa Rican children, Monge-Rojas, Smith-Castro, Colón-Ramos, Aragón, & Herrera- Raven, examined the correlation between frequency of fast food consumption and socio-demographic and psychosocial factors (2013). Study participants (n=400) included male and female Costa Rican children ages 12-17 years. Children were asked to complete a questionnaire that assessed socio-demographic information and frequency of fast food consumption during the past month. Three factors were associated with fast food consumption: availability, living in a rural area, and convenience. Children who resided in urban areas consumed fast food at least three to

four times a month, while many rural adolescents reported eating fast food every day (i.e., 1.8 times higher than urban children). Also, male adolescents consumed more fast food on a daily basis compared to female adolescents (15.9% boys; 8.1% girls,  $p < 0.001$ ). There were several study limitations in the study population and data-collection methods. There was not an equal representation of students from both rural and urban schools. In addition, results may not be generalizable to populations within the United States since the study was based in Costa Rica.

A longitudinal study assessed the association between acculturation to the United States and the amount of fast food consumed among Asian-American and Hispanic adolescents (Unger, et al., 2004). Participants ( $n=2,004$ ) were 6<sup>th</sup> grade students from Southern California; 83% of respondents self-identified as Asian-American or Hispanic. Students completed a self-administered survey at baseline, in 6<sup>th</sup> grade (2001), and again in 7<sup>th</sup> grade (2002). To assess acculturation, the survey used the United States Orientation subscale from the Acculturation, Habits, and Interests Multicultural Scale (AHISMA). To assess fast food consumption, the survey asked two questions: “How many times during the school week (Monday-Friday) do you typically get something to eat at McDonald’s....Taco Bell, or other fast food restaurants?” and “How many times during the weekend (Saturday- Sunday) do you typically get something to eat at McDonald’s...Taco Bell, or other fast food restaurants?”. Researchers found that acculturation level for both Hispanics and Asians were significantly associated with an increased frequency of fast food consumption ( $\beta = .078$ ,  $p < .001$ ). However, researchers also found that Asian-American adolescents reported less fast food consumption compared to Hispanic adolescents ( $\beta = -.097$ ,  $p < .001$ ). These findings suggest that

acculturation to the United States is a risk factor for increased fast food consumption in Hispanic and Asian-American children.

In a longitudinal study, Gorden-Larsen, Guilkey, & Popkin explored the association between community-level food prices and dietary intake (2011). Data were collected from the 1996, 2001 and 2002 National Longitudinal Study of Adolescent Health. Researchers assessed participants' (n=11,088) race/ethnicity, income-level, fast food prices and individual-level fast food intake across 158 counties at baseline and across 363 counties at follow-up. There was a negative association between price and fast food purchasing among Black males; a 20% increase in the price of soda was associated with a 25% decrease in frequency visits to fast food restaurants ( $p < 0.0001$ ). Overall, there was a negative association between fast food price and consumption of fast food and soda. Males consumed more fast food compared to females. In addition, lower intake levels of fast food were found among Asians, Hispanics, and Non-Hispanic Blacks compared to White adolescents when prices increased.

Mandal and Powell (2014) recently conducted an analysis using data from the Early Childhood Longitudinal Study (n=10,700) to assess the relationship between a childcare setting and child diet with specific reference to consumption of fast food, soft drinks, 100% juice, and vegetables. Childcare settings were defined as parental care, unpaid relative care, paid relative care, non-relative care, center care, and Head Start. Children who were in paid and Head Start childcare settings had greater fruit and vegetable consumption compared to children in single-mother households. Children of single mothers had a 15% increased risk of being obese and a 25% increase in fast food consumption. In a two-parent household with unemployed mothers (parental care),

increased fruit and vegetable consumption was associated with a 10% decrease in obesity. Results of this study are generalizable to the US population; however, data do not yield international comparisons since childcare settings and definitions of what is overweight and obesity vary.

The findings from this review indicate that being a single parent, higher levels of acculturation to the United States, food prices, race/ethnicity, and gender are associated with more frequent fast food consumption in children.

#### Fast Food Consumption Among Children and Weight Status

For children, 2% of energy intake in the 1970s was from consuming fast food. By 2008, 41% of children and adolescents consumed fast food on an average day (Poti, Duffey, & Popkin, 2014). Recently, researchers found that fast food consumption accounted for 14.1% of energy, 15.9% of sodium and 17.9% of solid fat of 12,000 children studied (Rehm & Drenowski, 2014). The dietary profile of 12 fast food restaurants, including Chick-fil-A, McDonalds, Burger King and other prominent Western fast food restaurants revealed that of the 5,427 potential kids' meal combinations, less than 1% met the standard nutritional recommendations (Harris, et al., 2013). A review of 15 prospective cohort studies between 1998- 2010, found a positive association between fast food consumption and waist circumference and body weight among adults and children (Nago, LaChat, Dossa, & Kolseteren, 2014).

In a longitudinal study, family food environment was associated with weight status in school-aged children (MacFarlane, Cleland, Crawford, Campbell, & Timperio, 2009). At baseline (2002/2003), parents of 161 children ages 5-6 years and 132 children ages 10-12 were given a questionnaire to assess socio-demographic factors and the family

food environment, including fast food use; anthropometrics and physical activity were also measured. Four years later (2006), these data were collected again. The authors found that children who consumed more fast food at baseline had greater odds of being overweight at follow-up (OR=3.1, 95% CI=1.4-7.0) compared to children who consumed less fast food. Limitations of this study included lack of generalizability to the United States population since the study was conducted in Australia. However, the researchers concluded by stating that increased consumption of fast food was a risk factor for being overweight.

A cross-sectional analysis of children and adolescents, ages 4 to 19 years (n=6,212), explored patterns of fast food consumption among children and to determine whether consumption of fast food increased the risk of obesity (Bowman, Gortmaker, Ebbeling, Pereira, & Ludwig, 2004). Researchers analyzed data from the 1998 Supplemental Children's Survey and the US Department of Agriculture 1994 and 1996 Continuing Survey of Food Intake by Individuals (CSFII). The aim of this study was to. An interviewer-administered 24-hour recall was used to find out where participants purchased or ate their food; choices included fast food restaurants, vending machines, schools, and childcare centers. Results indicated that 30.3% of the study population had consumed fast food at least once in the past week. In addition, children who consumed fast food had increased amounts of saturated fat, total carbohydrates, sugar-sweetened beverages, and total fat in their diets compared to children who did not consume fast food. Overall, a large proportion of children (30%) consumed fast food on a daily basis, regardless of race/ethnicity, gender or location within the United States.

Fraser, Clarke, Cade, & Edward explored the association between fast food consumption and obesity (2012) using data from the Avon Longitudinal Study of Parents and Children (ALSPAC) (n=4,827). Between 2004 and 2008, participant weight, height and age were collected when the participant was 13 years of age and again at 15 years of age. Parents reported how often their child consumed fast food in the past month; responses to this question included: never/rarely, once a month, once every two weeks, once or twice per week, three to four times a week, five or more times a week. Responses were later categorized into a binary variable as “my child eats fast food”, yes or no. To measure fast food accessibility, researchers analyzed proximity to fast food outlets using ArcGIS. They found that consumption of fast food was associated with an increased probability of being overweight or obese (OR 1.23, 95% CI: 1.02, 1.49). However, there was no significant relationship between proximity to food outlets and frequency of fast food consumption.

Across the studies reviewed, researchers consistently found that regular consumption of fast food led to an increased probability of being overweight or obese (MacFarlane, et al., 2009; Bowman, et al., 2004; Fraser, et al., 2012). All, but one study was conducted in the United States (MacFarlane, et al., 2009). However, it is not clear why some children consume more fast food than others. Further research to understand why caregivers choose fast food, while conscious of health consequences caused by a continued diet of non-nutritious foods, is warranted.

#### Parent/Caregiver Perception of Child Weight and Its Influence on Parenting Behavior

Parents influence the eating habits of children (Golan & Crow, 2004; Nicklas, et al., 2009; Anzman, Rollins & Birch, 2010). Thomas, Olds, Pettigrew, Randle, and Lewis,

assessed the association between family communication regarding body weight and the weight-related behaviors of family members (2014). Parent and child pairs (159 parents and 184 children) participated in the study. Over a one-year period, researchers conducted face-to-face interviews with parents and children separately. For children, data were collected on self-reported weight and height, age, and gender. For parents, data were collected on household income, occupation, education level of each family member, age, gender, and self-reported weight and height. Parents and children reported physical activity and 'screen time' (videogame, television and computer time). Open-ended questions to understand beliefs, behaviors and attitudes associated with weight were also asked. Researchers found three common themes from discussions with parents and children. First, both parents and children reported that weight status and shape were predictors of health, with thinness being associated with good health. Second, parents frequently communicated the consequences of being overweight in an effort to limit children's consumption of junk food. Finally, parents and children stated that if an individual were thin, exercise and eating habits were less important, and physical activity would offset the types of food consumed.

In a prospective cohort study of parents with young adolescents, Sand, Lask, Hysing, and Stormark (2014) explored the association between accuracy of weight perception among parents of young adolescents, troubled eating patterns and mental health problems. Participants born between 1993 and 1995 were included in the study and followed over a ten-year period. The study sample included 5,781 participants ages 11 to 13. Parents completed a questionnaire to measure demographic variables, weight status, parents' weight perception, adolescents' weight perception, and disturbed eating patterns.

Over 80% of parents correctly identified their child's weight. Parents of overweight adolescents underestimated their child's weight; 34.8% of parents underestimated girls weight and 12.8% of parents underestimated boys weight. Overestimating their children's weight (i.e., parents' perceiving a child who is underweight to be overweight) was associated with disturbed eating patterns, such as comfort eating (girls: OR= 4.42, CI 1.96 - 10.01,  $p < .001$ , boys: OR= 3.04, CI 1.10 – 8.43,  $p < .05$ ). Trends suggested that the eating habits of adolescents are associated with the accuracy of parents' weight perceptions.

In a cross-sectional study of economically and racially diverse parents and children, Wehrly, Bonilla, Perez and Liew (2013) explored two parenting behaviors - forcing foods and restricting foods - and their association to various measures of child weight status (e.g., percent body fat, perception of child weight, and body mass index). Children (n=243) ages 4 to 6 years and their parents participated in the study. Parents who perceived their child as being overweight were more likely to use restrictive feeding techniques than were parents who perceived their children as normal weight. Although the researchers found no association to BMI, parents of White children pressured their children to eat less compared to Black and Hispanic parents. However, previous studies found that an increased BMI was associated with restrictive feeding techniques (Johnson & Birch, 1994; Powers, Chamberlin, van Schaick, Sherman, & Whitaker, 2006). Wehrly and colleagues went on to suggest that Asian parents in the study sample pressured their children to eat more compared to other racial groups in order to assimilate to Western culture. Future analyses to examine cultural differences and its influence on parental/caregiver feeding patterns are warranted.

Yilmaz, Erkorkmaz, and Karaaslan (2013) conducted a cross-sectional analysis in 16 Turkish elementary schools to assess parents' perceptions of their child's weight and parent feeding practices. Mothers of children 5 to 7 years old ( $n = 380$ ) completed a 15-20 minute questionnaire comprised of three sections: (1) demographic information, (2) The Parent Feeding Style Questionnaire (PFSQ), and (3) sketches of children; respondents were asked to circle the body shape that most closely matched that of their child. Sketches of the children were also categorized as BMI percentiles of underweight, normal weight (well-nourished), and overweight. For this study, the PFSQ consisted of 27 questions with four subscales: Encouragement (e.g., I praise my child if she eats what I give her), Emotional (e.g., I give my child something to eat to make him feel better when he is upset), Control (i.e., 1 –strict control and 2-permissive control) (e.g., I decide how many snacks my child should have), and Instrumental (e.g. I reward my child with something to eat when she is well-behaved) (Wardle, Sanderson, Guthrie, Rapoport, & Plomin, 2002). Among mothers who perceived their child as underweight and overweight, there was a significant association with emotional feeding styles ( $p > 0.015$ ). In addition, researchers found an association between mothers who perceived their children to be normal and overweight and an encouragement feeding style ( $p > 0.033$ ). Overall, study results indicated that perceptions of mothers were a determinant of child feeding styles.

Caregivers' perception of child weight can be meaningful in understanding feeding styles and caregiver behavior; however, few studies have explored the cultural implications of child weight perception and its effect on dietary habits. Also, a few analyzed studies reviewed here were conducted outside of the United States; those

countries include, Turkey, Australia, Costa Rica and Norway (Yalmiz, et al., 2013; Thomas, et al., 2014; Sand, et al., 2014; Monge-Rojas, et al.,2013). Moreover, only one qualitative study was conducted (Bowman, et al., 2004). From studies examined, future research should also analyze how the sex of the caregiver/child, culture of the family unit, location of fast food outlet, and income could potentially influence perception of child weight status and feeding practices.

## THEORETICAL FRAMEWORK

The social cognitive theory (SCT) describes the continuous interaction between personal factors, environmental influences, and behavior (Bandura, 1986). It assesses key constructs in behavior change, including self-regulation, self-efficacy, social support and outcome expectations (Monahan, Byhan-Gray, Denmark, Touger-Decker, & Harris, 2011).

Personal factors, such as knowledge, expectations, and attitudes, influence the dietary intake of children (Nestle, et al., 1998). In addition, cultural factors determine perceptions and attitudes towards certain food choices. Behavioral factors, such as skills and practice, are measured by the ability to maintain a healthy diet across a lifespan. Environmental factors, including access, social norms, ability to change one's environment and the influence of others, are influential in creating the dietary environment and patterns of children (Parajes, 2002; Hendrie, Sohonpal, Lange, & Golley, 2013).

For purposes of the current study, two constructs of SCT- behavioral and personal -factors will be examined. Variables to assess personal factors include race/ethnicity, child age, caregiver education level, and caregiver perception of child weight status. The behavioral factor to be assessed is frequent fast food consumption. Environmental components such as proximity to food store and types of family meals at home, are likely important factors to consider; however, the data source for these analyses does not include environmental factors; therefore, they will not be included in the current study.

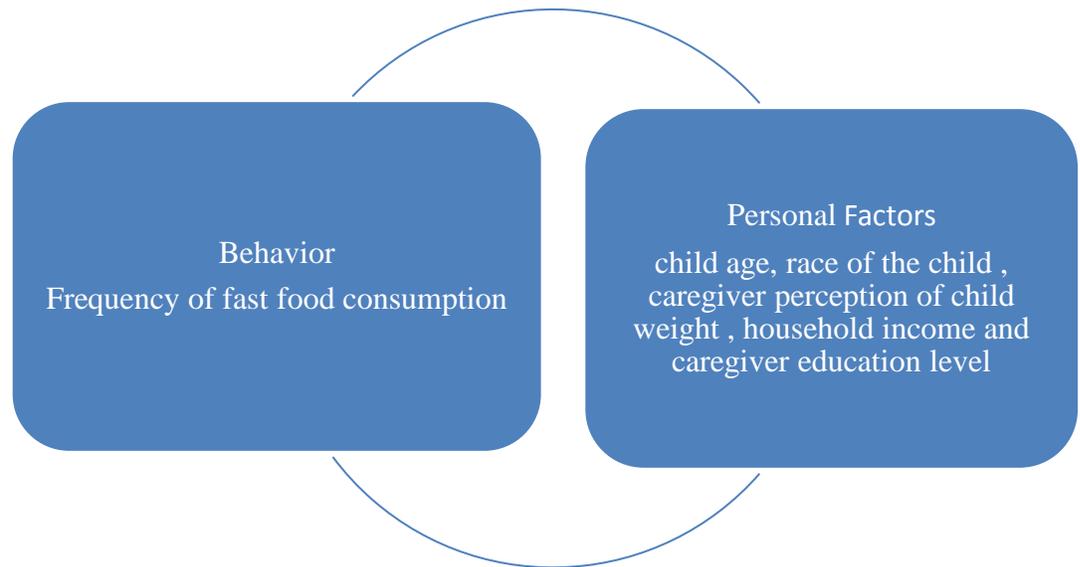


Figure 1: Adaption of the social cognitive theory (Parajes, 2002; Glanz & Bishop, 2010)

## HYPOTHESIS

### Objective and Hypothesis

This study explored the association between caregiver perception of child weight status and fast food consumption two or more times per week in children, while accounting for control variables. It was hypothesized that caregivers' perceiving children as overweight would be associated with reduced odds of consumption of fast food more than two times a week in children from North Carolina; while considering race/ethnicity of each child.

## METHODS

### Study Design and Sample

This cross-sectional study examined the association between caregiver perception of child weight status and fast food consumption two or more times a week in children using the North Carolina Child Health Assessment and Monitoring Program (NC CHAMP) and Behavioral Risk Factor Surveillance System (NC BRFSS) data from 2009. Adults with children under 18 years of age and living in the same household were asked to participate in the NC CHAMP survey if they previously participated in the North NC BRFSS telephone survey. Both the NC BRFSS and NC CHAMP surveys employ complex stratified random sampling strategies for landline numbers provided by the Centers for Disease Control and Prevention: Behavioral Surveillance Branch (Miles, Herrick, & Ford, 2010).

The NC BRFSS collects information on health risks and behaviors related to prominent causes of morbidity (Miles, et al., 2010). The NC BRFSS consists of three sections: (1) core component, (2) optional modules, and (3) state-added questions (Miles, Herrick, & Ford, 2010). The state-added North Carolina modules consists of: (1) random child selection (RCS) and (2) CHAMP follow-up. If caregivers indicate they have two children under the age of 18 living in the home, interviewers ask caregivers to participate in the RCS. RCS allows caregivers to select one child, in which they have the most knowledge of the identified child's health. Once the RCS is complete, caregivers are then asked to participate in the NC CHAMP follow-up module, which interviewers call participants two-weeks following their completion of the NC BRFSS.

Annually, the NC CHAMP survey (conducted in English and Spanish) collects data on a variety of health topics for children aged 0-17 years of age; topics include physical activity, physical health, nutrition, early childhood development, oral health, access to health care, mental health, and breast feeding. NC CHAMP is representative of children and adolescents in NC; its goal is to “monitor the status of child health, gain parent perceptions of child health and understand parent- child relationships, in relation to health”. Survey questions are adapted annually; questions are pretested among 20-30 individuals by The North Carolina State Center for Health Statistics (NC SCHS) staff to access and to improve validity (North Carolina State Center for Health Statistics, 2013). Moreover, the NC CHAMP survey allows individuals to identify their relationship to the selected child; responses include biological mother/father to in-laws, grandparents and adoptive parents.

Among African-American grandparents in the United States, nearly 51.7% identify as primary caregivers (Kicklighter, Whitley, Kelley, Shipskie, Taube, & Berry, 2007). Research suggests parents and primary caregivers can influence healthful or unhealthful behaviors in children, by reinforcing certain values and attitudes (La Rocca, 2009). Therefore, all identified primary caregiver-child relationship dyads (i.e. child/grandparent or child/adoptive parent), were included in the current analysis. Caregiver responses included in the current analyses were based on children ages 4-17 years old, with caregivers of this age group responding to the key outcome, frequency of fast food consumption, and independent variable, caregiver perception of child weight. Children less than three years of age were not included in the analyses since research suggests that this age group mainly consumes modified or soft variations of table food

(i.e., pureed fruits and vegetables, cooked rice or pasta) and would therefore be unable to eat the majority of foods offered at fast food restaurants (Lucas, Brooke, Morley, Cole, Bamford, 1990; Nemours: Children's Health System, 2015).

#### Measurement of the Independent Variable

The independent variable was caregiver perception of child weight status. Caregivers were asked to define child's weight status as: Very overweight, Somewhat overweight, Healthy weight, Somewhat underweight, or Very underweight. For this study, weight status was recoded as the binary variable "perceived overweight" by collapsing the responses "Very overweight" and "Somewhat overweight" and "Perceived not overweight" by collapsing the responses "Healthy weight", "Somewhat underweight", and "Very underweight".

#### Measurement of Outcome Variable

The outcome of interest was fast food consumption two or more times per week. Caregivers were asked how often their child consumed fast food. Consumption of fast food was defined as: less than once/week, once/week, 2 times/week, 3 to 5 times/week, 5 or more times a week or child does not eat fast food. Grier, et al., (2007) previously found that children consume fast food an average of two times per week therefore, consuming fast food two times per week; was used as a cut-point to define the outcome variable.

#### Control Variables

The following factors were included in the multivariate analyses as control variables: race/ethnicity of the child, age of the child, caregiver's highest level of education, gender of the child, and household income. Gender was categorized as male

and female on the 2009 NC CHAMP; gender categories remained the same for the current study. Child age was a continuous variable ranging from 4-17 years of age. For the analyses, age was categorized into three groups: (1) 4 through 9, (2) 10 through 14, and (3) 15 through 17. Participants had the option to select multiple race/ethnicities if they identified with more than one racial or ethnic group. NC CHAMP data defined race/ethnicity as Hispanic (yes or no), White, Black, Asian, Native Hawaiian, Pacific Islander, American Indian, Alaska Native, Other, Don't Know/Not Sure, Refused, or No Additional Choices. For these analyses race/ethnicity was defined as Non-Hispanic White, Non-Hispanic Black, Hispanic and Other. NC BRFSS classified caregiver educational level as: less high school, high school, some college, and college graduate. This variable was collapsed into caregiver education beyond high school (yes or no). The NC BRFSS survey classified household income as: less than \$10,000, less than \$15,000, less than \$20,000, less than \$25,000, less than \$35,000, less than \$50,000, less than \$75,000 and \$75,000 or more. In the current study income was consolidated into three categories: (1) <\$15,000 - \$24,999, (2) <\$25,000 - \$49,999, and (3) >\$50,000 or more.

#### Analysis Plan

##### Univariate Analysis

Weighted frequencies were calculated to provide summary statistics for each variable.

##### Bivariate Analysis

To identify crude associations between caregiver perception of child weight status and consumption of fast food more than two times a week in children, simple logistic regression was used to calculate odds ratios and 95% confidence intervals.

## Multivariate Analysis

Multivariate logistic regression was used to calculate odds ratios and 95% confidence intervals for caregiver perception of child weight status and consumption of fast food more than two times a week in children, adjusting for control variables. Statistical Analysis System (SAS) (version 9.4) was used, and sample weights were applied to all analyses.

## Power and Sample Size

A total of 2,370 caregiver responses were represented in the 2009 NC CHAMP and BRFSS surveys (See Figure 2). However, caregivers who reported children between the ages of 0 and 3 were not included in these analyses (n=452). In addition, caregivers who did not report perception of child weight status were excluded from the overall study sample (n=2), as were caregivers with missing information on the fast food consumption question (n=11). Thus, a total of 1,905 caregiver responses were included for analysis.

Approximately 85.9% of caregivers reported perceiving children ages 4 to 17 as overweight. In addition, 36% of caregivers reported children consuming fast food more than two times a week. With power set at 80% and alpha set at 0.05, the smallest detectable odds ratio is 1.28.

## Human subject protection

Authorization for this study was provided by the UNC Charlotte Institutional Review Board. The secondary data provided for the current study is de-identifiable, maintaining the confidentiality of the study participants.

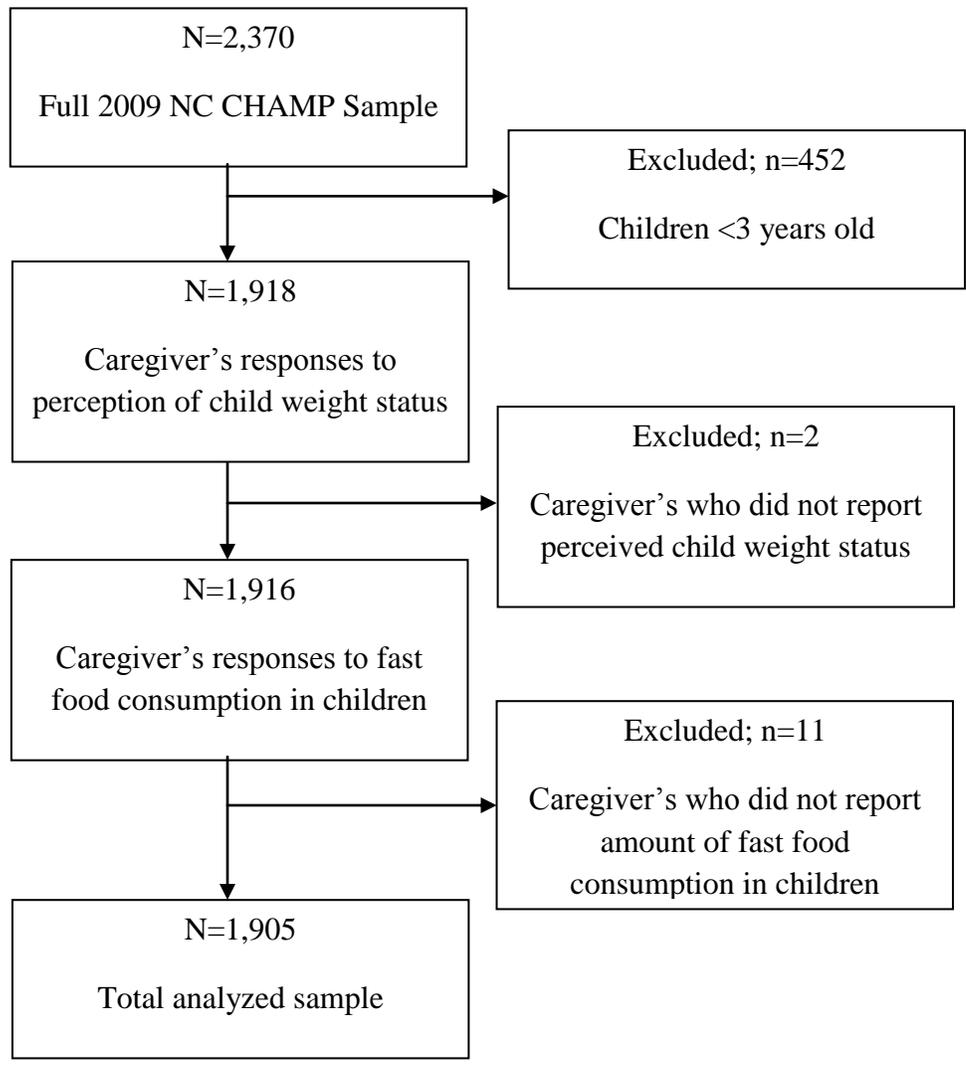


Figure 2: Study sample flowchart.

## RESULTS

### Univariate Analyses

The sample was comprised of 1,905 caregiver responses (see Table 1). The majority of children were Non-Hispanic White (n=1,377, 62.3%) and perceived to be not overweight (n=1,601, 85.9%). Approximately 36.7% of children consumed fast-food more than two times a week (n=700). Over half of children's caregivers obtained education beyond high school (n=1,287, 67.2%) and about 50% reported an average household income of \$50,000 or more (n=959).

### Bivariate Analyses

There was no significant relationship between caregiver's perceiving children as overweight and consuming fast food more than two times a week (OR=1.28, 95% CI: 0.90-1.83)(see table 2). However, a significant relationship between frequency of fast food consumption and age was evident. Children ages 10 through 14 years had a 66% decreased odds of consuming fast food more than two times a week, as compared to children ages 15 through 17 (OR=0.34, 95% CI: 0.24-0.47). Also, children ages 4 through 9 had a decreased odds of consuming fast food more than two times a week compared to children ages 15 to 17 (OR=0.50; 95% CI: 0.36-0.70). Moreover, children of caregivers who reported a household income of less than or equal to \$15,000 to \$24,999 were at decreased odds of consuming fast food two or more times/week compared to children of caregivers who reported a household income of greater than or equal to \$50,000 (OR=0.59, 95% CI: 0.41-0.85).

### Multivariate Analyses

After adjusting for caregiver perception of child weight status, household income, child sex, child race/ethnicity, and child age, there was no relationship between caregivers who perceived children as overweight and the child consuming fast food more than two times a week (OR=1.23, 95% CI:0.84-1.79), Table 2. Among the covariates, race/ethnicity, child age, and household income were associated with fast food consumption. Non-Hispanic Black children, were at 65% greater odds of consuming fast food two or more times per week compared to Non-Hispanic White children (OR=1.65, 95% CI: 1.13-2.41). The association between fast food consumption and child age remained consistent; compared to children ages 15 through 17 years, children ages 4 through 9 and 10 through 14 had decreased odds of consuming fast food two or more times per week (OR=0.33, 95% CI:0.24-0.46; OR=0.50, 95% CI: 0.36-0.71, respectively). Also, among children whose caregivers reported an annual household income of less than or equal to \$15,000 to \$24,999 had a decreased odds of consuming fast food two or more times per week compared to households whose reported household income was greater than or equal to \$50,000 (OR=0.43, 95% CI: 0.28-0.67).

## DISCUSSION

### Summary of Main Findings

The purpose of this cross-sectional analysis was to evaluate the association between caregiver perception of child weight status and consuming fast food two or more times per week in children ages 4 to 17 years using data from the 2009 North Carolina Child Health Assessment and Monitoring Program and Behavioral Risk Factor Surveillance System. The findings did not support the hypothesis that children whose caregivers perceived them as overweight had a decreased odds of consuming fast food more than two times a week.

No previous studies have examined the association between caregiver perception of child weight status and fast food consumption among children in North Carolina. Thus, findings from the current study will be compared to previous research which examined caregiver perception of child weight status and health and fast food consumption in children specifically. All reviewed studies assessed parents' perception of child weight status, rather than caregivers in general, which made identifying correlations to the current study difficult.

Previous research suggests that caregivers and parents are influential in the development of dietary patterns of children (Mandal & Powell, 2014; Golan & Crow, 2004; Nicklas, et al, 2009; Rollins & Birch, 2010; Sand, et al., 2014; Wehrly, et al., 2013; Yilmaz, et al., 2013). , with parents who perceive their children as overweight restricting their child from eating unhealthy foods (Wehrly, et al., 2013; Sand et al., 2014). However, these findings did not correlate with results from the current study.

Child age, household income, and race/ethnicity, were all significantly associated with fast food consumption in children. Younger children overall had a decreased odds of consuming fast food as compared to older children in the current study. Similar to findings from Bowman, et al., (2004) children ages 4-14 in the current study, were consistently found to have decreased odds of fast food consumption more than two-times a week, in both the unadjusted and adjusted analyses. Also, the results identified low household income (<\$15,000 to \$24,999) as a factor for decreased consumption of fast food in children, as previous research has acknowledged otherwise. Inconsistent with findings from previous research, Non-Hispanic Black children had an increased odds of consuming fast food as compared to Non-Hispanic White children (Gordon-Larsen, et al., 2011). Researchers stated, that Non-Hispanic Blacks were less likely to purchase fast food compared to Non-Hispanic Whites; while controlling for price of fast food items. However, data on price of fast food and association to fast food consumption was not available on the 2009 NC CHAMP, thus, not examined in the current study. Assessment of acculturation to the United States, parenting/caregiver feeding style, and environmental would have been variables of interest in the current analyses; however, data on variables were not available to be analyzed.

There was no statistically significant difference in fast food consumption and perceived weight of children in this study. This finding contradicts previous research which found parents restricted unhealthy foods if they perceived them to be overweight (Wehrly, et al., 2013). It is plausible that findings from the current study differed since unhealthy food was defined as sweets and snack foods, compared to only fast food in the current study.

## Strengths and Limitations

This study adds to the child nutrition literature. The strengths include a large state-representative sample size (n=1,905) and assessment of caregiver and child characteristics. Finally, the questions on the NC CHAMP survey were validated and pre-tested by survey administrators. However, as with all research, some limitations were noted. These include a cross-sectional study design, making it difficult to understand the temporal relationship between the independent and outcome variables. For example, it is unclear if the dietary habits of children influenced caregivers' perceptions of child weight status or if caregivers' perceptions of child weight status influenced the amount of fast food consumption in children. The second limitation is the reliance on caregiver reports; for example, older children may purchase fast food without caregivers' knowledge; this may over or under-report the frequency of the child's fast food consumption. In addition, NC CHAMP interviewers only called households with a landline phone, excluding other methods of contact. Fewer households are using landline phones as forms of communication, potentially excluding a large number of respondents from this survey (Siebens, 2013). Another potential limitation is that children whose caregivers reported that they were underweight were included in the analysis. Their caregiver behavior with regard to fast food use may be different from the caregivers of normal weight children. Further, previous research assessed parent perception exclusively, which may not equate with caregiver perception. Finally, data were not collected on some variables of interest, including being a single mother, food prices, access to fast food outlets and social pressure to achieve a desired weight.

### Areas for Future Research

An in-depth review of the literature, indicated that this study was the first to assess the association between caregiver perception of child weight status and fast food consumption in North Carolina children. Likewise, this was the first study to assess children ages 4-17; younger children have limited control of their diet compared to teenagers of working age with increased ability to purchase their own foods. Children ages 10 to 14 had slightly higher rates of consuming fast food more than two times a week compared to children ages 4 to 9; however, both age groups consumed less fast food compared to children ages 15 to 17. The findings from the current study showed differences in fast food consumption between various racial/ethnic groups. Future research should explore the interaction between cultural differences in caregiver perception of child weight status and fast food consumption in children further.

Additional research on rate of fast food consumption in children could be examined by stratifying for actual weight status, race/ethnicity of the child, and relationship to the child (i.e., biological parent or grandparent). Also, in-depth qualitative analysis of cultural implications on dietary behaviors could potentially assist in the development of future nutrition interventions geared toward a decrease in fast food consumption in children. If researchers identify barriers to consuming healthy foods in various cultural groups, from the qualitative analysis, targeted programs can be developed

## CONCLUSION

This study evaluated caregiver perception of child weight status and fast food consumption in children. The current study builds on previous research indicating that socio-economic factors (i.e., race/ethnicity and household income) influence fast food consumption and meals purchased away from home. Cultural norms of various racial or ethnic groups have the potential to influence dietary patterns and perception of weight in children and caregivers. Moreover, available household income to purchase meals away from home could be a factor in frequency of fast food consumption in children. Continued research on cultural influence on caregiver perception of child weight status, and increased fast food consumption, have the potential to inform nutrition-related policies, such as decreased marketing of non-nutritious food items intended for certain populations and assisting with development of targeted health programming geared towards certain demographics.

Caregivers are often the primary regulators of dietary habits in children; including them in future analyses is warranted. Findings from the current study suggest that race/ethnicity, child age, and household income are demographic factors associated with fast food consumption. Future research on childhood obesity and fast food consumption should examine these and other potential factors more in-depth.

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## APPENDIX A: TABLES

Table 1: Univariate statistics for the study population of children in North Carolina, (North Carolina Child Health Assessment and Monitoring Program, 2009)

Characteristics	Full Sample, n (% <sup>w*</sup> ) n= 1905	Consumption of fast food $\geq$ 2 times a week, n (% <sup>w</sup> ) (n=700)	Consumption of fast food $\leq$ 2 times a week, n (% <sup>w</sup> ) (n=1205)
<b>Caregiver perception of child weight</b>			
Not overweight	1601 (85.9)	580 (83.9)	1021 (87.0)
Overweight	304 (14.0)	120 (16.0)	184 (12.9)
<b>Child Gender</b>			
Male	1039 (53.1)	374 (51.1)	665 (54.3)
Female	866 (46.8)	326 (48.8)	540 (45.6)
<b>Child Race/Ethnicity</b>			
Non-Hispanic White	1377 (62.3)	517 (62.7)	860 (62.0)
Non-Hispanic Black	259 (21.0)	115 (25.4)	144 (18.5)
Hispanic	140 (10.6)	35 (8.13)	105 (12.0)
Other	126 (6.0)	32 (3.6)	94 (7.3)
<b>Age of Child</b>			
4 through 9	720 (43.1)	204 (32.8)	516 (48.8)
10 through 14	683 (34.3)	240 (34.2)	443 (34.3)
15 through 17	502 (22.4)	256 (32.8)	246 (16.7)
<b>Caregiver's educational level</b>			
Beyond high school (no)	628 (32.7)	243 (33.0)	380 (32.6)
Beyond high school (yes)	1287 (67.2)	457 (66.9)	824 (67.3)
<b>Household Income</b>			
<\$15,000 - \$24,999	393 (21.7)	118 (17.1)	275 (24.2)
<\$25,000 - \$49,999	405 (20.9)	147(20.6)	258 (21.2)
>+50,000 or more	959 (50.0)	384 (55.4)	575 (47.0)
Missing	148 (7.2)	51 (6.8)	97 (7.4)

Note: \*weight percentages based on the population of North Carolina in 2009.

Table 2: Unadjusted and adjusted odds ratio and 95% confidence intervals of children consuming fast food 2> times a week or more, North Carolina Child Health Assessment and Monitoring Program, 2009

Characteristics	Unadjusted		Adjusted	
	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>
<b>Caregivers Perception of Child Weight</b>				
Perceived not overweight	1.00	<i>referent</i>	1.00	<i>referent</i>
Perceived overweight	1.28	(.90, 1.83)	1.23	(.84, 1.79)
<b>Child Gender</b>				
Male	1.00	<i>referent</i>	1.00	<i>referent</i>
Female	1.13	(.87, 1.47)	1.15	(.88,1.50)
<b>Child Race/Ethnicity</b>				
Non- Hispanic White	1.00	<i>referent</i>	1.00	<i>referent</i>
Non- Hispanic Black	1.37	(.96, 1.91)	1.65*	(1.13, 2.41)*
Hispanic	.66	(.41,1.08)	.79	(.47,1.32)
Other	.48	(.27,.86)	.54	(.29,.99)
<b>Child Age</b>				
4 through 9	.50*	(.36,.70)*	.50*	(.36,.71)*
10 through 14	.34*	(.24-.47)*	.33*	(.24-.46)*
15 through 17	1.00	<i>referent</i>	1.00	<i>referent</i>
<b>Caregivers Educational Level</b>				
Beyond high school (no)	1.01	(.77,1.33)	1.23	(.88,1.72)
Beyond high school (yes)	1.00	<i>referent</i>	1.00	<i>referent</i>
<b>Household Income</b>				
<\$15,000 - \$24,999	.59*	(.41,.85)*	.43*	(.28,.67)*
<\$25,000 - \$49,999	.82	(.59,1.15)	.75	(.51,1.08)
>\$50,000 or more	1.00	<i>referent</i>	1.00	<i>referent</i>

Note: \*variables are statistically significant

## APPENDIX B: IRB APPROVAL



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t/ 704.687.1876 f/ 704.687.0980 <http://research.uncc.edu/compliance-ethics>**Institutional Review Board (IRB) for Research with Human Subjects***Approval of Exemption*

<b>Protocol #</b>	<b>14-11-03</b>		
<b>Title:</b>	<b>The Association Between Parent Perception of Child Weight Status and Frequency of Fast Food Consumption among Children</b>		
<b>Date:</b>	<b>11/6/2014</b>		
<b>Responsible Faculty</b>	<b>Dr. Elizabeth Racine</b>	<b>Public Health Sciences</b>	
<b>Investigator</b>	<b>Ms. Candace Butler</b>	<b>Public Health Sciences</b>	

The Institutional Review Board (IRB) certifies that the protocol listed above is exempt under category 4 (45 CFR 46.101).

Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

This approval will expire one year from the date of this letter. In order to continue conducting research under this protocol after one year, the "Annual Protocol Renewal Form" must be submitted to the IRB. Please note that it is the investigator's responsibility to promptly inform the committee of any changes in the proposed research, as well as any unanticipated problems that may arise involving risks to subjects. Amendment and Event Reporting forms are available on our web site: <http://research.uncc.edu/compliance-ethics/human-subjects/amending-your-protocol> or <http://research.uncc.edu/compliance-ethics/human-subjects/reporting-adverse-events>

  
 Dr. M. Lyn Exum, IRB Chair

11/11/14  
 Date

