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The Association between the Social Context of Mealtime, Children's Diet, Caregiver's Experiences with Discrimination and Household Food Insecurity

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THE ASSOCIATION BETWEEN THE SOCIAL CONTEXT OF MEALTIME,
CHILDREN'S DIET, CAREGIVER'S EXPERIENCES WITH DISCRIMINATION AND
HOUSEHOLD FOOD INSECURITY

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DEDICATION

For my mother Kathleen Staples.

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First and foremost, I would like to thank my committee members who made all this possible. To my advisor Dr. Sonya Jones: thank you for all of the opportunities you have provided me and treating me as your equal. Your thoughtful and respectful manner were much appreciated and your pursuit of social justice is inspiring. To Dr. Edward Frongillo: thank you for setting the bar high and helping me get over it; your tireless pursuit of improving the fields of food-insecurity research and public health nutrition cannot be overstated. To Dr. Christine Blake: thank you for your insights into qualitative methodology and the importance they hold for understanding household food insecurity. To Dr. Maryah Fram: thank you for your critical eye and the importance of social work and public health.

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Finally, I would like to thank the participants in this study for welcoming me into their lives, if only briefly—your participation will help move the struggles of poor and working class people forward towards a more just society.

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ABSTRACT

Paper 1: The Association Between the Social Context of Mealtime and Children’s Dietary Quality within Food-Insecure Households with Children

The social context of mealtime—defined as the social interactions and practices during mealtime—plays an important role in children’s diet. Household food insecurity disrupts or causes worry about the household food supply, and therefore may negate the positive effect of the social context of meals; however, little research has examined household food security and the social context of mealtime. The purpose of this study was to examine the association between various aspects of the social context of mealtime—dietary modeling, parenting style, eating together, mealtime screen time, and priority and atmosphere of mealtime—and dietary quality among children within food-insecure households. The results of this study indicate that food-insecure households engage in many of the positive aspects related to the social context of meals, but the protective associations related children’s diet are not always seen. Our study also shows that the dietary quality of our sample of food-insecure children is severely lacking, even compared to other low-income children. Intervention and policy efforts that target improved dietary quality among children within food-insecure households should consider the social context of mealtime.

Paper 2: Lifetime Racial Discrimination and Household Food Security Status

To achieve the U.S. Department of Agriculture's (USDA) goal of eliminating very low food security (VLFS), a better understanding of the factors that distinguish VLFS from low food security (LFS) is needed. Historical and contemporary racial discrimination produce inequalities in housing, education, and food access, which all can decrease food security; yet, the association between racial discrimination and food security has not been explicitly examined. Using theories of racial segregation and discrimination, we investigated the association between lifetime racial discrimination and food security status. Greater reports of lifetime racial discrimination were associated with lower food security, after adjusting for demographic confounders. The U.S. government and others have called for strategies that increase food security. Our analysis suggests that preventing racial discrimination will increase food security among African-American households with children.

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CHAPTER 1

INTRODUCTION

This dissertation is comprised of two separate studies that results in two manuscripts. Both manuscripts share common characteristics but answer separate specific aims. For example, the same methodologies were used for recruitment and participation, but the first study examines social context of mealtime and children’s dietary quality and the other examines lifetime racial discrimination and risk of very low food security. In addition, while both studies share common demographic similarities (e.g., low-income, food insecure), there are distinctions in racial composition. Finally, while each study uses the socio-ecological model as a framework for understanding how health and well-being outcomes are produced, each study also uses its own unique set of theories for guidance. Given the distinctions between the two manuscripts, the Introduction will be separated by study, but their contributions will be considered as a whole.

1.1 OVERALL CONTRIBUTION TO THE LITERATURE

Much has been learned about household food insecurity in the last 20 years, however, the majority of this work has focused on demographic distinctions or the direct relationship between household food insecurity, health, and well-being (Nord 2013). Both studies in this dissertation build upon the work done in the last 20 years, but also examine the contexts in which these negative outcomes arise. For example, household food insecurity threatens or affects the household food supply, but less is known about how food insecurity can influence child dietary quality. Similarly,

African-American households have much higher rates of food insecurity and racial discrimination (Coleman-Jensen, Nord, and Singh 2013; Hausmann, Jeong, Bost, and Ibrahim 2008), but little is known about the context in which this disparity occurs. Understanding the context in which negative health outcomes occur is a critical step in addressing the outcome (Emmons 2000); therefore, a better understanding of the mealtime context as well as experiences with racial discrimination, will move the literature toward policies or interventions that better address and target food-insecure households.

1.2 STUDY 1: THE ASSOCIATION BETWEEN THE SOCIAL CONTEXT OF MEALTIME, CHILDREN'S DIETARY QUALITY, AND HOUSEHOLD FOOD INSECURITY

Household Food Insecurity in the U.S.

Household food insecurity is one of the most pressing nutrition related issues children and adults experience in the U.S. In 2012, 14.5% of all U.S. households and 20.0% of households with children were food insecure (Coleman-Jensen, Nord, and Singh 2013). In total, nearly 50 million people in the food-rich U.S. lived in a food-insecure household in 2012 (Coleman-Jensen, Nord, and Singh 2013). These rates are the highest they have been since national measurement began in 1998 and have received the attention of the highest levels of government such as The Department of Health and Human Services, which pledged to reduce and end food insecurity (Healthy People 2020 2010). Given the magnitude, scope, and attention from policy makers, strategies to better understand and end household food insecurity are needed.

Household food security is defined as "...a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO 1996). Therefore, any deviation from this definition would make a household or individual "food insecure." Based on this definition, food insecurity

is a multidimensional concept that touches many aspects of a person's life. Food insecurity is primarily the consequence of lack of economic resources, however, not all of those who are food insecure lack economic resources. Indeed, food insecurity is still present among some households with incomes above 200% of the federal poverty level, although at considerably reduced rates (Coleman-Jensen, Nord, and Singh 2013).

The Social Context of Mealtime

The social context of mealtime—defined here as the social interactions and practices during mealtime—plays an important role in children's diet and has received a considerable amount of attention from researchers (Patrick and Nicklas 2005). We conceptualize three distinct areas of the social context of mealtime:

1. **Dietary Modeling.** Children learn about food preferences and intake by watching their caregivers (Hayman 2003). A robust set of literature shows that children tend to have similar intakes, preferences, food sampling, and dieting practices as their caregivers (Chen et al. 1991; Fisher, Mitchell, Smiciklas-Wright, and Birch 2002; Gibson, Wardle, and Watts 1998; Tibbs et al. 2001; Rozin 1990; Harper and Sanders 1975; Pike and Rodin 1991; Cutting, Fisher, Grimm-Thomas, and Birch 1999). Thus, dietary modeling is associated with children's diet, and mealtime is a setting in which dietary modeling frequently occurs.
2. **Parenting Style.** Parenting Style refers to the attitudes and behaviors caregivers use when interacting with their children (Baumrind 1971). Three primary styles are authoritative (e.g., warm but firm), authoritarian (e.g., little warmth but firm), and permissive (e.g., warm but not firm). Authoritative is considered the optimal style because it is associated with beneficial health and well-being outcomes (Steinberg, 2001). The research base is limited regarding parenting

style and child dietary quality, however, two studies have found associations with authoritative caregivers having children with increased fruit and vegetable intake (Gable and Lutz 2000; Kremers, Brug, Vries, and Engels 2003). In addition, parenting styles represent a general approach to interacting with children and this is expected during mealtime as well (Hubbs-Tait et al. 2008).

3. Mealtime Behavior and Regulation. Mealtime is important for families to socialize and establish norms and routines. Caregivers typically regulate mealtime by deciding the ways in which the family comes together for meals. How often the family eats together, whether or not they watch television, eating away from home, meals prepared away from home, the priority given to mealtime, and the overall atmosphere are all important for dietary quality in children (Neumark-Sztainer, Wall, Story, and Fulkerson 2004; Videon and Manning 2003; Guthrie, Lin, and Frazao 2002; Bowman et al. 2004; Gillman et al. 2000). Thus, mealtime behavior and regulation is an important factor associated with children’s dietary quality.

While the social context of mealtime is associated with improved child nutrition, there is limited evidence if these effects carry over into food-insecure households. In addition, these three areas, while distinct, occur simultaneously during mealtime. Currently, there are no studies that examine how these three areas—and therefore the social context of mealtime as a whole—are associated with children’s dietary quality.

Household Food Insecurity and the Social Context of Mealtime

While no previous research has specifically examined what happens socially during mealtime in food-insecure families, some studies provide insights into some of the changes in food-insecure families that are relevant to the social context of mealtime. For example, caregivers and children actively alter aspects of the social context of

mealtime to either lessen or disguise the presence and severity of food insecurity, which might have unintended consequences for child dietary quality (Fram et al. 2011). For caregivers food insecurity causes stress and is associated with negative feeding practices, such as lower rates of breast feeding (Bronte-Tinkew et al. 2007). Food-insecure households are also more likely to have non-traditional work hours (Coleman-Jensen 2010), which can alter the priority given to family mealtime. Finally, food insecurity can affect children’s diet (Kaiser et al. 2002) and nutrient status negatively (Skalicky et al. 2006). Although, even if we assume that children in food-insecure households have diets that are comparable to food-secure households, there is much room for improvement, as most children in the U.S. do not meet dietary recommendations (Krebs-Smith et al. 2010).

Theoretical Guidance

We draw upon two theories to understand the association between the social context of mealtime, children’s dietary quality, and household food insecurity. First, we use Family Stress Theory (Boss 2001), to link how household routines and behaviors (e.g., dietary modeling, mealtime structure and parenting styles) can be negatively disrupted in the face of a stress-event (e.g., food insecurity). According to this theory, “Interactions among 1) stress-events, including parenting challenges, 2) coping resources, and 3) the family’s perception of the events are embedded in the external and internal context of the family (Contreras and Horodynski 2010).” That is, to understand how the social context of mealtime might be disrupted in the face of a stress-event, such as food insecurity, is critical to understanding how a child’s diet might be influenced. Second, we use Social Cognitive Theory (Bandura 1986), to link children’s behaviors (e.g., dietary intake) as a function observational learning (e.g., mealtime structure), modeling (e.g., dietary modeling) and emotional coping response (e.g., parenting style). The social environment is defined as factors that

can affect a person's behavior but are physically external to the person and often includes family members (Baranowski, Perry, and Parcel 2002). Social Cognitive Theory provides a way of conceptualizing how parental and household behaviors affect child dietary quality by altering the child's social environment. Finally, inherent to this work is the Social Ecological Model, which suggests that multiple levels of influence, which include intrapersonal, interpersonal, community, institutional, and policy levels influence human behavior and development (Bronfenbrenner 1979).

Purpose of Study 1

Household food insecurity disrupts or causes worry about the household food supply, and therefore can negate the positive associations related to mealtime; yet, little research has examined household food security and the social context of mealtime. The purpose of this study was to examine the association between various aspects of the social context of mealtime—dietary modeling, parenting style, eating together, meals away from home, mealtime screen time, and priority and atmosphere of mealtime—and dietary quality among children within food-insecure households. We hypothesized that caregivers who model healthy food, have an authoritative feeding style, prioritize and provide a positive mealtime atmosphere, and have children that less frequently watch a screen during mealtime will have children with increased dietary quality. In addition, we consider the individual and simultaneous effects of the social context of mealtime variables on children's dietary quality. We focus on the linear and logistic association between dietary quality and the social context of meals using a continuous and discrete measures of dietary quality and continuous and discrete measures of the social context of mealtime. This study will add to the literature two perspectives that are unknown: 1) the association between the social context of mealtime and children's dietary quality in food-insecure households and 2) the simultaneous effect of the social context of mealtime variables on children's dietary quality.

1.3 STUDY 2: THE ASSOCIATION BETWEEN LIFETIME RACIAL DISCRIMINATION AND RISK OF VERY LOW HOUSEHOLD FOOD SECURITY

Household Food Insecurity among African-Americans

Since measurement began in 1998, African-Americans have had rates of food insecurity that are at least double those of Whites (Bickel and Carlson 1999; Andrews, Nord, Bickel, and Carlson 2000; Nord, Andrews, and Carlson 2003; Nord, Andrews, and Carlson 2004; Nord, Andrews, and Carlson 2005; Nord, Andrews, and Carlson 2006; Nord, Andrews, and Carlson 2007; Nord, Andrews, and Carlson 2008; Nord, Coleman-Jensen, Andrews, and Carlson 2010; Nord and Golla 2009; Nord, Coleman-Jensen, Andrews, and Carlson 2010; Coleman-Jensen 2010; Coleman-Jensen, Nord, Andrews, and Carlson 2011; Coleman-Jensen, Nord, Andrews, and Carlson 2012). This is not completely unexpected as African-Americans have rates of poverty and unemployment that are much greater than Whites as well (Macartney, Bishaw, and Fontenot 2013; Bureau of Labor Statistics 2013). Among a nationally representative sample of children that were followed over middle childhood, African-American children were more than twice as likely to be food insecure compared to White children (Burke, Jones, Fram, and Frongillo 2012). Food insecurity is a unique aspect of the larger context of low socioeconomic status (SES), and understanding why there is a disproportionate amount of African-Americans that are food insecure begins with a better understanding of why many African-Americans are more likely to have a lower socioeconomic status.

Racial Discrimination among African-Americans and SES

Historical and contemporary racial discrimination is considered a leading cause of socioeconomic disparities for African-Americans (Williams 1997; Oliver and Shapiro 2006). Racial discrimination can negatively influence educational attainment and

employment (Oliver and Shapiro 2006; Steele 1997; Brief et al. 2000; Mickelson 2003; Pager and Shepherd 2008), residential opportunities (Massey and Denton 1993), and wealth accumulation (Oliver & Shapiro, 2006). While the U.S. has made great strides towards reducing discrimination through policy changes that make it illegal at the institutional and individual levels in most settings, the effects of racial discrimination in the U.S. have been profound. For example, African-Americans have lower rankings on most metrics of social and economic standing (Williams 1997; Oliver and Shapiro 2006), which increases the likelihood of African-Americans having health problems (Williams 1999; Mays, Cochran, and Barnes 2007), being incarcerated (Roberts 2004), and experiencing domestic violence (Hampton, Oliver, and Magarian 2003). The effects of discrimination on the lived experience of many African-Americans are well known; recently, more attention has focused on understanding food insecurity from a justice perspective (Gottlieb and Joshi 2010).

Racial Discrimination, Nutrition, and Household Food Insecurity

Racial discrimination has separated African-Americans from production of and access to food, especially in the Southern rural U.S. (Brown, Christy, and Gebremedhin 1994). Beginning in the late eighteenth century and continuing until the 1970s, African-American farmers were systematically denied land to farm that was instead given to Whites (Wood and Gilbert 2000). This has resulted, at least in part, to drastically decreased rates of African-American farmland ownership compared to Whites. For example, in 1999 two percent of farmland was owned by African-Americans compared to 96% of farmland owned by Whites (Gilbert, Wood, and Sharp 2002). African-Americans are more likely to live in food deserts that lack access to food markets (Dutko, Ploeg, and Farrigan 2012) and are less likely to have access to fair-priced markets in general (2008). Finally, African-Americans, even after adjusting for possible confounders, are less likely to consume vegetables (Dubowitz et al. 2008),

fewer micronutrients (Newby et al. 2011), and are more likely to consume fast food (Kwate 2008), all of which are indicators of decreased dietary quality. Taken together the evidence suggests that racial discrimination negatively affects both structural and individual markers of nutrition.

There is no research that explicitly examines racial discrimination and household food insecurity. Some have suggested that racial discrimination will lead to decreased food insecurity (Gottlieb and Joshi 2010), but there are limited datasets available that measure both racial discrimination and household food insecurity. The theoretical basis for the association exists and suggests that African-Americans are more likely to have a lower socioeconomic status which can negatively affect their income and wealth, and therefore increase the risk of household food insecurity (Chilton and Rose 2009). Therefore, there is a need to better understand the association of racial discrimination and household food insecurity to refine theory and create empirical evidence.

Theoretical Guidance

We draw upon two theories to understand the relationship between racial discrimination and household food insecurity. Social stratification theory (Harrington 1962; Kain 1968) posits that because African-Americans have been discriminated against throughout much of U.S. history, they have been separated from equal education, employment, and housing opportunities, which has negatively affected their SES. For many African-Americans, being socially isolated from mainstream White society also lead to a deterioration of social and political capital needed to make positive changes (Loury 1981; Coleman 1989). Second, continued social and economic disadvantage has led to instability in community organization and the inability to realize common values that help to maintain social control (Sampson and Wilson 1995). This in turn has led to “lower-class value stretch”—the idea that members of lower classes

aspire to the same achievements of the middle- and upper-classes (e.g., education, financial stability, marriage), but realize that those achievements might not occur, so they instead “stretch” their values to fit their circumstances (Rodman 1963). For example, dropping out of school and getting a “street” education that is more likely to benefit their immediate circumstances or achieving financial stability by working outside of the traditional labor market (Anderson 1999). These theories suggest that racial discrimination has resulted in a lower socioeconomic status and the isolation and instability of many African-American communities, all of which are associated with increased household food insecurity.

Purpose of Paper 2

The need to better understand how racial discrimination is associated with food insecurity is great—food insecurity is one of the most pressing nutrition related issues in the U.S. and African-Americans are more likely to be food insecure. The purpose of this study was to examine the association between report of lifetime racial discrimination and food security status among a sample of African-American food-insecure households with children. We hypothesized that increased report of lifetime racial discrimination will differentiate low food-secure households from very low food-secure households and there will be a positive linear trend between the number of lifetime racial discrimination events and reports of food insecurity. We hypothesized that African-Americans who report more lifetime racial discrimination will be more likely to be classified as very low food-secure and there will be a positive linear trend between the number of lifetime racial discrimination events and reports of food insecurity. We focused on likelihood of being classified as very low food-secure as well as the linear association between number of reports of lifetime racial discrimination and affirmed items to the USDA Household Food Security Survey. This paper will add to the literature an analysis that has been called for but not done: what is the

association between racial discrimination and household food insecurity and what are the implications of this association?

CHAPTER 2

BACKGROUND AND SIGNIFICANCE

2.1 PAPER 1: THE ASSOCIATION BETWEEN THE SOCIAL CONTEXT OF MEAL-TIME, CHILDREN’S DIETARY QUALITY, AND HOUSEHOLD FOOD INSECURITY

Section 2.1 will provide the background on the social context of mealtime within households with children, children’s dietary quality, and household food insecurity. Evidence for the significance of understanding how the social context of mealtime and children’s dietary quality are associated within food-insecure households with children will also be provided.

Children’s Dietary Quality in the U.S.

Children in the U.S. do not meet recommendations for fruit and vegetable consumption, exceed recommended amounts of added sugar intake (Krebs-Smith et al. 2010), and have an overall dietary quality score that is labeled “needs improvement” as measured by the Healthy Eating Index (HEI) (Guenther, Reedy, Krebs-Smith, and Reeve 2008). Dietary quality among children is a concern because it relates to future disease risk (Baker, Olsen, and Sorensen 2007) but also has immediate concerns such as childhood obesity (Nicklas, Baranowski, Cullen, and Berenson 2001). Given the drastic increases in childhood obesity in the last forty-years (Freedman et al. 2006; Ogden, Carroll, Kit, and Flegal 2012), the pediatric and public health communities have called for interventions that improve child dietary quality as a way to decrease obesity (Ikeda and Mitchell 2001). In addition to disease risk, the USDA’s Dietary

Guidelines recommend that children and adolescent meet dietary guidelines to help support and maintain healthy weight (Dietary Guidelines Advisory Committee 2010).

Added sugar intake has increased among children and adolescents in the U.S. (Wang, Bleich, and Gortmaker 2008). Current recommendations suggest that children should reduce their added sugar consumption because most children are consuming large amounts of sugar per day and it considered detrimental to overall dietary quality (Johnson et al. 2009). The most common source of added sugar in children's diets are sweetened beverages, most notably soft drinks and juices (Guthrie and Morton 2000). Added sugar consumption from sugar-sweetened beverages is associated with overweight and obesity (Malik, Schulze, and Hu 2006) and micronutrient-poor foods among children and adolescents; this is a concern because foods with added sugars could be displacing foods, such as fruits and vegetables, which are nutrient rich.

Children do not meet recommendations for fruit and vegetable consumption (Centers for Disease Control and Prevention 2013). About 36% of adolescents report consuming fruits and vegetables less than one time per day and only about 1% of children in a nationally representative survey met the recommended intake of fruits and vegetables (Centers for Disease Control and Prevention 2013). Increasing fruit and vegetable consumption is encouraged by the USDA's Dietary Guidelines for Americans because they are a critical part of a healthy diet and are associated with reduced risk of chronic diseases and help in weight management. Increased fruit and vegetable consumption is encouraged not only because they are low-calorie and nutrient-dense, but also because they are though to displace less healthy dietary options (Dietary Guidelines Advisory Committee 2010).

The HEI, which is a dietary quality assessment tool, considers all the foods a child eats and gives a score of 0 to 100, with 0 being the worst possible score and 100 being the best (Guenther, Reedy, Krebs-Smith, and Reeve 2008). The HEI breaks

diets into three categories: bad, needs improvement, and good. Since measurement began in 1989, children have never been in the “good” category and have been on the low end of the “needs improvement” category. In particular, low-income children score lower than higher income children, a disparity that has persisted over time (Kennedy et al. 1995; Bowman, Lino, Gerritor, and Basiotos 1998; Basiotis et al. 2002; Guenther, Reedy, Krebs-Smith, and Reeve 2008). Overall, children in the U.S. do not meet recommendations for dietary quality; therefore, factors that are associated with improved dietary quality have been sought.

The Social Context of Mealtime and Children’s Dietary Quality

The social context of mealtime—defined as the social interactions and practices during mealtime—has long been considered an important context in which a family interacts. Indeed, mealtime has been a cornerstone of family life for centuries—a time when families can come together to eat, socialize, and establish routines and norms (Collins 1995; Steinberg 1990). Although many of the same practices that were performed centuries ago still occur today, the social context of mealtime has undergone changes that reflect new economic and technological realities. For example, many households have both caregivers or the only caregiver participating in the labor market (Vespa, Lewis, and Kreider 2013) and households now spend nearly 41% of their food budget on meals consumed away from home (Lin and Guthrie 2012). In addition, nearly all households now have a television which has resulted in adults and children watching about two and a half hours of television per day (Bureau of Labor Statistics 2013). Given these realities, studies began to examine the social context of mealtime and how, if at all, they were associated with child dietary quality (Patrick and Nicklas 2005).

Eating the evening meal together is considered a positive family practice because it promotes communication and socialization within a family. Since the 1970s, the

percent of families that eat the evening meal together has declined (Nicklas et al. 2004). Increased participation of women in the labor market, increased television use, and the increased freedom of teenagers to feed themselves away from home are possible explanations for decreased rates of eating the evening meal together (Perry, Kelder, and Komro 1993; Nicklas et al. 2004). Given this change, researchers and others began to examine the effect of declining family mealtime had on children's dietary quality. Generally, the results have shown a positive association between eating meals together and improved child dietary quality. In a nationally representative sample of children, having a caregiver present at the family meal was associated with higher intakes of fruits, vegetables, and dairy foods (Videon and Manning 2003). Similarly, among a large sample of children and adolescents, eating the evening meal together was associated with increased fruit and vegetable consumption, decreased fried food and soda, and less saturated and trans fat consumption (Gillman et al. 2000). Finally, children consumed more calcium, iron, folate, fiber, and vitamins A, C, E and B-6 as the frequency of family mealtime increased (Neumark-Sztainer et al. 2003). Although it is not clear why families that eat more meals together have children with increased dietary quality, a leading theory is that parents dictate what a child is able to eat and acts as a role model of more healthful eating practices (Neumark-Sztainer et al. 2003).

About 44% of all calories consumed by children and adolescents are prepared away from the home (Poti and Popkin 2011). Foods prepared away from home are more energy dense, higher in fat and added sugar, and less nutritious (Poti and Popkin 2011; Bowman et al. 2004; Lin and Guthrie 2012). Caregivers choices about what foods to consume are partly based on work and family conditions (Blake et al. 2011) and therefore, are likely associated with the social context of mealtime. For example, adolescents cite caregiver work schedules, conflicting schedules, and extracurricular activities as primary reasons for consuming meals prepared away from home and

missing meals with their family. Households are an important place for identity and cultural development in children, especially related to food, and children actively participate in consumption decisions (Valentine 1999). It is possible some of the negative associations related to food prepared away from home are attenuated when other mealtime factors are considered such as dietary modeling, parenting style, or eating together.

Caregivers serve as a food role model throughout their children's childhood and adolescence (Hertzler 1983; Hayman 2003), which results in caregivers and their children having similar food preferences and intakes (Rossow and Rise 1994; Oliveria et al. 1992; Tibbs et al. 2001; Beydoun and Wang 2009). Indeed, a diverse set of studies show that caregivers who consume more fruits and vegetables have children with increased fruit and vegetable intake (Fisher, Mitchell, Smiciklas-Wright, and Birch 2002; Gibson, Wardle, and Watts 1998) and lower dietary fat intake (Stolley and Fitzgibbon 1997; Fitzgibbon et al. 1996; Tibbs et al. 2001). In addition, children are more likely to taste foods that they have seen their caregiver taste (Harper and Sanders 1975). A limitation to this body of research is that the majority of studies do not directly measure caregiver dietary modeling, rather, they correlate what the caregiver consumes with what the child consumes. While certainly an appropriate approach, it makes the assumption that the child is present when the caregiver consumes the food, and therefore exposed to the role modeling. There is a lack of research that associates the frequency of which caregivers actually eat healthy foods when their children are present, a strategy that would better capture healthy food modeling. Finally, across these studies, the association between caregiver and child dietary intake is relatively small, suggestion that other mealtime factors are also important for understanding child dietary intake and quality (Beydoun and Wang 2009).

Parenting style is associated with a range of health and developmental outcomes

among children (Borawski, Ievers-Landis, Lovegreen, and Trapl 2003; Huebner and Howell 2003; Piko and Balázs 2012), and a growing body of literature has examined parenting style in relation to child dietary intake (Arredondo et al. 2006; Kremers, Brug, Vries, and Engels 2003; Horst et al. 2007). Parenting style can be divided into four main categories (Baumrind 1971), three of which are covered in this dissertation:

1. **Authoritarian.** Authoritarian caregivers tend to be strict and less sensitive to the child’s desires. They expect high levels of self-control from the child with less emotional support and they often remove choice from behavioral decisions. Authoritarian caregivers tend to have children with lower fruit consumption (Kremers, Brug, Vries, and Engels 2003) and lower academic performance (Baumrind 1971; Dornbusch et al. 1987).
2. **Authoritative.** Authoritative caregivers have high demands for self-control and are sensitive to their child’s desires. They expect mature decisions and foster this by encouraging discussion and offering the child choices in behavioral decisions. Authoritative caregivers are considered as ideal because they are associated with improved child outcomes such as academic achievement and increased self-esteem (Steinberg et al. 1994; Milevsky, Schlechter, Netter, and Keehn 2006). Authoritative caregivers also tend to have children with greater fruit and vegetable availability and intake, as well as decreased “junk food” intake (Gable and Lutz 2000).
3. **Permissive.** Permissive caregivers have low expectations for self-control and are less strict but are warm and are sensitive to the child’s desire. Permissive caregivers tend to have children that are confident, but have lower levels of self-control which can lead to behavioral problems (Lamborn, Mounts, Steinberg, and Dornbusch 1991). Permissive caregivers also tend to have children with higher sweetened beverage intake (Horst et al. 2007).

Although conceptualized as three separate styles, they are not mutually exclusive. That is, most caregivers display behaviors from each style, with one style being the most dominant. In general, there are few studies that examine parenting styles with multiple markers of dietary quality in children, especially in low-income populations. Given that parenting styles are associated with a variety of other health and well-being outcomes in children, including obesity (Rhee 2008; Rhee et al. 2006), more research is needed to understand how they relate to multiple markers of child dietary quality and the social context of mealtime.

Watching television during meal time is associated with lower dietary quality in children (Wiecha et al. 2006; Coon, Goldberg, Rogers, and Tucker 2001; Patrick and Nicklas 2005). For example, about 32% of adolescents watched television during family meals and this was associated with lower intake of vegetables and calcium-rich foods and higher intake of soft drinks (Feldman, Eisenberg, Neumark-Sztainer, and Story 2007). Children from households with high television use during mealtime derived 5% more of their diet from pizza, salty snacks, and soda, and about 5% less of their diet from vegetables and fruit (including juice) (Coon, Goldberg, Rogers, and Tucker 2001). Television advertising for fast foods or foods high in sugar aimed at children is thought to increase requests to caregivers for those foods, resulting in increased consumption (Coon and Tucker 2002; Cotugna 1988; Clancy-Hepburn, Hickey, and Nevill 1974; Young, Haskell, Taylor, and Fortmann 1996). Another explanation is that children or adolescents who are watching television during mealtime might be doing so alone, as a way to distance themselves from the rest of the family to hide an eating disorder such as bulimia, anorexia, or chronic dieting. For example, adolescent girls who more regularly ate alone did so to hide disordered eating patterns (Neumark-Sztainer, Wall, Story, and Fulkerson 2004). Although the exact mechanisms through which television viewing can influence child dietary intake are not clear, a robust set of studies show a consistent association between watching

television during meal time and children's dietary quality.

Meal time is considered a cornerstone of family life in the U.S. because it is a time when families can come together to discuss important family issues, be they serious or light, positive or negative, or a combination of both. Two aspects of family mealtime that have received attention are the social atmosphere of mealtime (e.g., positive, negative, supportive) and the priority families give to mealtime. Families generally view mealtime as positive, although caregivers more so than their children (Fulkerson, Neumark-Sztainer, and Story 2006). In the same study, they found that a positive family mealtime was associated with less disordered eating among female adolescents. In addition, families who prioritize family mealtime eat together more frequently, which is associated with improved dietary outcomes among children (Neumark-Sztainer, Wall, Story, and Fulkerson 2004). Overall, the available evidence suggests that families who view mealtime positively and prioritize eating meals, tend to have children with higher dietary quality and less disordered eating.

Household Food Insecurity

Research into household food insecurity was formalized in the early 1990s when a standard measure was created to measure the phenomena (National Research Council 2006). Food insecurity, or as it is sometimes called "hunger" has always existed in the U.S., but it was not until the Great Depression that a formal response to the issue was created. In the 1930s, at a time of increased poverty, hunger, and malnutrition, the government created the first version of what was soon to be called the "Food Stamp Program" to address malnutrition, hunger as well as support U.S. agriculture. The early version of this program was localized, and served as a way to benefit farmers and those in need, by issuing food stamps that would buy \$2 worth of food for every \$1 spent. Prior to the program, farmers had no way of getting their unsold products to people, and therefore lost revenue and those without the means went hungry. This

program lasted throughout the depression, but was no longer needed as World War II began and the economy recovered and need was not as great. The program was revitalized in the 1960s, under the direction of Presidents Kennedy and Johnson, when it was clear that there was still a sizable population of Americans that could not afford enough food for their families. The Food Stamp Program went through early testing, with general bipartisan support, and was implemented fully in the 1970s (Lander 2007).

The Food Stamp Program was successful in preventing hunger and malnutrition for many in the U.S., but hunger still existed. Beginning in the early 1990s, more research was targeted towards defining, measuring, and understanding the consequences of food insecurity (National Research Council 2006). Often called an “invisible epidemic,” because those who are food insecure are not noticeably malnourished, research found that many households were food-insecure despite living in a food-rich nation with targeted programs to prevent food insecurity (Coleman-Jensen, Nord, and Singh 2013). Over two decades of research into the causes and consequences of household food insecurity have shown it to be a complex and multidimensional condition (Nord 2013), that has recently become more of a concern with the Great Recession of 2008, when food-insecurity rates increased considerably (Coleman-Jensen, Nord, and Singh 2013).

Household food security continues to be a public health concern for many households with children in the U.S and its reduction is a goal of the USDA and Health and Human Services (Coleman-Jensen, Nord, and Singh 2013; Healthy People 2020 2010). Low and very low food security—defined as all people at all times not having access to enough food for an active, healthy life—are the broadest two categories into which households experiencing food struggles and shortages may be classified (Coleman-Jensen, Nord, and Singh 2013). A low food secure household typically has food access issues but rarely has reduced food intake among its members, whereas a

very low food-secure household has food access issues as well as reduced food intake and disrupted eating patterns among its members. In addition, a household may be classified as “food insecure” if they have any indication of food struggle or shortage. While any household may be classified as food insecure, households with children are of particular concern as they have increased rates of food insecurity compared to the general population. In 2012, 14.0% of all households with children were low food secure and 6.0% were very low food secure (Coleman-Jensen, Nord, and Singh 2013). Furthermore, 30.5% and 20.6% of households with children will experience food insecurity or low or very low food security at some point during middle childhood, respectively (Burke, Jones, Fram, and Frongillo 2012).

Food insecurity is associated with many negative health outcomes for adults and children. Adults in food-insecure households are more likely to have poor or fair health status (Stuff et al. 2004), reduced nutrient intake (Rose 1999), and be overweight (Adams, Grummer-Strawn, and Chavez 2003; Townsend et al. 2001). Children in food-insecure households are more likely to have poor health status (Cook et al. 2004; Weinreb et al. 2002; Dunifon and Kowaleski-Jones 2003), behavior problems (Slack and Yoo 2013), frequent stomachaches and headaches (Alaimo, Olson, Frongillo, and Briefel 2001), and worse developmental outcomes (Jyoti, Frongillo, and Jones 2005). In addition, food insecurity is associated with maternal depression and anxiety in mothers and behavior problems, overweight, and health problems in their children (Whitaker, Phillips, and Orzol 2006; Bronte-Tinkew et al. 2007; Laraia, Siega-Riz, Gundersen, and Dole 2006).

Considerable disparities exist between population groups based on food security status. Households with children living under the federal poverty level have a rate of low or very low food security that is about five times greater than those with incomes 1.85 times or above the federal poverty line (Coleman-Jensen, Nord, and Singh 2013). While food security status is largely determined by household income and the largest

disparities are seen based on this metric, other demographic factors consistently show large disparities. Black, non-Hispanic households with children have rates that are nearly double those of White, non-Hispanic households with children; households with children that are headed by a non-married female have a rate that is about two and half times that of married-couple households with children (Coleman-Jensen, Nord, and Singh 2013). Furthermore, these disparities persist over time. For example, when followed over an eight year period, households with children that were living below the federal poverty line, Black, non-Hispanic, or single-parent had rates of food insecurity that were at least two times greater than those of households living above the poverty line, White, non-Hispanic, or dual-parent, respectively (Burke, Jones, Fram, and Frongillo 2012).

Household Food Insecurity and the Social Context of Meals

The household context within food-insecure households likely differs from food-secure households because food-insecure households worry about or struggle with food shortages. Surprisingly little research has focused on exactly how household context changes when food insecurity occurs, with most research focusing on the causes of household food insecurity or health and well-being outcomes (Nord 2013). Recently, more emphasis has been placed on examining household-level social variables that are associated with household context such as positive environment for child development and social capital (Belsky et al. 2010; Dean and Sharkey 2011). Other work has focused on how children influence the social context within households. For example, parents and children actively alter aspects of the social context of mealtime to either lessen or disguise the presence and severity of food insecurity, which might have unintended consequences for child dietary quality (2011). For caregivers food insecurity causes stress and is associated with negative parenting practices (Bronte-Tinkew et al. 2007). Food-insecure households are also more likely to have non-traditional work

hours, which can alter the priority given to family mealtime (Coleman-Jensen 2010). Overall, evidence suggests that household food insecurity likely negatively affects the social context within households.

2.2 PAPER 2: THE ASSOCIATION BETWEEN LIFETIME RACIAL DISCRIMINATION AND RISK OF VERY LOW HOUSEHOLD FOOD SECURITY

Section 2.2 will provide background on discrimination against African-Americans as it relates to SES and household food insecurity. Evidence for the significance of understanding how the association between discrimination and household food insecurity relates to African-Americans will also be provided.

A Framework for Understanding Modern Racism Against African-Americans

Racism refers to “institutional and individual practices that create and reinforce oppressive systems of race relations whereby people and institutions engaging in discrimination adversely restrict, by judgment and action the lives of those against whom they discriminate” (Krieger 2003, pg. 195). Racism has always existed in the U.S., and many efforts have been made to reduce and eliminate it, however, it still persists. Much of the racism that occurs today is different that was has occurred in the past. That is not to say that the overt and deliberate racism that was common until the end of Jim Crow laws does not still occur, but rather, a different type of racism has become more common: racism without racists. Racism without racists is a term used to describe how African-Americans are discriminated against by people and institutions that do not consider themselves racist. There are four main frames through which Bonilla-Silva (2009) describes how racism without racists occurs in a society such as the U.S.:

1. The belief that African-Americans and White-Americans all have the same opportunities and therefore African-Americans should not receive “special treat-

ment” (e.g., affirmative action) now based on what has happened in the past. For many, this might seem reasonable because many African-Americans did not directly experience the harsh racism of the past and therefore should not receive “special benefits.” In addition, many White-Americans are descendants of immigrants who had a hard time when entering the U.S., and their family managed, therefore African-American families should also manage without special treatment. This type of discrimination ignores the severity of racism African-Americans experienced in the past and its association with current social, economic, and health disparities.

2. Segregation that is seen in schools, neighborhoods, and work places is the result of self-segregation and not the result of past discrimination. This helps to maintain the status quo of racial segregation and the physical and social distancing of African-Americans from White society. The “natural segregation” concept is rooted in beliefs about fundamental differences between racial groups based on culture and genetics that are meant to justify inequalities between racial groups.
3. The effects of racism are seen as a cultural problem. That is, many blame social, economic, and health disparities between African-Americans and other population groups on a culture that does not value morals typically associated with White America and the Protestant work ethic. This shifts the focus away from resolving racism through social action at the policy level towards something that the African-American community must address because that is where the “problem” originates.
4. Many people in the U.S. simply minimize racial discrimination or suggest that it does not exist because it is not visible like it once was. This diverts attention away from the issue of racism, and therefore, invites other explanations for the

disparities between African-Americans and Whites.

Current racial discrimination is more abstract than it was in the past, which has made it more difficult to study and understand (Krieger 2003). The above frames serve as a way to gain insight into how African-Americans are treated differently and why this difference occurs in contemporary U.S. society. For many African-Americans, subtle or overt discrimination, which can be understood through the frames above, is a perceived daily occurrence (Essed 1991). Other times, such acts of discrimination “silently” occur, and the person discriminated against is not aware.

Socioeconomic Status, Racial Discrimination, and African-Americans

The U.S. is considered a racialized society. That is, divisions among social and economic classes are also divided by racial categories. According to Manuel (2004), “Socially-structured, institutionalized, and customary behaviors that exclude persons from full participation in the society, because of their race, constitute both a sociological and social psychological reality.” The daily context of African-Americans is influenced by historical and current factors that are rooted in discrimination based on race (Essed 1991). Historically African-Americans were excluded from equally and fully participating in the labor, education, and economic sectors of society (Watkins 2001; Sundstrom 1994), which has had profound effects on what Lenski (1966) describes as “property, prestige, and power—the three determinants of social class.” Indeed, it is suggested that the historical and current relationship between discrimination and lower social class of African-Americans is responsible for many of the negative social, biological, and economic racial disparities (Massey and Denton 1993; Krieger 2003). Whereas it is likely that both racial discrimination and lower social class are both independently associated with negative outcomes (Kawachi, Daniels, and Robinson 2005), given historical and current discrimination practices based on race (Massey and Denton 1993; Sundstrom 1994), African-Americans are more likely

to have a lower social class and less likely to improve their property, prestige, and power—the keys to improving overall social, biologic, and economic health.

Household Food Insecurity and African-Americans

African-Americans experience far greater rates of household food insecurity at most sociodemographic levels compared to Whites. In 2012, African-Americans had a low or very low food security rate of 24.6% compared to 11.4% of White households (Coleman-Jensen, Nord, and Singh 2013). In addition, for the most severe level of food insecurity, a condition where hunger is likely to exist “very low food security,” African-Americans had a rate of 10.6% compared to 4.6% of Whites (Coleman-Jensen, Nord, and Singh 2013). In other words, African-American households are twice as likely to experience hunger compared to White households. These disparities persist over time as well. For example, among a sample of children followed from kindergarten through eighth grade, nearly 60.0% of African-American children would experience food insecurity compared to about 24.0% of White children and 20.5% of African-American children would experience persistent food insecurity compared to about 2.0% of White children (Burke, Jones, Fram, and Frongillo 2012).

Understanding Racial Discrimination, Socioeconomic status, and Food Insecurity

Among African-Americans, racial discrimination, socioeconomic status, and food insecurity do not occur independently, rather, they often occur at the same time and create a context that is detrimental to health and well being. It is thought that racial discrimination leads to decreased SES, which in turn leads to decreased food security. There is, however, not enough evidence to support the direct association between racial discrimination and food security. Residential segregation, access to affordable markets, and unfair labor practices are associated with racial discrimina-

tion, all of which could influence food security, especially among African-Americans. Indeed, food justice and anti-hunger movements in the U.S.—which emphasizes an equitable food system without hunger—target fair housing practices, food access, education, and fair labor practices as a way of increasing food security among the most disadvantaged (Gottlieb and Joshi 2010). Overall, racial discrimination, lower socioeconomic status, and racial discrimination interact and negatively influence the lives of millions of African-Americans, and whereas the association between racial discrimination and socioeconomic status is understood, the role of food insecurity and racial discrimination is not.

CHAPTER 3

RESEARCH DESIGN AND METHODS

The first section of this chapter presents an overview of the research design for the Family Mealtime Study (FMS) as it relates to both dissertation studies. The second section details the data collection procedures and analysis for both dissertation studies papers.

3.1 OVERVIEW OF THE FAMILY MEALTIME STUDY

The FMS was a cross-sectional, non-experimental, quantitative research study that examined dietary and social variables related to food insecurity in households with children. The study occurred between March and December of 2012 in nine counties in South Carolina. FMS was approved by the Institutional Review Board at the University of South Carolina.

FMS was part of a larger study led by Dr. Sonya Jones and funded by the U.S. Department of Agriculture, Food and Nutrition Service Child Hunger Research Program through the University of Kentucky's Poverty Research Center, titled "How can communities and households protect children from very low food security?" The purpose of the parent study was to examine factors that lead to very low food insecurity among children (commonly referred to as child hunger) as well as examine how anti-hunger leaders view the issue of very low food security among children. The larger study recruited about 800 participants, many of which were also part of FMS. Briefly, FMS shared many similarities with MFS including recruitment strategies, scheduling, survey administration, participant reimbursement, staff, and overall study design.

More detailed information about Dr. Jones' study can be found elsewhere (Jones et al, under review).

3.2 STUDY AREA

FMS recruited and surveyed participants that lived in a nine county area of South Carolina (Figure 1). Richland County is one of the state's most densely populated areas and the central location of the University of South Carolina, therefore, most participants were recruited there. The remaining eight counties are mostly rural or contained small towns. Given the large geographical space of the study area, as well to meet the needs of the participants, we conducted the survey at a location that was most convenient to the participant. For example, most surveys were completed in the participants home or in a quiet area in a local county library. A small proportion of surveys were done in restaurants in a area that ensured privacy.

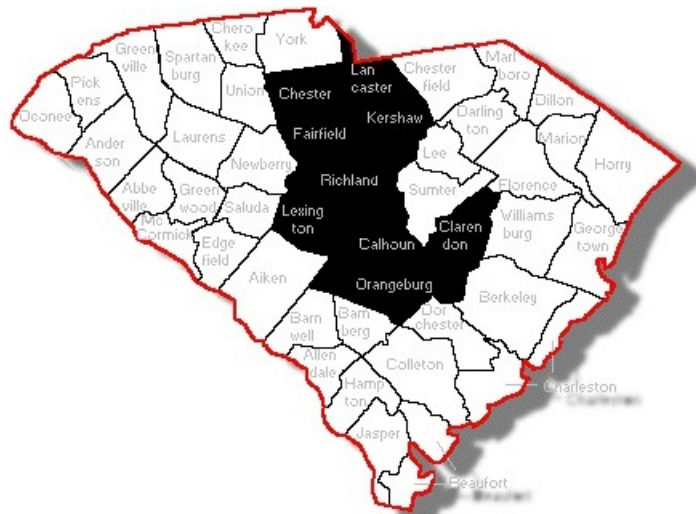


Figure 3.1 Family Mealtime Study Coverage Area

3.3 RECRUITMENT PROCEDURES AND ELIGIBILITY CRITERIA

FMS recruited participants through a variety of mechanisms to obtain a sample that reflected the diverse outlets through which households with food-insecure individuals use to obtain food. We first generated a list of over 1,660 food system stakeholders in the study area, which includes grocers, restaurants, emergency food providers, and food assistance organizations. We then randomly selected 218 of these stakeholders for permission to recruit from their site. Recruitment of clients, customers, visitors, or workers at the sites was done in-person by a member of the research team or through a flier that was hung at the site. We also allowed for each recruited participant to invite up to four others into the study. The study recruitment conceptualization is provided (Figure 3.2).

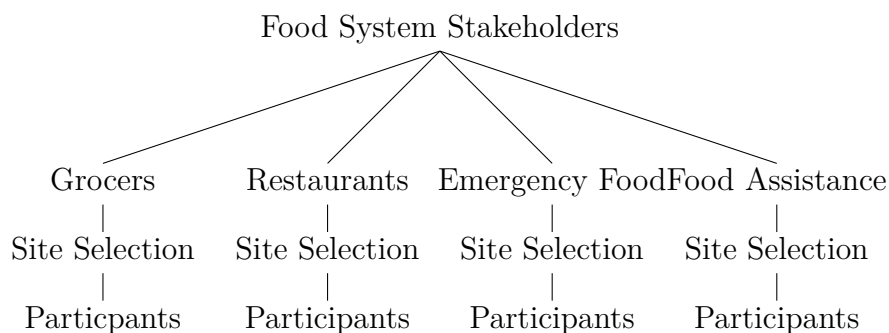


Figure 3.2 Family Mealtime Study Recruitment Conceptualization

Once a participant consented to participate in FMS, they were first administered a brief “screener” survey to determine eligibility. The screener took about 10 minutes to complete and verified that the participant was eligible to be included in the study. The screener was administered either over the phone or in person with the researcher reading the questions and inputting the answers into a computer. To be eligible for FMS, participants must have met the following criteria:

1. At least one child between the ages of 9 and 15 in the household that is under

the legal custody of the respondent and resides in the household at least 50% of the time.

2. The caregiver of the child must be at least 18 years or older and be the primary caregiver of the child participant.
3. The participant must reside in one of the nine study areas based on their home address zip code.
4. Have a household with incomes less than \$100,000 per year
5. Participants must at least affirm three or more items on the Household Food Security Survey.
6. The mother or caregiver self-classifies as non-Hispanic, African-American or non-Hispanic, White.

Regardless of eligibility, participants were given a \$5 gift card for their time and effort.

3.4 DATA COLLECTION PROCEDURES

If a participant was eligible and consented to participate in FMS, we scheduled a time to complete the rest of the study. Most participants were scheduled within a week of their screening date. Participants were given a reminder call one to two days before their survey and again on the day of the survey. A member of the research team would drive to meet the participant at the predetermined location. Upon arrival, the research team member would explain the consent and assent forms to the caregiver and child and request their signature if they understood and agreed to the terms.

Since there was a survey for the caregiver and child, each survey was completed separately, but on the same day. The caregiver could choose whether or not their child was present during their survey and the parent could choose if they were present when

their child was being surveyed. The surveys were administered verbally to the participant and their responses were input into a laptop computer. The participants were encouraged to ask any questions they had during the survey. Participants received a \$20 gift card for completing the FMS survey.

3.5 DATA COLLECTION MEASURES

We measured demographics at the person and household levels that were used in both papers. Specifically we measured:

Household Food Security Food security status was measured using the 18-item Household Food Security Survey (HFSS) (Coleman-Jensen, Nord, and Singh 2013). We used scoring methods suggested by the USDA such that a household is considered to be low food secure if three to seven items are affirmed and very low food secure if eight to eighteen items are affirmed. In addition, we used the HFSS as a continuous measure of food security, with a possible range of 3 to 18 questions affirmed. Note that affirmed adult or child questions count towards the total sum, consistent with USDA calculations. For the categorical variable, low food secure is the reference category in statistical models.

Income Caregivers were asked “Within the last 12 months, did you or any other adults receive any income from an employer such as commissions, bonuses, tips, wages, or salary? If so, how much?” Caregivers could give the amount in whichever time frame they preferred (e.g., weekly, monthly, annually). Depending on the time frame selected, income amounts were summed or divided for a monthly income amount variable. The values of monthly income were then divided by 100 to create monthly income in units of \$100.

Education Caregivers were asked “What is the highest level of education you’ve finished?” with response categories of “some high school,” “high school or

GED,” “some college or technical college,” “college or technical college,” and “graduate school or higher.” Responses were categorized into “some high school or high school or GED,” “some college or technical college,” or “college or technical college or graduate school or higher.” The interviewed caregiver’s education level was used for analyses and “high school or GED” is the reference category in the statistical models.

Presence of Second Caregiver Caregivers were asked “Besides yourself, do you have another parent or caregiver of your child/children that lives in your household at least 50% of the time?” Caregivers responses were coded as “yes” or “no.” Households with a second caregiver were the reference group in the statistical models.

Age Caregivers and children were asked the month, day, and year of their birth day and an “age” variable was calculated. Caregivers were also asked to give the month, day, and year of all other children in the household if applicable.

Household Size Caregivers were asked “Number of adults living in household at least 50% of the time” and “Number of children living in household at least 50% of the time.” A “household size” variable was then created with categories of two-three, four, five, or six or more. Households with two to three people were the reference category in the statistical models.

Gender Each caregiver and child was asked “Are you . . .” with response categories of “female” or “male.” Females were the reference category in the statistical models.

Race and Ethnicity Caregivers and children were asked “Are you . . .” with response categories of “Black/African-American,” “White/Caucasian,” American Indian or Alaskan Native,” “Native Hawaiian or other Pacific Islander,” or

“Other.” To measure ethnicity, caregivers and children were asked “Are you...” with response categories of “Hispanic” and “non-Hispanic.” The caregiver’s response was used and dichotomized into a “race” variable of non-Hispanic Black or non-Hispanic White, with non-Hispanic Black as the reference category in the statistical models.

Supplemental Nutrition Assistance Program (SNAP) Caregivers were asked “Did you or any other adults receive SNAP or food stamps in the last year?” with response option of “yes” or “no.” Not receiving SNAP was the reference category in the statistical models.

Parental Perception of Child Weight Caregivers were asked “I feel my child’s weight is . . .” with response options of “underweight,” “a little underweight,” “about the right weight,” “a little overweight,” and “overweight.” A “child weight” variable was created with categories of “underweight or a little underweight,” “about the right weight” or “a little overweight or overweight.” “About the right weight” was the reference category in the statistical models.

Each paper also measured other variables that were unique to each analysis. The following measures were specific to dissertation paper 1:

Dietary Intake We used a single 24-hour dietary recall using the multiple pass method to measure dietary intake among child participants. First, the child was asked to list the time and type of food or drink consumed the previous day. Second, the list was repeated back to the child to confirm its accuracy. Third, the child was asked to give the specific food or drink (e.g., brand name or type of fruit) that was consumed and to estimate the amount. The child used a booklet that had common serving amounts to aid in estimation. Finally, the research team member would review everything the child reported and ask if there was anything missing or if they child would like to edit a response.

To collect the times, types, and amounts of foods and drinks consumed, we used the Nutrition Data System for Researchers (NDSR) software developed by the Nutrition Coordinating Center at the University of Minnesota in Minneapolis, Minnesota (NDSR 2011). NDSR has the most current data base of foods and drinks regularly consumed in the U.S. with detailed dietary information on each, and is highly reliable. The research team member responsible for conducting the 24-hour dietary recalls and using NDSR attended a training put on by NDSR at the University of Minnesota prior to conducting the recalls.

Dietary Quality We measured child dietary quality using four different indicators: Healthy Eating Index-2005 (HEI) score, added sugar consumption, vegetable consumption and fruit (including 100% fruit juice) consumption. The HEI is a tool to measure compliance to the 2005 Dietary Guidelines for Americans (Guenther, Reedy, Krebs-Smith, and Reeve 2008). The HEI uses 12 separate components, with each component contributing “points,” to evaluate consumption patterns per 1000 kcals of: total fruit (five points), total whole fruit (five points), total vegetables (five points), dark-green vegetables (5 points) and orange vegetables or legumes (five points), total grains (five points), total whole grains (five points), milk (ten points), meat and beans (ten points), saturated fat (ten points), oils (ten points), sodium (ten points), and solid fats and added sugars (20 points). The HEI is a continuous measure with a range of 0-100. A score of 0-51 is considered “bad,” 52-80 is considered “needs improvement,” and 81-100 is considered “good.” Added sugars were measured in grams for each food or drink consumed. Fruits and vegetables were measured in servings. Since many children either consumed no fruit or a negligible amount (e.g., less than a fifth of a serving), we created a dichotomous variable that was “0” if the child consumed less than a fifth of a serving and “1” if they consumed more than a fifth of a serving. Children who consumed less than a fifth of a serving

were the reference category in the statistical models.

Parental Dietary Modeling We developed a questionnaire to measure frequency of parental healthy food modeling. Cognitive interviewing was done with five caregivers to refine the scale (Willis 2005). The script to the questionnaire read: “These next questions are about the foods you eat when eating with your child. Within the last month, please describe how often each of the following statements occurs when you eat and your child is eating with you. Note: we are interested in what you eat in front of your child rather than what you feed your child or what your child eats.” Each of the five questions began with 1) I eat fruits ...; 2) I eat vegetables ...; 3) I eat low-fat dairy ...; 4) I eat whole grains ...; 5) I eat low-fat meats ... and they all ended with “when my child is eating with me.” Response options were “never,” “rarely” “sometimes,” “most of the time,” and “always.” We also conducted a principal components analysis with varimax rotation to reduce the number of questions and improve prediction. We found that fruit modeling and vegetable modeling loaded onto one factor and the other three modeling questions onto another factor (factor loadings greater than 0.80). Therefore we created a variable that was the sum of the fruit and vegetable modeling scores and one that was the sum of the low fat dairy, low fat meat, and whole grains modeling scores. Each variable was treated as continuous in the statistical models.

Parenting Style To assess parenting style we used the Parenting Styles and Dimensions Questionnaire (PSDQ) (Robinson, Mandleco, Olsen, and Hart 2001). The PSDQ measures frequency of parental reaction to thirty-two different scenarios. Response options were “never,” “once in a while,” “about half the time,” “very often” and “always” and were coded from 0-4. Of the 32 items in the PSDQ, 15 belong to the authoritarian subscale, 12 to the authoritative subscale, and 5 to

the permissive subscale. We summed the items for each subscale to create three variables “authoritarian,” “authoritative,” and “permissive” which were treated as continuous. Each variable captures how frequently the parent displays either authoritarian, authoritative, or permissive styles when interacting with their children.

Mealtime Characteristics We used questions from the Early Childhood Longitudinal Study-Kindergarten 1998-1999 survey to measure the frequency of eating the evening meal together (Tourangeau et al. 2009). Specifically we asked “In a typical week, please tell me how often your family eats the evening meal together” We dichotomized the responses into “never,” “sometimes,” “most of the time” or “always” and were coded as 3-0, respectively with “Always” as the reference category in the statistical models. To measure television time during mealtime, we asked “How often does your child watch TV or videos during mealtime?” Response categories were “never,” “sometimes,” “most of the time,” and “always,” and were coded as 0-3 respectively. “Never” was the reference category in the statistical models.

To measure meals prepared away from home, we asked three separate questions. Each question began with “In a typical week. . .” and then asked “How many of your family’s main meals are from a fast-food restaurant,” “How many of your family’s main meals are take-out foods,” and “How many of your family’s main meals are eaten at a sit-down restaurant.” Participants gave the number of times per week for each question. We summed the three questions and treated it as a continuous variable.

To measure mealtime attitudes and behaviors, we used the Family Eating Attitude and Behavior Scale (FEABS) (Hogen 1988). We used the “priority of family meals” and “atmosphere of family meals” sub scales of the FEABS for

our study, which have five and four questions each, respectively. The FEABS includes questions such as “In my family, it is important that we eat at least one meal a day together” and “In my family, eating together brings people together in an enjoyable way.” Response categories were “strongly disagree,” “disagree,” “agree,” and “strongly agree” and were coded from 0-3. Each sub scale was summed and treated as a continuous variable.

The following measure was specific to paper 2:

Racial Discrimination We used a modified version of the Perceived Ethnic Discrimination Questionnaire-Community Version (PEDQ-CV) as a measure of our primary independent variable of interest, lifetime racial discrimination (Kwok et al. 2011). The PEDQ-CV is a 17-item Likert-type survey that measures lifetime racial discrimination across several domains, namely exclusion and rejection, stigmatization and devaluation, discrimination at work and school, threat and aggression, and discrimination by police and security officers. Participants were asked to consider their whole lives, from when they were a child until the present day and respond to questions such as “Have you ever been treated unfairly by teachers, principals, or other staff at school,” “Have others threatened to hurt you,” “Have policeman or security officers been unfair to you,” “Has your boss or supervisor been unfair to you” and “Have people not trusted you” Our version was slightly modified from the original PEDQ-CV as we added “because of your race” to the end of each question whereas the original makes a general statement at the beginning of the survey of “because of your ethnicity have you . . .” We did this because the sample was restricted to non-Hispanic African-Americans, so ethnicity was not relevant. Participants could respond “never,” “rarely,” “sometimes,” “often,” or “very Often” and were coded from 0-4. We summed the 17 questions within the PEDQ-CV and treated it as a

continuous variable.

3.6 DATA ANALYSIS

The data analysis plans for papers 1 and 2 will be presented separately. The portion of participants that came from each site, however, will be presented here. Fifty-five percent of participants were recruited through on-site recruitment at local food banks, convenience stores (e.g., gas stations marts, dollar stores), child day care centers, or farmers markets; 23% were recruited through word-of-mouth by an existing participant; and 22% were recruited through fliers.

Data Analysis for Paper 1.

From our food system stakeholder sites, 332 people agreed to participate, and 179 completed a survey for a response rate of 53.9%. To analyze the data gathered from the measures specific to paper 1, we used descriptive statistics as well as linear, and logistic regression models. For the descriptive statistics, we used the proportion of each category that was affirmed for categorical measures and mean with standard deviation for continuous measures. The following models were constructed for the ordinary least squares (OLS) regression models:

HEI OLS regression models for individual components of the social context of meal-time:

- $Y_1(\text{HEI score}) = \beta_0 + \beta_1(\text{fruit and vegetable modeling score}) + \epsilon$
- $Y_1(\text{HEI score}) = \beta_0 + \beta_1(\text{low fat meat, low fat dairy, and whole grain modeling score}) + \epsilon$
- $Y_1(\text{HEI score}) = \beta_0 + \beta_1(\text{authoritative parenting style score}) + \epsilon$
- $Y_1(\text{HEI score}) = \beta_0 + \beta_1(\text{authoritarian parenting style score}) + \epsilon$
- $Y_1(\text{HEI score}) = \beta_0 + \beta_1(\text{permissive parenting style score}) + \epsilon$

- $Y_1(\text{HEI score}) = \beta_0 + \beta_1(\text{frequency of eating dinner together}) + \epsilon$
- $Y_1(\text{HEI Score}) = \beta_0 + \beta_1(\text{frequency of screen time during mealtime}) + \epsilon$
- $Y_1(\text{HEI Score}) = \beta_0 + \beta_1(\text{priority of family mealtime score}) + \epsilon$
- $Y_1(\text{HEI Score}) = \beta_0 + \beta_1(\text{social atmosphere of family mealtime score}) + \epsilon$

Added sugar OLS regression models for individual components of the social context of mealtime:

- $Y_1(\text{added sugar (g)}) = \beta_0 + \beta_1(\text{fruit and vegetable modeling score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{added sugar (g)}) = \beta_0 + \beta_1(\text{low fat meat, low fat dairy, and whole grain modeling score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{added sugar (g)}) = \beta_0 + \beta_1(\text{authoritative parenting style score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{added sugar (g)}) = \beta_0 + \beta_1(\text{authoritarian parenting style score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{added sugar (g)}) = \beta_0 + \beta_1(\text{permissive parenting style score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{added sugar (g)}) = \beta_0 + \beta_1(\text{frequency of eating dinner together}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{added sugar (g)}) = \beta_0 + \beta_1(\text{frequency of screen time during mealtime}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{added sugar (g)}) = \beta_0 + \beta_1(\text{priority of family mealtime score}) + \beta_2(\text{energy (kcal)}) + \epsilon$

- $Y_1(\text{added sugar (g)}) = \beta_0 + \beta_1(\text{social atmosphere of family mealtime score}) + \beta_2(\text{energy (kcal)}) + \epsilon$

Vegetable consumption OLS regression models for individual components of the social context of mealtime:

- $Y_1(\text{vegetable consumption (servings)}) = \beta_0 + \beta_1(\text{fruit and vegetable modeling score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{vegetable consumption (servings)}) = \beta_0 + \beta_1(\text{low fat meat, low fat dairy, and whole grain modeling score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{vegetable consumption (servings)}) = \beta_0 + \beta_1(\text{authoritative parenting style score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{vegetable consumption (servings)}) = \beta_0 + \beta_1(\text{authoritarian parenting style score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{vegetable consumption (servings)}) = \beta_0 + \beta_1(\text{permissive parenting style score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{vegetable consumption (servings)}) = \beta_0 + \beta_1(\text{frequency of eating dinner together}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{vegetable consumption (servings)}) = \beta_0 + \beta_1(\text{frequency of screen time during mealtime}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{vegetable consumption (servings)}) = \beta_0 + \beta_1(\text{priority of family mealtime score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{vegetable consumption (servings)}) = \beta_0 + \beta_1(\text{social atmosphere of family mealtime score}) + \beta_2(\text{energy (kcal)}) + \epsilon$

Fruit consumption logistic regression models for individual components of the social context of mealtime:

- $Y_1(\text{Fruit consumption, yes (reference) vs. no}) = \beta_0 + \beta_1(\text{fruit and vegetable modeling score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{Fruit consumption, yes (reference) vs. no}) = \beta_0 + \beta_1(\text{low fat meat, low fat dairy, and whole grain modeling score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{Fruit consumption, yes (reference) vs. no}) = \beta_0 + \beta_1(\text{authoritative parenting style score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{Fruit consumption, yes (reference) vs. no}) = \beta_0 + \beta_1(\text{authoritarian parenting style score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{Fruit consumption, yes (reference) vs. no}) = \beta_0 + \beta_1(\text{permissive parenting style score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{Fruit consumption, yes (reference) vs. no}) = \beta_0 + \beta_1(\text{frequency of eating dinner together}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{Fruit consumption, yes (reference) vs. no}) = \beta_0 + \beta_1(\text{frequency of screen time during mealtime}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{Fruit consumption, yes (reference) vs. no}) = \beta_0 + \beta_1(\text{priority of family mealtime score}) + \beta_2(\text{energy (kcal)}) + \epsilon$
- $Y_1(\text{Fruit consumption, yes (reference) vs. no}) = \beta_0 + \beta_1(\text{social atmosphere of family mealtime score}) + \beta_2(\text{energy (kcal)}) + \epsilon$

The following models were used to adjust for all components of the social context of mealtime and for demographic variables:

HEI OLS model:

- $Y_1(\text{HEI score}) = \beta_0 + \beta_1(\text{fruit and vegetable modeling score}) + \beta_2(\text{low fat meat, low fat dairy, and whole grain modeling score}) + \beta_3(\text{authoritative parenting style score}) + \beta_3(\text{authoritarian parenting style score}) + \beta_3(\text{permissive parenting style score}) + \beta_4(\text{frequency of eating dinner together}) + \beta_5(\text{frequency of screen time during mealtime}) + \beta_6(\text{priority of family mealtime score}) + \beta_7(\text{social atmosphere of family mealtime score}) + \beta_8(\text{vector of demographic variables}) + \epsilon$

Added sugar consumption (g) OLS model:

- $Y_1(\text{added sugar (g)}) = \beta_0 + \beta_1(\text{fruit and vegetable modeling score}) + \beta_2(\text{low fat meat, low fat dairy, and whole grain modeling score}) + \beta_3(\text{authoritative parenting style score}) + \beta_3(\text{authoritarian parenting style score}) + \beta_3(\text{permissive parenting style score}) + \beta_4(\text{frequency of eating dinner together}) + \beta_5(\text{frequency of screen time during mealtime}) + \beta_6(\text{priority of family mealtime score}) + \beta_7(\text{social atmosphere of family mealtime score}) + \beta_8(\text{energy (kcal)}) + \beta_9(\text{vector of demographic variables}) + \epsilon$

Vegetable consumption (servings) OLS model:

- $Y_1(\text{vegetable consumption (servings)}) = \beta_0 + \beta_1(\text{fruit and vegetable modeling score}) + \beta_2(\text{low fat meat, low fat dairy, and whole grain modeling score}) + \beta_3(\text{authoritative parenting style score}) + \beta_3(\text{authoritarian parenting style score}) + \beta_3(\text{permissive parenting style score}) + \beta_4(\text{frequency of eating dinner together}) + \beta_5(\text{frequency of screen time during mealtime}) + \beta_6(\text{priority of family mealtime score}) + \beta_7(\text{social atmosphere of family mealtime score}) + \beta_8(\text{energy (kcal)}) + \beta_9(\text{vector of demographic variables}) + \epsilon$

Fruit consumption (servings) logistic regression model:

- $Y_1(\text{Fruit consumption, yes (reference) vs. no}) = \beta_0 + \beta_1(\text{fruit and vegetable modeling score}) + \beta_2(\text{low fat meat, low fat dairy, and whole grain modeling score}) + \dots$

score) + β_3 (authoritative parenting style score) + β_3 (authoritarian parenting style score) + β_3 (permissive parenting style score) + β_4 (frequency of eating dinner together) + β_5 (frequency of screen time during mealtime) β_6 (priority of family mealtime score) + β_7 (social atmosphere of family mealtime score) + β_8 (energy (kcal)) + β_9 (vector of demographic variables) + ϵ

3.7 DATA ANALYSIS FOR PAPER 2

From our food system stakeholder sites, 345 people agreed to participate, and 194 completed a survey for a response rate of 55.4%. For this analysis we only focused on the 160 caregivers that self-identified as African-American or Black. Six participants had missing information and were excluded from the analysis, for a total analytical sample size 154. We restricted the analysis to African-Americans for two primary reasons: 1) the experience of racial discrimination against African-Americans is rooted in historical racial discrimination that does not exist for Whites; by restricting the sample to African-Americans only, we can examine discrimination in one group that have a shared history of racial discrimination; 2) we did not have a large enough sample of Whites for a meaningful comparison. To analyze the data gathered from the measures specific to paper 2, we used descriptive statistics as well as linear, and logistic regression models. For the descriptive statistics, we used the proportion of each category that was affirmed for categorical measures and mean with standard deviation for continuous measures. Chi square tests were used to test for differences between categorical descriptive statistics and t-tests were used for continuous descriptive statistics. The following models were constructed for the logistic regression models:

- Y_1 (low food secure (reference) vs. very low food secure) = $\beta_0 + \beta_1$ (PEDQ-CV score) + ϵ

- $Y_1(\text{low food secure (reference) vs. very low food secure}) = \beta_0 + \beta_1(\text{vector of demographic variables}) + \epsilon$
- $Y_1(\text{low food secure (reference) vs. very low food secure}) = \beta_0 + \beta_1(\text{PEDQ-CV score}) + \beta_2(\text{vector of demographic variables}) + \epsilon$

The following models were constructed for the OLS regression models:

- $Y_1(\text{HFSS affirmed responses}) = \beta_0 + \beta_1(\text{PEDQ-CV}) + \epsilon$
- $Y_1(\text{HFSS affirmed responses}) = \beta_0 + \beta_1(\text{vector of demographic variables}) + \epsilon$
- $Y_1(\text{HFSS affirmed responses}) = \beta_0 + \beta_1(\text{PEDQ-CV}) + \beta_2(\text{vector of demographic variables}) + \epsilon$

CHAPTER 4

RESULTS

4.1 PAPER 1: THE ASSOCIATION BETWEEN THE SOCIAL CONTEXT OF MEALS AND CHILDREN'S DIETARY QUALITY WITHIN FOOD-INSECURE HOUSEHOLDS WITH CHILDREN¹

Abstract

The social context of mealtime—defined as the social interactions and practices during mealtime—plays an important role in children's diet. Household food insecurity disrupts or causes worry about the household food supply, and therefore may negate the positive effect of the social context of meals; however, little research has examined household food security and the social context of mealtime. The purpose of this study was to examine the association between various aspects of the social context of mealtime—dietary modeling, parenting style, eating together, mealtime screen time, and priority and atmosphere of mealtime—and dietary quality among children within food-insecure households. The results of this study indicate that food-insecure households engage in many of the positive aspects related to the social context of meals, but the protective associations related children's diet are not always seen. Our study also shows that the dietary quality of our sample of food-insecure children is severely lacking, even compared to other low-income children. Intervention and policy efforts that target improved dietary quality among children within food-insecure households

¹Burke, M.P., Jones, S.J., Blake, C.E., Fram, M.F. and Frongillo, E.A. To be submitted to the American Journal of Public Health

should consider the social context of mealtime.

Introduction

Over 75% of 9 to 18 year old males and females are below minimum recommended levels of fruit and vegetable consumption and nearly all exceed recommendations for added sugars (Krebs-Smith et al. 2010). In addition, children’s overall dietary quality has never been categorized as “good” and has been on the low end of the “needs improvement” category since measurement began in 1989 using the Health Eating Index (HEI) (Kennedy et al. 1995; Bowman, Lino, Gerrior, and Basiotis 1998; Basiotis et al. 2002; Guenther, Reedy, Krebs-Smith, and Reeve 2008). Given children’s dietary intake and quality, emphasis has been placed on improving the household level correlates that may improve dietary intake and quality in children such as the social contexts within households (Patrick and Nicklas 2005) and improved food security (Zhang, Jones, Ruhm, and Andrews 2013).

The social context of mealtime—defined as the social interactions and practices during mealtime—plays an important role in children’s diet (Patrick and Nicklas 2005). We conceptualize three distinct areas of the social context of mealtime that are particularly relevant to children’s dietary quality: 1) dietary modeling, 2) parenting style, and 3) mealtime behavior and regulation. Positive practices in these three areas are associated with improved dietary quality in children. For example families that have caregivers who more regularly model healthy foods and eat together have children that consume more fruits and vegetables and fewer soft drinks compared to those who do so less frequently (Tibbs et al. 2001). Caregivers that have an authoritative feeding style (e.g., high responsiveness and high control) have children that consume more fruits and vegetables compared to those with an authoritarian feeding style (e.g., low responsiveness and high control) (Gable and Lutz 2000). In addition, eating together, not watching a television during mealtime, eating

out less, and having a positive mealtime atmosphere are associated with improved dietary outcomes in children and less disrupted eating patterns (Neumark-Sztainer, Wall, Story, and Fulkerson 2004; Videon and Manning 2003; Poti and Popkin 2011; Bowman et al. 2004; Lin and Guthrie 2012; Gillman et al. 2000). These three areas, while represented in the literature individually, are rarely looked at simultaneously and, therefore, less is known about their individual and total contribution within the social context of mealtime. Finally, while the social context of mealtime is associated with improved child nutrition, there is limited evidence if these associations are also observed in food-insecure households—households that worry about or have a disrupted household food supply (Coleman-Jensen, Nord, and Singh 2013).

Associations between the social context of mealtime and children’s dietary quality may not be consistent based on household food security status. Within food-secure households, it is suggested that positive mealtime practices do not solely account for increased dietary quality in children, but rather, they are associated with other practices that predispose a family to make healthier choices (e.g., food affordability, exposure and resilience to unhealthy food advertising). Within food-insecure households, two scenarios could change associations seen in food-secure households: 1) struggles with food shortages make it difficult to obtain costly healthy foods so that even when positive mealtime practice occur, they do not result better dietary quality; or 2) struggles with household food shortages alters the household context which makes it less likely for positive mealtime practices to occur. For many food-insecure families, healthy food affordability is a leading cause of eating a less healthy diet. Changes in household context and food-insecurity are associated as well. Parents and children actively alter aspects of the social context of mealtime to either lessen or disguise both the presence and severity of food insecurity, which might have unintended consequences for child dietary quality (Fram et al. 2011). For caregivers, food insecurity causes stress and is associated with negative feeding practices, such

as decreased breast feeding in infants (Bronte-Tinkew et al. 2007). Food-insecure households are also more likely to have non-traditional work hours (Coleman-Jensen 2010), which may alter the priority given to family mealtime.

Food insecurity disrupts or causes worry about the household food supply, and therefore may negate the positive dietary intake and quality associations related to the social context of mealtime; yet, little research has examined household food security and the social context of mealtime. Food insecurity affects about 20% of households with children in the U.S. (Coleman-Jensen, Nord, and Singh 2013) and over one third of children will experience food insecurity during middle childhood (Burke, Jones, Fram, and Frongillo 2012). Given that nearly 16 million children live in food-insecure households (Coleman-Jensen, Nord, and Singh 2013), understanding how the social context of mealtime is associated with dietary quality in this population will lead to better informed public health policy and practice. In addition, little research has examined multiple components of the social context of mealtime in one study, which might lead to a better understanding of how aspects of the social context of mealtime uniquely contribute to dietary intake and quality in children. The purpose of this study was to examine the association between various aspects of the social context of mealtime—dietary modeling, parenting style, eating together, meals prepared away from home, mealtime screen time, and priority and atmosphere of mealtime—and dietary quality among children within food-insecure households. We hypothesized that caregivers who model healthy food, have an authoritative feeding style, eat together more frequently, have fewer meals prepared away from home, prioritize and provide a positive mealtime atmosphere, and have children that less frequently watch TV during mealtime will have children with increased dietary quality. We focus on the linear and logistic association between dietary quality and the social context of meals using a continuous and discrete measures of dietary quality and continuous and discrete measures of the social context of mealtime.

Methods

Data were from the Family Mealtime Study (FMS), a research study that examined food insecurity in households with children between the ages of 9 and 15 years old in metropolitan and rural areas in SC in 2012. Data were collected in two stages. First, a member of the research team conducted an in-person or telephone screening survey. The screening survey collected basic demographic information (e.g., age(s) of children in the household, race/ethnicity, income) and the food security status of the household. To be eligible for participation in the FMS, a participant must have met the following criteria: caregiver of a child between the ages of 9 and 15 that lives in the household at least 50% of the time, be self-classified as Black, non-Hispanic or White, non-Hispanic, have low or very low food household security, and have a total household income of less than \$100,000 in the past year. Participants received a five-dollar gift card for participating in the screening survey, regardless of final eligibility. Second, eligible caregivers participated in an in-person survey and one of their children in a 24-hour dietary recall at a location that was most convenient for them and ensured privacy. The child participant was chosen by the caregiver if there were multiple eligible children in the household.

Since the focus of FMS was to examine contextual mealtime factors that influence child dietary intake and eating patterns, a variety of information was collected from the caregiver and one of their children between the ages of 9 and 15. Information collected from parents included mealtime practices and behaviors, parenting style, and dietary habits. Information collected from the child included a 24-hour dietary recall.

Participants were recruited into FMS through a variety of mechanisms. Fifty-five percent of participants were recruited through on-site recruitment at local food banks, convenience stores, child day care centers, or farmer's markets; 23% were recruited through their friends or family; and 22% were recruited through flyers.

Three hundred and thirty two people agreed to participate, and 179 completed a survey, for a response rate of 53.9%. Participants received a twenty-dollar gift card for completing the second stage of the FMS.

Measures

Dietary intake and dietary quality. A trained interviewer collected a single 24-hour dietary recall. Dietary intake data were collected and analyzed using the multiple pass method and Nutrition Data System for Research (NDSR) software developed by the Nutrition Coordinating Center (NCC), University of Minnesota, Minneapolis, MN (NDSR 2011). The dietary recalls were collected on all days of the week and varying times of the day. Overall dietary quality was assessed using the Healthy Eating Index (HEI)-2005 (Guenther, Reedy, Krebs-Smith, and Reeve 2008). The HEI-2005 is a tool to measure compliance to the 2005 Dietary Guidelines for Americans. The HEI-2005 uses 12 separate components to evaluate consumption patterns per 1000 kcals of each of the following: total fruit, total whole fruit, total vegetables, dark-green vegetables and orange vegetables or legumes, total grains, total whole grains, milk, meat and beans, saturated fat, oils, sodium, and solid fats and added sugars. The HEI-2005 is a continuous measure with a range of 0-100. A score of 0-51 is considered “bad,” 52-80 is considered “needs improvement,” and 81-100 is considered “good.” HEI scores were generated from NDSR nutrient output (Landy, Kurtz, Miller, and Ludwig 2012). Given our limited sample size, we were not able to produce reliable estimates for the HEI subscales; therefore, we only used the overall HEI score as a measure of dietary quality. To account for other important features of the children’s diet that are most relevant to obesity prevention and public health goals (Dietary Guidelines Advisory Committee 2010), we separately calculated the total serving amount of fruits (including 100% fruit juice) and vegetables as well as the total amount of grams of added sugar the children consumed. Since many children either consumed no fruit

or a negligible amount (e.g., less than a fifth of a serving), we created a dichotomous variable that was “0” if the child consumed less than a fifth of a serving and “1” if they consumed more than a fifth of a serving.

Parental dietary modeling. We developed a questionnaire to measure frequency of parental healthy food modeling. Cognitive interviewing was done with five caregivers to refine the scale (Willis 2005). The script to the questionnaire read: “These next questions are about the foods you eat when eating with your child. Within the last month, please describe how often each of the following statements occurs when you eat and your child is eating with you. Note: we are interested in what you eat in front of your child rather than what you feed your child or what your child eats.” Each of the five questions began with 1) I eat fruits. . . ; 2) I eat vegetables. . . ; 3) I eat low-fat dairy. . . ; 4) I eat whole grains. . . ; 5) I eat low-fat meats. . . and they all ended with “when my child is eating with me.” Response options were “never,” “rarely,” “sometimes,” “most of the time,” and “always” and were coded 0-4. We also conducted a principal components analysis with varimax rotation to reduce the number of questions and improve prediction. We found that fruit modeling and vegetable modeling loaded onto one factor and the other three modeling questions onto another factor (factor loadings greater than 0.80). Therefore we created a variable that was the sum of the fruit and vegetable modeling scores and one that was the sum of the low fat dairy, low fat meat, and whole grains modeling scores. Each variable was treated as continuous in the statistical models.

Parenting style. To assess parenting style we used the Parenting Styles and Dimensions Questionnaire (PSDQ) (Robinson, Mandleco, Olsen, and Hart 2001). The PSDQ measures frequency of parental reaction to thirty-two different scenarios. Response options were “never,” “once in a while,” “about half the time,” “very often” and “always” and were coded from 0-4. Of the 32 items in the PSDQ, 15 belong to the authoritarian subscale, 12 to the authoritative subscale, and 5 to the permissive

subscale. We summed the items for each subscale to create three variables “authoritarian,” “authoritative,” and “permissive” which were treated as continuous. Each variable captures how frequently the parent displays either authoritarian, authoritative, or permissive styles when interacting with their children.

Mealtime behavior and regulation. We used questions from the Early Childhood Longitudinal Study-Kindergarten 1998-1999 survey to measure the frequency of eating the evening meal together (Tourangeau et al. 2009). Specifically we asked “In a typical week, please tell me how often your family eats the evening meal together.” Response categories were “never,” “sometimes,” “most of the time,” or “always” and were coded 3-0. To measure screen time during mealtime, we asked “How often does your child watch TV or videos during mealtime?” Response categories were “never,” “sometimes,” “most of the time,” or “always” and were coded 0-3.

To measure meals prepared away from home, we asked three separate questions. Each question began with “In a typical week. . .” and then asked “How many of your family’s main meals are from a fast-food restaurant,” “How many of your family’s main meals are take-out foods,” and “How many of your family’s main meals are eaten at a sit-down restaurant.” Participants gave the number of times per week for each question. We summed the three questions and treated it as a continuous variable.

To measure mealtime attitudes and behaviors, we used the Family Eating Attitude and Behavior Scale (FEABS) (Hogen 1988). We used the “priority of family meals” and “atmosphere of family meals” sub scales of the FEABS for our study, which have five and four questions each, respectively. The FEABS includes questions such as “In my family, it is important that we eat at least one meal a day together” and “In my family, eating together brings people together in an enjoyable way.” Response categories were “strongly disagree,” “disagree,” “agree,” and “strongly agree” and were coded from 0-3. Each sub scale was summed and treated as a continuous variable.

Food security. Food security status was measured using the 18-item Households Household Food Security Survey (HFSS) and we used the USDA method to score each question (Coleman-Jensen, Nord, and Singh 2013). We then dichotomized each question on whether or not it was affirmed, and summed across all questions to create a continuous household food insecurity variable. Detailed discussions on the reliability, validity, and use of the HFSSM can be found elsewhere (National Research Council 2006).

Demographics. We measured standard demographics to control for difference among households. Specifically, we measured total monthly income (continuous variable in units of \$100), child age in years (continuous variable), child gender (male vs. female), parental perception of child weight (about the right weight (reference) vs. a little underweight/underweight vs. a little overweight/overweight), primary caregiver race/ethnicity (White, non-Hispanic (reference) vs. Black, non-Hispanic), primary caregiver education level (less than high school, high school or equivalent (reference) vs. some college, some technical school vs. college, technical school, graduate school), secondary caregiver in household (having a secondary caregiver living in the household at least 50% of the time (e.g., spouse, family member) (reference) vs. no secondary caregiver in the household), total household size (two-three (reference), four, five, or six or more), Supplemental Nutrition Assistance Program (SNAP) participation (received SNAP in the last year (reference) vs. did not receive SNAP in the last year) and urbanicity (urban (reference) vs. non-urban).

Statistical Analyses

We first used descriptive statistics to analyze the sample. Then, we constructed ordinary least squares (OLS) and logistic regression models to examine the association between each component of the social context of mealtime individually (i.e., not adjusting for other social context of mealtime variables) and the dietary quality

variables, adjusting for total energy intake (kcal), except for in the analysis of HEI scores where energy consumption was already taken into account. OLS regressions were used for the HEI scores, added sugar, and vegetable consumption. Logistic regressions were used for fruit consumption. Finally, we used OLS and logistic regressions to examine the association between all the components of the social context of meals and the dietary quality variables. All analyses were carried out using Stata version 13.0 (StataCorp 2013) and values were considered significant at $P < 0.05$.

Results

The sample included 179 caregiver-child dyads. About 82% of the sample were African-American, the average household had a total monthly income of \$1606, and about 45% of primary caregivers had a high school education or less (Table 4.1). About 47% of households had a secondary caregiver in the household and about 32% of households had a total household size of four. About 75% of households received SNAP in the previous year and lived in an urban area.

The average HEI score was 52.1. The average child consumed about 90 g of added sugar, which constituted about 18% of total energy. Children consumed about two servings of vegetables in the previous 24-hours. About 44% of the sample did not consume any fruit or 100% fruit juice in the previous 24-hours. The average modeling score for fruits and vegetables was about 7 out of 10 and the average modeling score for low fat meats, low fat dairy, and whole grains was slightly less with a score of about 9 out of 15. Forty-four percent of caregivers reported that they “always” eat the evening meal with their family. The average amount of meals prepared away from home per week was about 2. About 25% of caregivers reported that their children “never” watch television during mealtime. The average priority of family mealtime score was about 10 out of 15 and the average atmosphere of family mealtime score was about 9 out of 12.

To understand sources of added sugar, vegetables, and fruits, we examined the top three sources of each and their relative contribution to the total amount consumed of added sugar, vegetables, and fruits (Table 4.2). The three most common sources of added sugar (g) from foods and drinks in the children’s diet accounted for about 58% of all consumed added sugar. The number one source of added sugar was juice or flavored beverages, which includes beverages such as juices that are not 100% fruit juice or sports drinks. The second most common source was soft drinks which accounted for about 17% of all added sugar consumed. The third most common source of added sugar was sweeteners (e.g., white granulated sugar, breakfast syrup), which accounted for about 12% of consumption of total added sugar. The top three sources of vegetables accounted for about 61% of all vegetables consumed. The number one source of vegetables were fried potatoes, which accounted for about 33% of all vegetables consumed. The second and third most common source of vegetables were tomatoes and green or string beans, with each accounting for about 22% and 6% of all vegetables consumed, respectively. The top three sources of fruit accounted for about 75% of all fruit consumed. The number one source of fruit was 100% fruit juice, which accounted for about 61% of all fruit consumed. The second and third most common sources of fruit were apples and watermelon, with each accounting for about 7% of all fruit consumed, respectively.

Several social context of mealtime variables were significantly associated with child dietary quality before adjustment for socioeconomic, demographic, and other social context of meal variables (Table 4.3). The children of caregiver’s who reported that their family “never” ate the evening meal together had children that consumed nearly 1.5 servings less of vegetables ($\beta = -1.46$ 95% CI $-2.54, -0.39$). Caregivers who reported that their children watch television “most of the time” compared to “never” had a 75% reduction in the odds of consuming at least a fifth of a serving of fruit (OR 0.24 95% CI 0.08, 0.67). Finally, caregivers who reported a more positive

atmosphere of family mealtime had children with about a 17% increase in the odds of consuming at least a fifth of a serving of fruit (OR 1.17 95% CI 1.01, 1.36). We did not find significant associations between HEI or added sugar consumption and dietary quality before adjustment for socioeconomic and demographic variables.

Several social context of mealtime variables were significantly associated with child dietary quality when adjusting for socioeconomic, demographic and the other social context of mealtime variables (Table 4.4). Each unit increase in the authoritarian parenting style scale was associated with a 0.36 unit increase in HEI score ($\beta= 0.36$, 95% CI 0.37, 0.68). No other social context of meal factors were associated with HEI. Each unit increase in the authoritative parenting style scale was associated with a decrease of 1.31 grams of added sugar consumption ($\beta= - 1.31$ 95% CI -2.48 , -0.14). Each unit increase in the permissive parenting style scale was associated with an increase of 2.59 grams of added sugar consumption ($\beta= 2.59$, 95% CI 0.95, 4.22). Caregivers who reported that their children “always” watched TV during mealtime had children that consumed about 23 grams less of added sugar compared to caregivers who reported their child “never” watched TV during mealtime ($\beta= -23.01$ 95% CI -42.48 , -3.54). In addition, each unit increase in the atmosphere of family mealtime scale was associated with about a 4 gram increase in added sugar consumption ($\beta= 4.19$ 95% CI 0.42, 7.96). Caregivers who reported “never” eating the evening meal together had children that consumed about 1.60 servings less of vegetables compared to caregivers who reported they “always” eat the evening meal together. Each unit increase in the authoritarian parenting style scale was associated with a 7% increase in the odds of consuming more than a fifth of a serving of fruit (OR= 1.07 95% CI 1.00, 1.16). Caregivers who reported that their children “most of the time” or “always” watched television during mealtime had a 87% and 76% decrease in the odds of consuming at least a fifth of fruit compared to caregivers that reported their children “never” watched television during mealtime, respectively

(OR= 0.13, 95% CI 0.37, 0.47; OR= 0.24 95% CI 0.06, 0.85).

Discussion

We found that parenting style and mealtime regulation—two important areas of the social context of mealtime—are associated with child dietary quality in food-insecure households. Aspects of the social context of meals have been promoted by academics, practitioners, and laypeople as examples of the ideal aspects of family mealtime to improve the dietary intake of children. That is, a family that eats healthy food together in a positive atmosphere, while not watching a television, and prioritizes family mealtime as a cornerstone of family life (Patrick and Nicklas 2005) are more likely to have children that consume healthier foods. We found that most of the households in our sample report eating healthy foods together in a positive atmosphere without television, but this did not always correspond to greater dietary quality. In other studies that examined aspects of the social context of meals, the food-security status of the household was generally not known, and therefore it is unclear if the beneficial associations of the social context of mealtime dependent on the food security status of the household or other unknown factors. Our study suggests that the social context of mealtime is associated with children’s diet within food-insecure households, but different aspects have relationships with diet.

The only significant association between the social context of mealtime and overall child dietary quality as measured by the HEI was authoritarian parenting style. Our results are similar to those of Hoerr et al. (2009) that found parents with authoritarian feeding styles had children with improved dietary quality. Our work shows that general parenting styles are associated with dietary outcomes in children, a finding that is novel as most work focuses specifically on feeding style, but not general parenting style, although the two are related (Ventura and Birch 2008). Other work suggests that children who are left to make their own decisions regarding food, tend

to pick less healthy choices (Hubbs-Tait et al. 2008). Our results suggest that having an authoritarian parenting style within the context of household food insecurity could translate to improved dietary quality in children.

Children consume more added sugar than recommended and its consumption is associated with overweight and obesity (Ludwig, Peterson, and Gortmaker 2001), therefore, reducing added sugar intake is a national priority (Dietary Guidelines Advisory Committee, 2010). Our analysis shows that total added sugar consumption was positively associated with a permissive parenting style and atmosphere of family mealtime. Two of the primary sources of added sugar were from juice or flavored beverages and soda, which is consistent with the diets of adolescents in general (Guthrie and Morton 2000). Our results suggest that caregivers with a permissive parenting style might be allowing their children to consume more sugar-sweetened beverages at the child's discretion. We found that children who watch TV during mealtime "always" compared to "never" consumed less sugar, which is not what was expected as many studies show that increased television screen time is associated with increased body mass index (Marshall et al. 2004) and decreased dietary quality (Coon and Tucker 2002; Rasmussen et al. 2006) in children. Reducing added sugar intake through reduced sugar-sweetened beverage consumption is a leading intervention strategy to reducing overweight and obesity in children (Malik, Schulze, and Hu 2006), and our study suggests that parenting styles and television screen time during mealtime are two possible factors that could influence intake. What is not clear from our analysis is whether other aspects of family function and wellbeing might be negatively affected if parents exert control over sugar-sweetened foods and beverages overall or during mealtime. For instance, children might be comforted by having discretion over their beverages in an otherwise chaotic and difficult home environment.

Children do not meet recommendations for fruit consumption (Dietary Guidelines Advisory Committee 2010). Our study shows that 45% of children consumed less than

a fifth of a serving of 100% fruit juice or whole fruit. The primary source of fruit in the children's diet was 100% fruit juice by a large margin, furthering concerns that whole fruit consumption is alarmingly low, especially among low-income children. We found that the greater time a child spent watching television during mealtime was associated with reduced odds of consuming at least a fifth of a serving of fruit. This is similar to literature that shows children who eat in front of a screen have lower dietary quality (Miller, Taveras, Rifas-Shiman, and Gillman 2008) and greater obesity (Robinson 1999) compared to those who do not, and this is at least partly due to the influence of nutrient-poor, energy-dense food marketing and advertising (Birch and Fisher 1998). Another potential reason for this association is television viewing providing a type of childcare for parents who are distracted with other demands. We also found that better social atmosphere of mealtime was associated with increased odds of a child consuming at least a fifth of a serving of fruit. Other research shows that female children are less likely to have disordered eating as the social atmosphere of mealtime improved; however, the causal mechanisms between improved social atmosphere and improved child dietary quality and eating habits are not clear (Neumark-Sztainer, Wall, Story, and Fulkerson 2004). Future research should examine how improved social atmosphere during mealtime relates to child dietary quality and eating patterns.

Many aspects of the social context of meals were not significantly associated with children's dietary quality. In the fully adjusted analysis, fruit and vegetable modeling, low fat meat, low fat dairy, and whole grain modeling, eating dinner together more frequently, and priority of family mealtime were not significantly associated with any aspect of children's dietary quality. The dietary modeling scale we developed was not significantly associated with children's dietary quality. There is a lack of measures that directly examine caregiver dietary modeling in the literature, as most studies simply correlate what the caregiver eats with what the child eats, and use this as a proxy for caregiver dietary modeling. Our analysis suggests that our direct

measure of parental dietary modeling is not associated with children's dietary quality. Our finding that increased frequency of mealtime was not associated with improved child dietary quality is in contrast to other work that shows the more families eat together, the more likely the children are to have improved dietary quality (Gillman et al. 2000); although, the coefficients were in the expected directions with families that eat together having children with improved HEI scores, reduced added sugar consumption, increased vegetable consumption, and more likely to consume fruit. We found meals prepared away from home was not associated with child dietary quality; although the coefficients were in the expected directions. This is in contrast to other work that shows meals prepared away from home are negatively associated with children's diets. Our study is unique, however, because we adjusted for other mealtime variables that may attenuate the relationship such as dietary modeling, parenting style, and eating together. Priority of family mealtime was not significantly associated with any aspect of children's dietary quality; little research has examined this aspect of family mealtime and our results suggest it may not be an important factor for children's dietary quality within a low-income food-insecure population.

Strengths and Limitations

Our analysis has several strengths and limitations that should be noted. First, our hypotheses were constructed on the notion that the social context of mealtime influences children's diet rather than children's diet influencing the social context of mealtime; however, given the cross sectional nature of our data, we are unable to establish temporality. Available evidence suggests a family makes mealtime decisions based on routines, norms, values, and household conditions (Larson, Branscomb, and Wiley 2006) rather than the dietary intake of its members; although, it is possible that families adjust these decisions once dietary intake changes in a negative (or positive) manner. Second, it is possible that we did not control for other relevant variables that

are associated with children's dietary quality. Food preferences, beliefs, and attitudes are associated with children's dietary quality and could also be related to the social context of mealtime. For example, caregivers with permissive parenting styles might have different beliefs or attitudes about their children's ability to choose healthy food options, which could also shape their child's food preferences. A strength of our study is that it captures many of the relevant person- and household-level characteristics associated with child dietary quality and accounts for them in one model specification, allowing for greater insight into how mealtime context is associated with children's dietary quality. Third, although we used nearly all of our measures have been validated and used in other studies, it is possible that social desirability was an issue. For example, caregivers might have been more likely to give socially desirable answers to our measures (especially to the social context of mealtime measures); although, if we assume that this was systematic, then our results are likely conservative, but still informative. Finally, our results are based on a convenience sample of low SES households with reports of low and very low food security that might not be generalizable to other populations. A strength of our sample is that it contains a large number of caregivers and their children from food-insecure households with reports on many personal and household level variables related to nutrition and household context, which are rare sample-qualities in the literature.

Conclusion

The results of this study indicate that food-insecure households engage in many of the same positive aspects related to the social context of mealtime as food-secure households. Furthermore, we found that many social context of mealtime variables associated with improved child dietary outcomes in presumably food-secure studies were also found in our food-insecure population. For example, dietary modeling, parenting style, television use during mealtime, and the social atmosphere of mealtime

were all significantly associated. Our study also shows that the dietary quality of our sample of food-insecure children is lacking, even compared to other low-income children (Guenther, Reedy, Krebs-Smith, and Reeve 2008). Intervention and policy efforts that target improved dietary quality among children within food-insecure households should consider the social context of mealtime as a potential strategy to improve dietary quality.

Table 4.1 Descriptive Statistics of the Analytic Sample in the Family Mealtime Study (N=179)

Demographic	Mean (SD) or Percentage
Healthy Eating Index Score	52.21 (11.18)
Added Sugars (g)	90.90 (62.67)
Vegetables (servings)	1.88 (2.17)
Fruit Consumption (Including 100% Fruit Juice)	
Consumed Less than a Fifth of a Serving	45.25
Consumed a Fifth of a Serving or More	54.75
Fruit and Vegetable Modeling Score ¹	6.91 (1.68)
Low Fat Meat, Low Fat Dairy, and Whole Grain Modeling Score ²	8.62 (2.97)
Parenting Style	
Authoritative	46.22 (7.96)
Authoritarian	11.45 (5.98)
Permissive	6.92 (4.15)
Frequency of Times Eating Dinner Together per Week	
Always	44.69
Most of the Time	35.75
Sometimes	17.88
Never	1.68
Meals Prepared Away from Home	1.99 (1.91)
Frequency of Television During Mealtime	
Never	25.15
Sometimes	41.90
Most of the Time	15.08
Always	17.88
Priority of Family Mealtime Score ³	10.17 (2.51)
Social Atmosphere of Family Mealtime Score ⁴	9.35 (2.07)
Household Monthly Income	1606 (1264)
SNAP ⁵ Receipt	
Yes	78.21
No	21.79
Primary Caregiver Education Level	
High School or GED or Less	44.69
Some College or Technical School	32.96
College, Technical, or Graduate School	22.35
Primary Caregiver Race	
African-American	82.12
White	17.88
Child Gender	
Female	49.72
Parental Perception of Child Weight Status	
About the Right Weight	50.28
A Little Underweight or Underweight	12.29
A Little Overweight or Overweight	37.43
Age of Child in Years	12.54 (2.03)
Second Caregiver in Household	
Yes	47.49
No	52.51
Total Household Size	
Two—Three	27.93
Four	31.84
Five	20.67
Six or More	19.55
Urbanicity	
Urban	73.18
Non-Urban	26.82
Affirmed Responses to the Household Food Security Survey	10.11 (4.12)

¹ Range 0-10 Higher scores indicate more modeling

² Range 0-15 Higher scores indicate more modeling

³ Range 0-12 Higher scores indicate higher priority given to mealtime

⁴ Range 0-12 Higher scores indicate higher importance of a positive social atmosphere

⁵ Supplemental Nutrition Assistance Program

Table 4.2 Top three sources and percent of total consumed for added sugar, vegetables, and fruit in children's diets in the Family Mealtime Study (N=179)

Food Group	Percent of total consumed within food group
Added sugars (g)	
Juice or flavored beverages ¹	29.5
Soft drinks	16.9
Sweeteners ²	11.8
Vegetables (servings)	
Fried potatoes	32.7
Tomatoes	21.9
Green or string beans	6.3
Fruits (servings)	
100% Fruit juice	61.1
Apples	7.3
Watermelon	6.7

¹ For example, non-100% fruit juice, sports drinks, or breakfast themed beverages

² For example, white granulated sugar or pancake syrup

Table 4.3 Liner and logistic regression analysis between individual components* of the social context of mealtime and children's dietary quality variables in the Family Mealtime Study (N=179)

Effect	Healthy Eating Index (HEI) Score ¹	Total Added Sugar Consumed (g) ²	Total Vegetables Consumed (servings) ²	Total Fruit and 100% Fruit Juice Consumed (servings) ²
	β (95% CI)	β (95% CI)	β (95% CI)	OR (95% CI)
Fruit and Vegetable Modeling Score	0.80 (-0.16, 1.78)	-3.80 (-8.01, 0.41)	-0.00 (-0.16, 0.15)	1.13 (0.94, 1.35)
Low Fat Meat, Low Fat Dairy, and Whole Grain Modeling Score	-0.01 (-0.57, 0.54)	0.16 (-2.57, 2.24)	0.03 (-0.05, 0.12)	0.98 (0.88, 1.08)
Authoritative Parenting Style Score	0.17 (-0.03, 0.37)	-0.38 (-1.43, 0.66)	-0.00 (-0.05, 0.03)	1.08 (0.97, 1.04)
Authoritarian Parenting Style Score	0.21 (-0.08, 0.51)	-0.52 (-1.55, 0.50)	-0.00 (-0.05, 0.04)	1.01 (0.96, 1.07)
Permissive Parenting Style Score	-0.30 (-0.74, 0.14)	1.21 (-0.51, 2.95)	0.01 (-0.05, 0.07)	0.98 (0.91, 1.05)
Frequency of Eating Dinner Together per Week				
Always	Ref	Ref	Ref	Ref
Most of the Time	-0.13 (-3.79, 3.53)	0.29 (-15.42, 16.00)	0.29 (-0.25, 0.84)	0.72 (0.36, 1.41)
Sometimes	-0.23 (-5.13, 4.66)	6.38 (-12.09, 24.86)	0.09 (-0.72, 0.91)	0.73 (0.31, 1.69)
Never	-7.57 (-18.15, 3.00)	47.42 (-82.32, 177.17)	-1.46 (-2.54, -0.39)**	0.28 (0.02, 3.33)
Meals Prepared Away from Home	-0.19 (-1.06, 0.67)	3.59 (-0.13, 7.31)	-0.10 (-0.24, 0.03)	0.91 (0.77, 1.06)
Frequency of Television Screen Time During Mealtime				
Never	Ref	Ref	Ref	Ref
Sometimes	1.85 (-2.28, 5.99)	-16.57 (-34.48, 1.33)	0.25 (-0.42, 0.92)	0.54 (0.24, 1.19)
Most of the Time	-3.56 (-8.91, 1.77)	-3.71 (-26.86, 19.44)	0.45 (-0.41, 1.32)	0.28 (0.10, 0.78)*
Always	-0.12 (-5.20, 4.95)	-16.02 (-38.02, 5.96)	-0.20 (-1.03, 0.62)	0.54 (0.21, 1.42)
Priority of Family Mealtime Score	-0.34 (-1.00, 0.31)	-0.81 (-3.67, 2.04)	0.04 (-0.06, 0.14)	0.96 (0.85, 1.09)
Social Atmosphere of Family Mealtime Score	0.67 (-0.11, 1.47)	3.05 (-0.36, 6.48)	0.01 (-0.11, 0.14)	1.18 (1.02, 1.37)*

* A regression model was used for each social context of mealtime variable, not adjusting for other social context of mealtime variables

¹ Range of 0-100

² Adjusted for total energy intake (kcal)

* P < 0.05; ** P < 0.01

Table 4.4 Multiple Linear OLS and logistic regression analysis of the association between selected indicators of children’s dietary quality and the social context of meals in the Family Mealtime Study (N=179)

Effect	Healthy Eating Index (HEI) Score ^{1,2}	Total Added Sugar Consumed (g) ³	Total Vegetables Consumed (servings) ³	Total Fruit and 100% Fruit Juice Consumed (servings) ³
	β (95% CI)	β (95% CI)	β (95% CI)	OR (95% CI)
Fruit and Vegetable Modeling Score	0.81 (−0.36, 1.99)	−4.38 (−8.76, −0.00)	−0.01 (−0.23, 0.19)	1.21 (0.94, 1.55)
Low Fat Meat, Low Fat Dairy, and Whole Grain Modeling Score	−0.46 (−1.16, 0.23)	0.89 (−1.77, 3.56)	0.00 (−0.08, 0.09)	0.89 (0.78, 1.03)
Authoritative Parenting Style Score	0.21 (−0.02, 0.46)	−1.31 (−2.48, −0.14)*	−0.00 (−0.06, 0.04)	0.98 (0.93, 1.04)
Authoritarian Parenting Style Score	0.36 (0.03, 0.68)*	−0.71 (−2.02, 0.60)	−0.02 (−0.08, 0.03)	1.07 (1.00, 1.16)*
Permissive Parenting Style Score	−0.41 (−0.93, 0.10)	2.59 (0.95, 4.22)**	0.05 (−0.02, 0.13)	0.92 (0.82, 1.02)
Frequency of Eating Dinner Together per Week				
Always	Ref	Ref	Ref	Ref
Most of the Time	0.67 (−3.38, 4.72)	−2.95 (−25.61, 19.70)	0.53 (−0.20, 1.26)	1.04 (0.40, 2.69)
Sometimes	2.56 (−3.64, 8.77)	−3.78 (−25.06, 17.48)	0.25 (−0.63, 1.14)	1.36 (0.40, 4.62)
Never	−7.46 (−18.98, 4.04)	39.51 (−53.67, 132.70)	−1.59 (−2.94, −0.24)*	0.10 (0.00, 1.64)
Meals Prepared Away From Home	−0.26 (−1.16, 0.63)	3.19 (−1.94, 8.33)	−0.11 (−0.28, 0.04)	0.96 (0.77, 1.19)
Frequency of Screen Time During Mealtime				
Never	Ref	Ref	Ref	Ref
Sometimes	2.50 (−1.82, 6.84)	−17.42 (−36.49, 1.64)	0.47 (−0.28, 1.24)	0.36 (0.13, 1.00)
Most of the Time	−3.28 (−8.26, 1.70)	−4.33 (−27.09, 18.41)	0.51 (−0.39, 1.42)	0.13 (0.03, 0.47)**
Always	1.70 (−4.18, 7.59)	−23.01 (−42.48, −3.54)*	−0.02 (−0.81, 0.86)	0.24 (0.06, 0.85)*
Priority of Family Mealtime Score	−0.39 (−0.48, 1.26)	0.16 (−3.75, 4.09)	−0.03 (−0.14, 0.07)	0.89 (0.75, 1.07)
Social Atmosphere of Family Mealtime Score	0.55 (−0.45, 1.55)	4.19 (0.42, 7.96)*	0.06 (−0.09, 0.22)	1.37 (1.10, 1.70)**

¹ Range of 0-100

² Adjusted for parental perception of child weight, child gender, child age, household monthly income total months worked in last year by caregiver(s), SNAP receipt, primary caregiver education, secondary caregiver in household, total household size, urbanicity, affirmed responses to the HFSS

³ Adjusted for total energy intake (kcal), parental perception of child weight, child gender, child age, household monthly income total months worked in last year by caregiver(s), SNAP receipt, primary caregiver education, secondary caregiver in household, total household size, urbanicity, affirmed responses to the HFSS

* P < 0.05; ** P < 0.01

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4.2 PAPER 2: LIFETIME RACIAL DISCRIMINATION AND HOUSEHOLD FOOD SECURITY STATUS²

Abstract

To achieve the U.S. Department of Agriculture’s (USDA) goal of eliminating very low food security (VLFS), a better understanding of the factors that distinguish VLFS from low food security (LFS) is needed. Historical and contemporary racial discrimination produce inequalities in housing, education, and food access, which all can decrease food security; yet, the association between racial discrimination and food security has not been explicitly examined. Using theories of racial segregation and discrimination, we investigated the association between lifetime racial discrimination and food security status. Greater reports of lifetime racial discrimination were associated with lower food security, after adjusting for demographic confounders. The U.S. government and others have called for strategies that increase food security. Our analysis suggests that preventing racial discrimination will increase food security among African-American households with children.

Introduction

Household food security continues to be a public health concern for many households with children in the U.S and its reduction is a goal of the U.S. Department of Agriculture (USDA) and Health and Human Services (Healthy People 2020 2010; Coleman-Jensen, Nord, and Singh 2013). Low and very low food security—defined as all people at all times not having access to enough food for an active, healthy life—are the broadest two categories into which households experiencing food struggles and shortages may be classified. A low food-secure household typically has food

²Burke, M.P., Jones, S.J., Blake, C.E., Fram, M.F. and Frongillo, E.A. To be submitted to the Journal of Nutrition Education and Behavior

access issues but rarely has reduced food intake among its members, whereas a very-low-food-secure household has food access issues as well as reduced food intake and disrupted eating patterns among its members (Coleman-Jensen, Nord, and Singh 2013). In addition, a household may be classified as “food insecure” if they have any indication of food struggle or shortage. While any household may be classified as food insecure, households with children are of particular concern as they have increased rates of food insecurity compared to the general population. In 2012, 14.0% of all households with children were low food-secure and 6.0% were very low food-secure (Coleman-Jensen, Nord, and Singh 2013). Furthermore, 30.5% and 20.6% of households with children will experience food insecurity or low or very low food security at some point during middle childhood, respectively (Burke, Jones, Fram, and Frongillo 2012).

Food insecurity is associated with many negative health outcomes for adults and children. Adults in food-insecure households are more likely to have poor or fair health status (Stuff et al. 2004), reduced nutrient intake (Rose 1999), and be overweight (Adams, Grummer-Strawn, and Chavez 2003; Townsend et al. 2001). Children in food-insecure households are more likely to have poor health status (Cook et al. 2004; Weinreb et al. 2002; Dunifon and Kowaleski-Jones 2003), behavior problems (Slack and Yoo 2013), frequent stomachaches and headaches (Alaimo, Olson, Frongillo, and Briefel 2001), and worse developmental outcomes (Jyoti, Frongillo, and Jones 2005). In addition, food insecurity is associated with maternal depression and anxiety in mothers and behavior problems, overweight, and health problems in their children (Whitaker, Phillips, and Orzol 2006; Bronte-Tinkew et al. 2007; Laraia, Siega-Riz, Gundersen, and Dole 2006).

Considerable disparities exist between population groups based on food-security status. Households with children living under the federal poverty level have a rate of low or very low food security that is about five times greater than those with incomes

1.85 times or above the federal poverty line (Coleman-Jensen, Nord, and Singh 2013). While food-security status is largely determined by household income and the largest disparities are seen based on this metric, other demographic factors consistently show large disparities. Black, non-Hispanic households with children have rates that are nearly double those of White, non-Hispanic households with children; households with children that are headed by a non-married female have a rate that is about two and half times that of married-couple households with children (Coleman-Jensen, Nord, and Singh 2013). Furthermore, these disparities persist over time. For example, when followed over an eight-year period, households with children that were living below the federal poverty line, Black, non-Hispanic, or single-parent had rates of food insecurity that were at least two times greater than those of households living above the poverty line, White, non-Hispanic, or dual-parent, respectively (Burke, Jones, Fram, and Frongillo 2012). The persistence of disparities over time can lead to an accumulation of inequality, which is associated with increased likelihood of negative health outcomes (Ferraro and Shippee 2009). Of particular concern are racial minority groups, such as African-Americans, who are more likely to have lower social and economic standing and therefore higher rates of food insecurity compared to Whites (Williams 1997; Oliver and Shapiro 2006).

Historical and contemporary racial discrimination is considered a leading cause of socioeconomic disparities for African-Americans (Williams 1997; Oliver and Shapiro 2006). Racial discrimination can negatively influence educational attainment and employment (Oliver and Shapiro 2006; Steele 1997; Brief et al. 2000; Mickelson 2003; Pager and Shepherd 2008) residential opportunities (Massey and Denton 1993), and wealth accumulation (Oliver and Shapiro 2006). While the U.S. has made strides towards reducing discrimination through policy changes that make it illegal at the institutional and individual levels in most settings, the effects of racial discrimination in the U.S. have been profound. For example, African-Americans have lower rankings

on most metrics of social and economic standing (Williams 1997; Oliver and Shapiro 2006), which increases the likelihood of African-Americans having health problems (Williams 1999; Mays, Cochran, and Barnes 2007), being incarcerated (Roberts 2004), and experiencing domestic violence (Hampton, Oliver, and Magarian 2003). The effects of discrimination on the lived experience of many African-Americans are well known; recently, more attention has focused on discrimination and food security.

Racial discrimination has separated African-Americans from production of and access to food, especially in the Southern rural U.S. (Brown, Christy, and Gebremedhin 1994). Beginning in the late eighteenth century and continuing until the 1970s, African-American farmers were systematically denied land to farm that was instead given to Whites (Wood and Gilbert 2000). This has resulted in, at least in part, drastically decreased rates of African-American farmland ownership compared to Whites. For example, in 1999 2% of farmland was owned by African-Americans compared to 96% of farmland owned by Whites (Gilbert, Wood, and Sharp 2002). African-Americans are more likely to live in food deserts that lack access to food markets (Dutko, Ploeg, and Farrigan 2012) and are less likely to have access to fairly priced markets in general (Pager and Shepherd 2008). Finally, African-Americans, even after adjusting for possible confounders, are less likely to consume vegetables (Dubowitz et al. 2008) and consume fewer micronutrients (Newby et al. 2011), and are more likely to consume fast food (Kwate 2008), all of which are indicators of decreased dietary quality. Taken together the evidence suggests that racial discrimination negatively affects both structural and individual markers of nutrition.

We draw upon two theories to understand the relationship between racial discrimination and household food insecurity. Social stratification theory (Harrington 1962; Kain 1968) posit that because African-Americans have been discriminated against throughout much of U.S. history, they have been separated from equal education, employment, and housing opportunities, which has negatively affected their socioeco-

conomic status. For many African-Americans, being socially isolated from mainstream White society also lead to a deterioration of social and political capital needed to make positive changes (Loury 1981; Coleman 1989). Second, continued social and economic disadvantage has led to instability in community organization and the inability to realize common values that help to maintain social control (Sampson and Wilson 1995). This in turn has led to “lower-class value stretch”—the idea that members of lower classes aspire to the same achievements of the middle- and upper-classes (e.g., education, financial stability, marriage), but realize that those achievements might not occur, so they instead “stretch” their values to fit their circumstances (Rodman 1963). For example, dropping out of school and getting a “street” education that is more likely to benefit their immediate circumstances or achieving financial stability by working outside of the traditional labor market (Anderson 1999). These theories suggest that racial discrimination has resulted in a lower socioeconomic status and the isolation and instability of many African-American communities, all of which are associated with increased household food insecurity.

The need to better understand how racial discrimination is associated with food insecurity is great; food insecurity is one of the most pressing nutrition-related issues in the U.S. and African-Americans are much more likely to be food-insecure. The purpose of this study was to examine the association between report of lifetime racial discrimination and food-security status among a sample of African-American food-insecure households with children. We hypothesized that African-Americans who report more lifetime racial discrimination will be more likely to be classified as very low food-secure and there will be a positive linear trend between the number of lifetime racial discrimination events and reports of food insecurity. We focused on likelihood of being classified as very low food-secure as well as the linear association between number of reports of lifetime racial discrimination and affirmed items to the USDA household food security survey.

Methods

Data were from the Family Mealtime Study (FMS), a research study that examined food insecurity in households with children between the ages of 9 and 15 in metropolitan and rural areas in SC in 2012. The main focus of FMS was to examine contextual mealtime factors that influence child dietary intake and eating patterns as a function of food security, with a secondary focus on lifetime racial discrimination and food security. Given the focus on food insecurity in FMS, only households classified as having low or very low food security were accepted into the study.

Data were collected in two stages. First, a member of the research team conducted an in-person or telephone screening survey. The screening survey collected basic demographic information (e.g., age(s) of children in the household, race/ethnicity, income) and food security status via the Household Food Security Survey (HFSS) (Coleman-Jensen, Nord, and Singh 2013). To be eligible for participation in the FMS, a participant must have met the following criteria: parent or caregiver of a child between the ages of 9 and 15 that lives in the household at least 50% of the time (called caregiver from here forward), be self-classified as Black, non-Hispanic or White, non-Hispanic, be classified as low or very low food secure, and have a total household income of less than \$100,000 in the past year. Participants received a five-dollar gift card for participating in the screening survey, regardless of final eligibility. Second, eligible caregivers participated in an in-person survey at a location that was most convenient for them and ensured privacy (e.g., at their residence, library, or restaurant). Since the focus of FMS was to examine contextual mealtime factors that influence child dietary intake and eating patterns, a variety of information was collected from the caregiver and one of their children between the ages of 9 and 15. Information collected from parents included mealtime practices and behaviors, parenting style, and dietary habits. Information collected from the child included a 24-hour dietary recall and a survey that queried the child's eating habits and pat-

terns. Relevant to this analysis, we also collected detailed personal and household level demographic information and report of lifetime racial discrimination from the caregiver.

Participants were recruited into FMS through multiple mechanisms. Fifty-five percent of participants were recruited in-person at local food banks, convenience stores (e.g., gas station marts, dollar stores), child day care centers, or farmer's markets; 23% were recruited through family or friends; and 22% were recruited through flyers. Three hundred and forty five people agreed to participate, and 194 actually completed a survey, for a response rate of 55.4%. For this analysis we only focused on the 160 caregiver's that self-identified as African-American. We restricted the analysis to African-Americans for two primary reasons: 1) the experience of racial discrimination against African-Americans is rooted in historical racial discrimination that does not exist for Whites; by restricting the sample to African-Americans only, we can examine discrimination in one group that have a shared history of racial discrimination; 2) we did not have a large enough sample of Whites for a meaningful comparison. Six participants had missing information and were excluding from the analysis, for a total analytical sample size of 154 caregivers. Participants received a twenty-dollar gift card for completing the second stage of the FMS.

Measures

Food Security. Food security status was our dependent variable and was measured using the 18-item HFSS (Coleman-Jensen, Nord, and Singh 2013). We used scoring methods suggested by the USDA such that a household is considered to have low food security if three to seven items are affirmed and very low food security if seven to eighteen items are affirmed. In addition, we used the HFSS as a continuous measure of food security, with a possible range of 3 to 18 questions affirmed. Note that affirmed adult or child questions count towards the total sum, consistent with USDA

calculations. Detailed discussions on the reliability, validity, and use of the HFSS can be found elsewhere (National Research Council 2006).

Lifetime Racial Discrimination. We used a modified version of the Perceived Ethnic Discrimination Questionnaire-Community Version (PEDQ-CV) as a measure of our primary independent variable of interest, lifetime racial discrimination (Kwok et al. 2011). The PEDQ-CV is reliable and valid across population groups. The PEDQ-CV is a 17-item Likert-type survey that measures lifetime racial discrimination across several domains, namely exclusion and rejection, stigmatization and devaluation, discrimination at work and school, threat and aggression, and discrimination by police and security officers. Participants were asked to consider their whole lives, from when they were a child until the present day and respond to questions such as “Have you ever been treated unfairly by teachers, principals, or other staff at school,” “Have others threatened to hurt you,” “Have policeman or security officers been unfair to you,” “Has your boss or supervisor been unfair to you” and “Have people not trusted you” Our version was slightly modified from the original PEDQ-CV as we added “because of your race” to the end of each question whereas the original makes a general statement at the beginning of the survey of “because of your ethnicity have you . . .” We did this because the sample was restricted to non-Hispanic African-Americans, so ethnicity was not relevant. Participants could respond “never,” “rarely,” “sometimes,” “often,” or “very Often.” Participants could respond “never,” “rarely,” “sometimes,” “often,” or “very Often” and were coded from 0-4. We summed the 17 questions within the PEDQ-CV and treated it as a continuous variable.

Demographics. We measured standard demographics that are associated with food security status (Gundersen, Kreider, and Pepper 2011). Specifically, total household monthly income (continuous variable in units of \$100), primary caregiver age in years (continuous variable), mean age of children in the household (continuous variable), primary caregiver self-reported race/ethnicity (Black, non-Hispanic vs. White,

non-Hispanic), primary caregiver education level (less than high school, high school or equivalent vs. some college, some technical school vs. college, technical school, graduate school), secondary caregiver in household (having a secondary caregiver living in the household at least 50% of the time (e.g., spouse, family member) vs. no secondary caregiver in the household), total household size (one or two, three, four, five, or six or more people in the household) and Supplemental Nutrition Assistance Program (SNAP) participation (received SNAP in the last year vs. did not receive SNAP in the last year). We also assigned each household a Rural Urban Commuting Area (RUCA) (Rural Health Research Center 2010) code based on their residential zip code and categorized each household as urban or non-urban.

Statistical analysis. Descriptive statistics were calculated for the whole sample (n=154) and based on food security status (Table 1). To test for differences between low food-secure and very low food-secure households, χ^2 tests were used for categorical variables and two tailed t-tests for continuous variables. Logistic regression models were used to estimate the association between food security status and report of lifetime racial discrimination. Ordinary least squares (OLS) regression models were used to estimate the association between number of affirmative responses in the HFSS and lifetime racial discrimination. We designed the modeling strategy to achieve two purposes: 1) to estimate the likelihood that a low food-secure household will be a very low-food secure household as a function of lifetime racial discrimination and 2) to estimate the linear trend of affirmative responses to the HFSS and report of lifetime racial discrimination. These modeling strategies will provide insight into not only how lifetime racial discrimination is associated with existing categorizations of food security, but also how report of food insecurity changes with report of lifetime racial discrimination. We estimated six separate models. First, we estimated the bivariate association between food security status and lifetime racial discrimination using logistic and OLS models without adjustment for covariates. Next, we estimated the

association between food security status and known demographic variables associated with food security status as a comparison model. Finally, we estimated the adjusted logistic and OLS models with report of lifetime racial discrimination. All analyses were conducted using Stata version 13.0 for Windows (StataCorp 2013) and used an alpha of less than 0.05 for statistical significance. Standard statistical assumptions were checked and verified for all models.

Results

Results of the descriptive analysis for the sample are presented (Table 4.5). Sixty-eight percent of the sample was classified as very low food-secure. On average, participants in this sample affirmed 10 of the 18 HFSS items. About 74% of participants affirmed at least one racial discrimination event across their lifetime compared to 69% of low food-secure households and about 75% of very low food-secure households. In addition, the mean PEDQ-CV response for the whole sample was 9.13, and was 3.08 points greater in very low food-secure households compared to low food-secure households.

There was not a significant bivariate association between food security status and lifetime racial discrimination (OR 1.03, 95% CI 0.99, 1.07, Table 4.6). Next we only included socioeconomic and demographic variables into the model and found that not having a second caregiver in the household was significantly associated with food-security status (OR 2.75 95% CI 1.16, 6.53). Finally, we introduced lifetime racial discrimination into the model with the socioeconomic and demographic variables. Lifetime racial discrimination was significantly associated with increased odds of a household having very low food-security compared to household low food security (OR 1.04, 95% CI 1.00, 1.09). A one standard deviation higher PEDQ-CV score was associated with a 60% greater odds of being very low food-secure. After adjusting for other covariates, a household with one caregiver, two to three people, a high school

or less education, and a PEDQ-CV score of 9.13 (the sample mean), had a predicted probability of 72% of being very low food secure compared to 63% for a similarly adjusted household with a PEDQ-CV of zero.

There was a significant bivariate association between the number of affirmative responses to the household food security survey and PEDQ-CV ($\beta=0.06$, 95% CI 0.00, 0.12, Table 4.7). Next we introduced demographics into the model and found that none of the demographic variables were significantly associated. Finally, we introduced lifetime racial discrimination into the model. Lifetime racial discrimination was positively associated with the number of affirmative HFSS responses ($\beta=0.08$, 95% CI 0.02, 0.15).

In both the logistic and OLS regressions, there were no modifying effects of PEDQ-CV score with other variables, providing evidence that the effect of lifetime racial discrimination on food security does not differ based on socioeconomic or demographic variables. In addition, we did not find strong effects of other demographic variables that are typically associated with poor food security such as income, education, and urbanicity.

Discussion

We examined the association between food security status and lifetime racial discrimination among a sample of African-American food-insecure households with children in South Carolina. More frequent reports of lifetime racial discrimination were associated with lower food security, after adjusting for socioeconomic and demographic confounders. For each unit increase in the frequency of lifetime racial discrimination, there was a corresponding 4% higher odds of being very low food-secure compared to the odds of being low food-secure. In other words, as caregivers more frequently experienced aggression, devaluation, or some other stigmatization because of their race, the odds of their household having reduced food intake and disrupted eating patterns

was 4% greater. In our sample, not having a second caregiver was the only socioeconomic and demographic variable that was significantly associated with greater food insecurity.

The negative association of racial discrimination with food-security status is consistent with racial discrimination among African-Americans being associated with other negative outcomes such as hypertension (Krieger and Sidney 1996; Guyll, Matthews, and Bromberger 2001) poorer health status (Schulz et al. 2000), low infant birth weight (Collins et al. 2004), and distress (Brown et al. 1999). Some research has demonstrated a correlation between these health outcomes and household food insecurity (Alaimo, Olson, Frongillo, and Briefel 2001; Hamelin, Habicht, and Beaudry 1999; Seligman, Laraia, and Kushel 2010). The institutional manifestations of discrimination, such as residential segregation, access to affordable markets, and unfair labor practices are associated with racial discrimination, all of which could influence food security, especially among African-Americans. Indeed, food justice and anti-hunger movements in the U.S.—which emphasizes an equitable food system without hunger—target fair housing practices, food access, education, and fair labor practices as a way of increasing food security among the most disadvantaged (Gottlieb and Joshi 2010; Maryns and Vollinger 2008). In our study, demographic factors were less important in differentiating households based on food-security status. Although we stress that our sample was limited to food-insecure, low socioeconomic status African-Americans living in the South, and therefore, we did not have the same amount of variability in socioeconomic and demographic variables seen in other studies (Coleman-Jensen, Nord, and Singh 2013; Gundersen, Kreider, and Pepper 2011).

The U.S. government and others have called for strategies that increase food security. Our analysis suggests that preventing racial discrimination will increase food security among an African-American sample of households with children. Racial dis-

crimination is prevalent in the U.S., and occurs in different contexts (Kessler, Mickelson, and Williams 1999; Seaton, Caldwell, Sellers, and Jackson 2008). With regards to increasing food insecurity, racial discrimination that occurs in the labor and educational settings should be of particular concern, especially for African-Americans. Education and income are two of the strongest predictors of food-security status in the U.S. (Coleman-Jensen, McFall, and Nord 2013); therefore, ensuring that all individuals, regardless of their race or ethnicity, have equal access to labor markets and education may reduce racial discrimination and increase food security. While discrimination in labor and educational settings is illegal, racial discrimination is often not reported, overlooked, or tolerated, especially in settings where a dominant group has power over an oppressed group (American Civil Liberties Union 2007). To increase food security, the U.S. government and other organizations should strive towards fair and just labor markets and educational settings where racial discrimination is not only prevented, but reported and punished when it occurs.

Previous work has offered racial discrimination as a possible explanatory variable between disparities in food security and food access (Dutko, Ploeg, and Farrigan 2012; Zenk et al. 2005), but our results are the first to demonstrate a direct association between racial discrimination and food security. This is important for several reasons. First, studies that examine racial discrimination and nutrition are limited, even though numerous health and policy organizations seek to reduce chronic diseases, many of which are highest in racial minorities that are most likely to experience discrimination. Second, relatively little food security research has focused on environmental and social factors specifically and explicitly among African-American populations. Our study demonstrates that socioeconomic and demographic factors that typically distinguish food-secure households from food-insecure households are less important in distinguishing among African-American food-insecure households in our sample of primarily food-insecure, low socioeconomic status African-Americans

living in the South. This implies that different policy and intervention strategies should be considered for improving food-security among African-American populations (e.g., reducing racial discrimination). Finally, our study adds to the growing body of literature that examines food systems from a food justice perspective (Gottlieb and Joshi 2010). That is, a food justice perspective seeks a fair and just food system that considers all factors that affect food and nutrition from “seed to table” Our study provides evidence that racial discrimination is an important factor to consider for food justice.

Strengths and Limitations

Our analysis has several strengths and limitations that should be noted. First, our hypotheses were constructed on the notion that lifetime racial discrimination causes food insecurity rather than food security causing lifetime racial discrimination; however, we cannot establish the temporality of occurrences given the cross-sectional study design. For example, we do not know if a person experienced all or some of the lifetime racial discriminations events before or after experiencing food insecurity. In addition, we do not know if the relationship between food security and lifetime racial discrimination changes over time. Given this limitation, we find it likely based on theory and observed socioeconomic disparities (i.e., cumulative inequality theory and social stratification theory) that discrimination occurred and accumulated over time to cause decreased food security. Second, it is possible that we did not control for other relevant variables that are associated with food security status. For example, other work shows that the degree to which African-Americans identify with their racial identity mediates the association between racial discrimination and negative outcomes (Sellers and Shelton 2003; Sellers, Caldwell, Schmeelk-Cone, and Zimmerman 2003). Third, the results of this analysis are based on self-report measures and therefore could be subject to recall bias. The PEDQ-CV is meant to capture lifetime

racial discrimination; however, it is unclear how sensitive the measure is to actual discrimination events. Unfortunately, this is a limitation in the literature as a whole, as a gold-standard does not exist. We did find that the percent of African-Americans ever experiencing racial discrimination as similar to other studies (Broman 1996; Krieger and Sidney 1996). Finally, our results are based on a convenience sample of low SES households with reports of low and very low food security that might not be generalizable to other populations. A strength of our sample is that it contains a large number of caregivers and their children from food-insecure households with reports on many personal and household level variables related to nutrition and lifetime racial discrimination, which are rare sample-qualities in the literature.

Conclusion

Food insecurity continues to be a persistent public health problem and one of the most pressing nutrition-related issues facing the U.S. Although the health and well-being effects of food insecurity are well documented and considerable efforts have been made to eliminate food insecurity, rates continue to increase. Similarly, racial discrimination is a persistent public health problem, which affects the health and well-being of millions of individuals in the U.S. Current strategies to increase food security focus on increasing or supplementing a household's ability to obtain enough food. For example, federal nutrition programs such as SNAP increasing food security (Nord and Golla 2009); yet, not all households that participate in these programs increase their food security. Furthermore, some households choose not to participate in these programs for various reasons such as stigma, inadequate benefits, or bureaucratic barriers (Maryns and Vollinger 2008). Our analysis suggests that addressing racial discrimination could be another effective tool in increasing food security in the U.S.

Table 4.5 Descriptive Statistics of Food-Insecure African–American Caregivers in the Columbia, SC Area in 2012 ¹

Demographic	Low Food Secure N=49	Very Low Food Secure N=105	Low or Very Low Food Secure N=154
Mean (SD) or Percentage			
HFSS ² Score	5.26 (1.42)	12.37 (2.80)	10.11 (4.12)
PEDQ-CV Score ³	7.00 (8.26)	10.13 (11.34)	9.13 (10.53)
Total Monthly Income (\$)	1706 (1170)	1475 (1346)	1578(1294)
SNAP ⁴ Receipt in Past Year			
Yes	79.59	80.00	78.87
No	20.41	20.00	20.13
Primary Caregiver Age in Years	41.71 (11.46)	40.44 (10.13)	40.84 (10.55)
Primary Caregiver Education Level			
High School or GED or Less	46.94	48.81	44.81
Some College or Technical School	22.45	35.24	31.17
College, Technical, or Graduate School	30.61	20.95	24.03
Primary Caregiver Gender			
Female	89.80	95.24	93.51
Male	10.20	4.76	6.49
Second Caregiver in Household			
Yes	59.18	38.10*	44.81
No	40.82	61.90	55.19
Total Household Size			
Two-Three	26.53	30.48	29.22
Four	42.86	27.62	32.47
Five	14.29	22.86	20.13
Six or More	16.33	19.05	18.18
Mean Age of Children in the Household	10.74 (2.90)	11.15 (2.85)	11.02 (2.86)
Urbanicity			
Urban	69.39	77.14	74.86
Non-Urban	30.61	22.86	25.32

¹ Significance tests compared low to very low food-secure households using χ^2 or t-tests

² Household Food Security Survey

³ Perceived Ethnic Discrimination Questionnaire-Community Version

⁴ Supplemental Nutrition Assistance Program

* p<0.05

Table 4.6 Multiple Variable Logistic Regression Models Examining the Association Between Household Food Security Status and Lifetime Racial Discrimination (N=154)

	Model 1	Model 2	Model 3
	OR (95% CI)		
PEDQ-CV ¹	1.03 (0.99, 1.07)		1.04 (1.00, 1.09)*
Total Monthly Income (\$)		1.00 (0.96, 1.03)	1.00 (0.96, 1.03)
SNAP ² Receipt			
Yes		Ref	Ref
No		1.32 (0.48, 3.64)	1.49 (0.53, 4.21)
Primary Caregiver Age in Years		0.99 (0.95, 1.03)	0.98 (0.94, 1.02)
Primary Caregiver Gender			
Male		Ref	Ref
Female		1.68 (0.39, 7.15)	2.33 (0.51, 10.44)
Primary Caregiver Education Level			
High School or GED or Less		Ref	Ref
Some College or Technical School		2.00 (0.79, 5.03)	1.91 (0.75, 4.85)
College, Technical, or Graduate School		0.92 (0.35, 2.37)	0.76 (0.29, 2.01)
Second Caregiver in Household			
Yes		Ref	Ref
No		2.75 (1.16, 6.53)*	2.72 (1.12, 6.59)*
Total Household Size			
Two-Three		Ref	Ref
Four		0.75 (0.28, 1.96)	0.72 (0.27, 1.90)
Five		1.99 (0.58, 6.73)	2.09 (0.60, 7.29)
Six or More		2.19 (0.62, 7.72)	2.44 (0.68, 8.80)
Mean Age of Children in the Household		1.09 (0.94, 1.25)	1.08 (0.94, 1.25)
Urbanicity			
Urban		Ref	Ref
Non-Urban		0.61 (0.27, 1.40)	0.63 (0.27, 1.46)

¹ Perceived Ethnic Discrimination Questionnaire-Community Version

² Supplemental Nutrition Assistance Program

* p<0.05

Table 4.7 Multiple Variable Ordinary Least Squares Regression Models
Examining the Association Between Household Food Security Status and
Lifetime Racial Discrimination (N=154)

Effect	Model 1	Model 2	Model 3
	β (95% CI)		
PEDQ-CV ¹	0.06 (0.00, 0.12)*		0.08 (0.02, 0.15)**
Total Monthly Income (\$)		-0.02 (- 0.08, 0.03)	-0.02 (-0.08, 0.02)
SNAP Receipt in Past Year ²			
Yes		Ref	Ref
No		0.97 (-0.75, 2.70)	1.25 (-0.45, 2.96)
Primary Caregiver Age in Years		-0.04 (-0.10, 0.01)	-0.05 (-0.05, 0.01)
Primary Caregiver Education Level			
High School or GED or Less		Ref	Ref
Some College or Technical School		0.79 (-0.74, 2.32)	0.79 (-0.74, 2.33)
College, Technical, or Graduate School		-0.82 (-2.43, 0.79)	-1.11 (-2.70, 0.47)
Primary Caregiver Gender			
Male		Ref	Ref
Female		0.88 (-2.04, 3.81)	1.43 (- 1.24, 4.11)
Second Caregiver in Household			
Yes		Ref	Ref
No		1.19 (-0.37, 2.76)	1.10 (-0.40, 2.62)
Total Household Size			
Two-Three		Ref	Ref
Four		-0.53 (-2.27, 1.19)	-0.57 (-2.29, 1.14)
Five		0.73 (-1.19, 2.67)	0.80 (-1.11, 2.72)
Six or More		1.65 (-0.58, 3.89)	1.76 (-0.43, 3.95)
Mean Age of Children in the Household		0.14 (-0.10, 0.39)	0.13 (-0.11, 0.38)
Urbanicity			
Urban		Ref	Ref
Non-Urban		-0.96 (-2.53, 0.59)	-0.86 (-2.36, 0.63)

¹ Perceived Ethnic Discrimination Questionnaire-Community Version

² Supplemental Nutrition Assistance Program

* p<0.05

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CHAPTER 5

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

5.1 SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS SPANNING BOTH DISSERTATION PAPERS

Over the last two decades, interest and research into household food insecurity has increased dramatically. This has led to an increased understanding of both the prevalence of food insecurity and the toll it takes on health and well-being of adults and children. Indeed, now there are exact definitions of household food insecurity with distinctions based on severity (Coleman-Jensen, Nord, and Singh 2013) and prevalence estimates at national and state levels (Coleman-Jensen, Nord, and Singh 2013). In addition, much has been learned about the effects of food-insecurity on child health such as poor health status (Cook et al. 2004; Weinreb et al. 2002; Dunifon and Kowaleski-Jones 2003), behavior problems (Slack and Yoo 2013), frequent stomachaches and headaches (Alaimo, Olson, Frongillo, and Briefel 2001), and worse developmental outcomes (Jyoti, Frongillo, and Jones 2005) as well as the effects on adult health such as poor/fair health status (Stuff et al. 2004), reduced nutrient intake (Rose 1999), and overweight or obesity (Adams, Grummer-Strawn, and Chavez 2003; Townsend et al. 2001).

What is less clear are other specific contextual factors that occur at the same time as food insecurity that might be important in understanding how these negative associations occur. The work presented in this dissertation begins to answer that question. From our analysis, it is clear that certain aspects the social context of meals

are important for child dietary quality in food-insecure households and that increased reports of racial discrimination are associated with a greater odds of being very low food secure compared to low food secure. And thus, with research that “unpacks” the black box that leads to negative outcomes among food-insecure individuals, will we gain more insight into how to prevent and remedy the effects of household food insecurity.

5.2 SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS FOR PAPER 1: THE ASSOCIATION BETWEEN THE SOCIAL CONTEXT OF MEALS, CHILDREN’S DIETARY QUALITY, AND HOUSEHOLD FOOD INSECURITY

Mealtime has always been a cornerstone of family life in the U.S. This has led to researchers, especially nutritionists, to examine if aspects of mealtime lead to better dietary outcomes. Overall, the literature demonstrates that families that eat together more frequently without watching a television, consume fewer meals away from home, eat healthy foods together, and regard mealtime positively, have children with increased dietary quality. A critical assumption in all of these studies is that the household is food-secure—that is, they have enough food to live an active and healthy lifestyle free from worry about or experiencing food shortages.

Household food insecurity causes stress and disrupts normal household routines related to food (e.g., worrying about having enough food, reducing meal portions, skipping meals). We found that the social context of meals is indeed important to child dietary in food-insecure households, although, the results are not always as expected. For example, caregiver’s with higher scores on the authoritarian scale, had children with increased dietary quality and decreased added sugar intake. We found that children who watch television “always” compared to “never” during mealtime consumed less added sugar. Watching TV during mealtime was also associated, however, with reduced odds of consuming 100% fruit juice of whole fruit. Finally, we

found that the social atmosphere during mealtime was associated with child dietary quality with reports of a more positive environment associated with greater odds of consuming 100% fruit juice or whole fruit but increase odds of consuming added sugar. These results suggest that even with the stress and disruption of household food insecurity, mealtime practices, behaviors, and atmosphere are still associated with dietary quality in children.

The results of this study indicate that food-insecure households engage in many of the positive aspects related to the social context of meals that food-secure households do, but the protective effects on children's diet are not always seen. Our study also shows that the dietary quality of our sample of food-insecure children is severely lacking, even compared to other low-income children. Intervention and policy efforts that target improved dietary quality among children within food-insecure households should consider the social context of mealtime as a potential strategy to improve dietary quality.

5.3 SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS FOR PAPER 2: THE ASSOCIATION BETWEEN LIFETIME RACIAL DISCRIMINATION AND RISK OF VERY LOW HOUSEHOLD FOOD SECURITY

Racial discrimination against African-Americans has existed for hundred of years in the U.S., and only in recent history was it made completely illegal by the courts but also made a socially unacceptable in society in general. Although racial discrimination has been reduced, it still occurs, and affects the health and well being of many African-Americans. For example, African-Americans who experience racial discrimination are more likely to have hypertension (Krieger and Sidney 1996; Guyll, Matthews, and Bromberger 2001) poorer health status (Schulz et al. 2000), low infant birth weight (Collins et al. 2004), and distress (Brown et al. 1999).

We found that increased reports of racial discrimination are associated with in-

creased household food insecurity. For example, each lifetime racial discrimination event increased the odds of being very low food secure compared to low food secure by about 10%. Previous work has offered racial discrimination as a possible explanatory variable between disparities in food security and food access (Dutko, Ploeg, and Farrigan 2012; Zenk et al. 2005), but our results are the first to demonstrate a direct association between racial discrimination and food security. This is important for several reasons. First, studies that examine racial discrimination and nutrition are limited, even though numerous health and policy organizations seek to reduce chronic diseases, many of which are highest in racial minorities that are most likely to experience discrimination. Second, relatively little food security research has focused on environmental and social factors among the most vulnerable populations.

Health and Human Services have called for an end to food insecurity in the U.S. Our study shows that reducing and ultimately reducing racial discrimination will increase food security among African-Americans (Healthy People 2020 2010). Food insecurity continues to be a persistent public health problem and one of the most pressing nutrition-related issues facing the U.S. Although the health and wellbeing effects of food insecurity are well documented and considerable efforts have been made to eliminate food insecurity, rates continue to increase. Similarly, racial discrimination is a persistent public health problem, which affects the health and wellbeing of millions of individuals in the U.S. Current strategies to increase food security focus on increasing or supplementing a household's ability to obtain enough food. For example, federal nutrition programs such as SNAP increasing food security (Nord and Golla 2009); yet, not all households that participate in these programs increase their food security. Furthermore, some households choose not to participate in these programs for various reasons such as stigma, inadequate benefits, or bureaucratic barriers (Maryns & Vollinger, 2008). Our analysis suggests that addressing racial discrimination could be another effective tool in increasing food security in the U.S. (Adams,

Grummer-Strawn, and Chavez 2003) test Andrews, Nord, Bickel, and Carlson 2000

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