Racial and Ethnic Disparities in the Relationship between Parental Incarceration and Childhood Obesity

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Abstract

Childhood obesity and parental incarceration are comparable phenomena in the contemporary United States. One similarity between these two issues is their high prevalence in recent decades. The other common thread is that childhood obesity and parental incarceration both exist disproportionately among racial and ethnic minorities. This research project aims to explore the relationship between parental incarceration and childhood obesity, focusing on whether or not this association differs by various racial or ethnic populations. Analyzing panel data from the Fragile Families and Child Wellbeing Study, I find that parental lifetime incarceration is correlated with a decreased risk of childhood obesity for non-Hispanic Black children, while it is the opposite for similar non-Hispanic White children. Moreover, the impacts of parental incarceration on childhood obesity are not significantly different when comparing non-Hispanic White and Hispanic children. I discuss these results through the lens of the stress process model, in terms of stress exposure and coping resources. This research endeavor aims to fill an important knowledge gap in the literature, and serve as the basis to initiate an interdisciplinary conversation on the intersection of family, health and corrections in academia as well as policy.

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Table of Contents

Abstract ii
Vita iii
List of Tables v
List of Figures vi
Introduction 1
Literature Review 3
Data and Methods 16
Results 23
Discussion 35
Appendix: Tables and Figures 46
References 52

List of Tables

Table 1. Descriptive statistics for Fragile Families respondents by child race and ethnicity, Years 3, 5 and 9. 46
Table 2. Results from multilevel mixed-effects logistic analyses predicting the differences in the relationship between parental lifetime incarceration and childhood obesity by race or ethnicity, Fragile Families, Years 3, 5, 9..... 48
Table 3. Results from multilevel mixed-effects logistic analyses predicting the differences in the relationship between parental current incarceration and childhood obesity by race or ethnicity, Fragile Families, Years 3, 5, 9..... 49
Table 4. Results from multilevel mixed-effects logistic analyses predicting the differences in the relationship between parental lifetime incarceration and childhood BMI score by race or ethnicity, Fragile Families, Years 3, 5, 9. ……...50
Table 5. Results from multilevel mixed-effects logistic analyses predicting the differences in the relationship between parental current incarceration and childhood BMI score by race or ethnicity, Fragile Families, Years 3, 5, 9. ……...51

List of Figures

Figure 1. Growth curves for childhood obesity by child age in months and child race or ethnicity, Fragile Families, Years 3, 5 and 9. ……...47

Introduction

As childhood obesity places millions of children under severe health risks at present, racial and ethnic variations in the prevalence of childhood obesity are pronounced (U.S. Department of Health and Human Services 2010a; Center for Disease Control and Prevention 2009; Ogden et al. 2015). Children of racial and ethnic minority groups are obese at disproportionate rates (Melius 2013; Kimbro and Denney 2013). Similarly, as incarceration in the United States rises at substantial rates since the 1970s, numerous children of incarcerated parents are subject to serious disadvantages in current society (Glaze and Kaeble 2014; Mumola 2000). Parental incarceration also affects racial and ethnic minorities disproportionately (Glaze and Maruschak 2008; Shaw 2016). Preliminary evidence indicates that children of imprisoned parents have a much higher probability of developing childhood obesity, but scant research has examined whether this relationship varies across racial or ethnic populations (Roettger and Boardman 2011; Turney 2014a). In this research project, I critically evaluate the association between childhood obesity and parental incarceration by investigating if this correlation significantly differs by child's race or ethnicity.

In order to explore the extent to which children of various racial and ethnic groups experience differential effects of parental incarceration on childhood obesity, I use nationally representative data from three consecutive waves of the Fragile Families

and Child Wellbeing Study. I apply two measures of parental incarceration. Parental lifetime incarceration is an indicator of whether or not a parent has ever spent time behind bars during lifetime. Parental current incarceration, on the other hands, demonstrates if a parent is locked up in a correctional facility at the time of investigation. A series of multilevel regression analyses reveal a significant difference between non-Hispanic White and non-Hispanic Black children. Specifically, parental lifetime incarceration is associated with an increased possibility of obesity for non-Hispanic White children, but a decreased chance of obesity for their non-Hispanic Black counterparts. However, such a disparity is not evident when investigating parental current incarceration. Furthermore, I find no variation between non-Hispanic Black and Hispanic children for either measure of parental incarceration. Finally, I refer to the stress process model to interpret the possible implications of these findings by discussing stress exposure and coping mechanisms.

In addition to filling an important knowledge gap in the academic literature on the impacts of parental incarceration on child physical health, this research project is relevant to a number of subdisciplines too, including public health, family demography and criminal justice. Therefore, the observations presented here may inform valuable interdisciplinary conversations and motivate collaborative academic as well as policy efforts to benefit the marginalized members in contemporary U.S. society.

Literature Review

Childhood Obesity: Childhood obesity is considered an important public health issue in the United States (U.S. Department of Health and Human Services 2000a; U.S. Department of Health and Human Services 2000b). Since the 1970s, the rates of childhood obesity have more than tripled, so much so that 17% of individuals aged two to nineteen years are categorized as obese these days (Fryar, Carroll, and Ogden 2014; Ogden et al. 2015). Not only does childhood obesity influence a wide range of early life outcomes, it also contributes to a number of major health problems in adulthood, including an increased risk of several cancers, hypertension, diabetes and other cardiovascular diseases as well as coronary heart diseases (Nader et al. 2006; Reilly and Kelly 2013; Reilly et al. 2003; Roettger and Boardman 2011; Biro and Wien 2010). Further, childhood obesity has excessive emotional and economic costs (Marder and Chang 2006; Strauss 2000). At the individual level, obesity is a source of perpetual stigma that is associated with interpersonal as well as institutional discrimination and subsequent self-denial (Allon 1981; Carr and Friedman 2005; Seidell 1998). On the other hand, the U.S. society at large is estimated to pay an additional $19,000 of lifetime medical costs to every one of the millions of obese children compared to their counterparts of normal weight (Finkelstein, Graham, and Malhotra 2014; Ogden et al. 2015). Thus, given these various serious consequences, the intervention of childhood

obesity has become a pressing national priority (Melius 2013; Koplan, Liverman, and Kraak 2005).

While obesity is prevalent for children in the United States in general, remarkable variations exist across race or ethnicity (Kimbro and Denney 2013; Melius 2013). Compared to non-Hispanic White children, Hispanic children experience much higher rates of obesity across the early life course (Whitaker and Orzol 2006; Kimbro, Brooks-Gunn, and McLanahan 2007). Indicative of much of the literature concerning racial and ethnic disparities in childhood obesity, Ogden at al. (2014) find that 22.4% Hispanic children are obese in contrast to 14.1% for similar non-Hispanic White children. Similarly, non-Hispanic Black children have higher levels of obesity than their non-Hispanic White counterparts (Rendall et al. 2012; Wang, Gortmaker, and Taveras 2011). For example, the 2003-2006 National Health and Nutrition Examination Survey reveals that the prevalence of obesity for non-Hispanic Black children between two to five years old is 14.9%, compared to 10.7% for their non-Hispanic White peers (Ogden, Carroll, and Flegal 2008). Obesity is particularly problematic for non-Hispanic Black adolescent girls (Winkler, Bennett, and Brandon 2017; Huh et al. 2012; Ogden et al. 2010). For teenage girls aged twelve to nineteen years, the percentage of obesity is 27.7% for non-Hispanic Black girls, in contrast to 18.5% and 14.5% for similarly aged non-Hispanic Black boys and non-Hispanic White girls respectively (Ogden, Carroll, and Flegal 2008).

Scholars have posited a diverse set of hypotheses to explain the disproportionate prevalence of childhood obesity across race or ethnicity in the United States (Yancey

and Kumanyika 2007; Melius 2013; Kimbro, Brooks-Gunn, and McLanahan 2007). One speculation is that differences within socioeconomic status exacerbate this phenomenon (Melius 2013; Fradkin et al. 2015). Specifically, since individuals with lower income are concentrated among racial and ethnic minorities, large percentages of non-Hispanic Black and Hispanic children live in disadvantaged neighborhoods with high rates of violence and crime and restricted access to healthy food and safe recreational spaces (Harrison and Bennett 1995; Williams, Takeuchi, and Adair 1992; Child Trends DataBank 2016; Flores 2008; Odoms-Young, Zenk, and Mason 2009). Because calorie intake and physical exercise regulate energy balance, the high consumption of calories and low physical recreation in those communities may promote higher rates of childhood obesity (Loureiro and Nayga 2005; Cutler, Glaeser, and Shapiro 2003). Other popular explanations for the racial or ethnic differentials in childhood obesity include disparate cultural perceptions of healthy weight, varying cooking and feeding practices, and differing genetic predispositions to obesity (Ariza et al. 2004; Crawford et al. 2004; Melius 2013; Flores 2008; Kumanyika et al. 2007; Ong 2006; Oken and Gillman 2003). Despite these divergent potential mechanisms, they account for only a limited proportion of the non-Hispanic Black versus non-Hispanic White as well as the Hispanic versus non-Hispanic White gaps in this key indicator of childhood health and wellbeing (Kimbro and Denney 2013; Singh et al. 2008; Pearce et al. 2016; Peracchi and Arcaleni 2011). Thus, much about how and why rates of childhood obesity vary so much across different racial or ethnic populations remains unknown.

The Social Patterning of Incarceration: The United States has experienced a

substantial increase in incarceration in the past four decades (Glaze and Kaeble 2014). Confining more than 2.8 million individuals in prison, the United States has the highest incarceration rate in the world (Glaze 2010; Wakefield and Uggen 2010). Researchers have argued that current and prior inmates constitute a new "criminal class" who are subject to legalized discrimination in a wide variety of public and private realms including education, employment, housing, voting, public benefits, and health (Uggen, Manza, and Thompson 2006; Alexander 2012).

Despite the high prevalence of incarceration throughout the United States, its impacts significantly differ across race or ethnicity, such that non-Hispanic Blacks and Hispanics are overrepresented in the correctional system (Uggen, Manza, and Thompson 2006; Mauer and King 2007a; Harris et al. 2009). Even though individuals who are non-Hispanic Black and Hispanic only account for one-third of the total national population, two-thirds of all the imprisoned individuals are members of these groups (Harrison and Beck 2006; Sakala 2014; Mauer and King 2007b). Compared to non-Hispanic White men, non-Hispanic Black men are six to eight times more likely to serve time behind bars (Western 2006). As for Hispanics, Mauer and King (2007b) note that the probability of lifetime incarceration for this ethnic subpopulation more than doubles that for similar non-Hispanic Whites. The differentials in incarceration by education are equivalently conspicuous. Non-Hispanic Black high school dropouts are more than nine times as likely to end up in correctional facilities as their college-educated counterparts. Similarly, among Hispanics between the ages of 20 to 34 years old, the rate of incarceration is twice as large for individuals without high school diploma or

comparable degrees (The Pew Charitable Trust 2010).

Since more than half of all prisoners are parents, children who are exposed to parental incarceration compose a particularly large and vulnerable population (Mumola 2000; The Pew Charitable Trust 2010). In contrast to one in every 125 children 25 years ago, one in every 28 children have an incarcerated parent at present, constituting a total of 2.7 million children. Most of these children have a father, instead of a mother, behind bars (The Pew Charitable Trust 2010). Approximately half of them are under 10 years of age (Schirmer, Nellis, and Mauer 2009). Scholars have recognized that parental incarceration can be correlated with a host of negative outcomes for children, including educational obstacles, delinquent actions, behavioral problems, deteriorated mental health as well as long-term challenges later in life (Hagan and Foster 2012; Roettger and Swisher 2011; Geller et al. 2012; Wakefield and Wildeman 2011; Wildeman 2010; Murray and Farrington 2008; Lee, Fang, and Luo 2012; Turney and Wildeman 2013).

Since incarceration concentrates disproportionately in disadvantaged racial, ethnic and socioeconomic populations, children in those contexts are under exceeding risk of experiencing parental incarceration as well as its subsequent consequences (Glaze and Maruschak 2008; Geller et al. 2009; Wakefield and Wildeman 2011). In 2007, children of color comprised more than 70% of all the children with incarcerated parents, most of whom were non-Hispanic Blacks and Hispanics (Schirmer, Nellis, and Mauer 2009; Federal Bureau of Prisons 2017a; Federal Bureau of Prisons 2017b). The ratio of exposure to parental incarceration is 1.8% for non-Hispanic White children, in contrast to 3.5% and 11.4% for respectively Hispanic and non-Hispanic Black children (The Pew

Charitable Trust 2010). Furthermore, parental education is another major predicator of parental incarceration, such that more than 50% of non-Hispanic Black children whose parents do not finish high school face parental incarceration (Wakefield and Wildeman 2011). However, if non-Hispanic Black parents have high school diploma or even college degree, the percentage of parental incarceration decreases to respectively 30% and 13% (Wildeman 2009).

While one's race or ethnicity independently predicts contact with the criminal justice system, scholars have come to realize that the association between race or ethnicity and risk of incarceration varies significantly by socioeconomic status. The likelihood of spending time in correctional facilities is the highest for non-Hispanic Blacks with limited educational attainment (Wakefield and Uggen 2010). The percentage of non-Hispanic Black, male, high school dropouts who have spent time in prison by early thirties is nearly 60%, while the rate for their non-Hispanic White counterparts who have some college education is merely 0.7% (Pettit and Western 2004). Consistent with predicting incarceration, a multiplicative effect exists between parental race or ethnicity and socioeconomic status for estimating risk of parental incarceration. The correlation between socioeconomic status and chance of exposure to parental incarceration is the most pronounced among non-Hispanic Blacks, followed by Hispanics, and finally non-Hispanic Whites. For instance, more than half of non-Hispanic Black children whose parents are high school dropouts have experienced parental incarceration by the age of 14 years. This is compared to only 3.4% and 1.7% for similar non-Hispanic Black and non-Hispanic White children whose parents have

some level of college education (Wildeman 2009).

In terms of spatial concentration, because the imprisoned parents usually come from poor, urban, minority neighborhoods, young people growing up in such communities face a significantly increased risk of parental incarceration at some point during their childhoods (Clear et al. 2003; Clear 2009; Geller et al. 2009). Although there is a possibility that the effects of concentrated neighborhood poverty on the likelihood of incarceration are endogenous, researchers have empirically demonstrated that the majority of children with parents behind bars reside in high-poverty areas not only during and after parental incarceration, but also before (Schaefer 2008; National Resource Center on Child and Families of the Incarcerated 2014; Rabuy and Kopf 2015; Johnston 1995).

Linking Stress of Parental Incarceration and Childhood Health: The stress process model provides a useful framework to conceptualize how and why parental incarceration may lead to long-lasting and damaging health consequences for children, including an elevated risk of obesity. Essentially, this theoretical approach describes the complex mechanisms by which psychosocial stress erodes an individual's health over time as an interaction of stress exposure and coping resources (Pearlin et al. 1981). Parental incarceration can be an extremely stressful experience because it can simultaneously increase exposure to stress while decrease available coping mechanisms, for parents and children alike (Wildeman and Western 2010; Johnson and Easterling 2015). As incarceration removes parents from families, children could be subjected to deteriorated parental health, elevated levels of parental neglect, strained familial ties and

destabilized family finances (Wildeman and Muller 2012; Turney 2014b; Turney and Wildeman 2013; Schwartz-Soicher, Geller, and Garfinkel 2011). Those undesirable transformations could all be sustained stressors that can gradually impair a child's health and wellbeing (Turney 2014a).

Apart from an increase in stress exposure, children of incarcerated parents may not be able to depend on as many or as effective coping resources as their peers whose parents are not behind bars (Bocknek, Sanderson, and Britner 2009). For example, due to the stigma and grief associated with parental incarceration, children who have incarcerated parents may experience social marginalization at school and within other important social domains (Dallaire, Ciccone, and Wilson 2010; Wildeman 2014; Lee, Porter, and Comfort 2014). Furthermore, they may use avoidance of others and emotional detachment as inappropriate coping strategies to deal with the stress of having a parent with whom their physical and emotional contact is severely restricted (Bocknek, Sanderson, and Britner 2009). Moreover, children in this adverse situation may not develop proper perceptive and coping skills to make sense of the loss of an incarcerated parent. Many of those children live in complicated homes in which parental substance abuse, poverty, child abuse, residential instability and parental conflicts prohibit not only the promotion of useful coping mechanisms, but also the availability of supportive caregivers who are adequately responsive to those children's emotional needs (Eddy and Poehlmann 2010; Bocknek et al. 2009). Furthermore, prior research has noted that traumatic parental bereavement, such as parental incarceration, often lead to a decline in familial communication that is integral to the grieving process (Dowdney 2000;

Bocknek, Sanderson, and Britner 2009). The few exceptions exist for children who rely on large kinship networks to provide resiliency and support (Bocknek, Sanderson, and Britner 2009). In summary, the concurrent rise in stressors as well as the reduction in coping resources can eventually result in negative health consequences for children of incarcerated parents.

This conceptual framework also suggests that stress can give rise to or exacerbate poor health through proliferation across generations (Thoits 2010; Pearlin et al. 2005). Specifically, stress experienced by one member of the family may have powerful reverberating effects on other family members, both within and across generations (Turney 2014a; Avison 2010). Thus, parental incarceration can be a source of stress proliferation between parents and their children (Pearlin 1989; Pearlin, Aneshensel, and Leblanc 1997). While the existing literature has established that life inside prison induces tremendous stress for inmates, new research increasingly demonstrates that secondary contact with incarceration also results in elevated levels of emotional strain for the significant others of prisoners (Sykes 2007; Comfort 2007). Since incarceration is stressful for both parents, children are indirectly exposed to all the additional parental stress, for instance, marital dissolution, persistent poverty and single parenting (Thoits 2010). Therefore, it is important to consider the clustering and contagion inherent in the proliferation of stress among children whose parents are behind bars and how this process is likely to negatively affect their health and wellbeing in the long run (Turney 2014a).

Finally, while parental incarceration leads to an immense amount of upheaval

and disruption for children when the incarcerated parents are imprisoned, reintegration back into family life after release can be stressful as well (Davies and Cook 1999). Most prisoners return to the same families and communities where they live before serving their sentences (Travis 2000). Prior research has shown that former inmates usually face pressure from economic, occupational, residential, marital and social uncertainties (Turney 2014a; Frye and Dawe 2008). Further, the reentering parents may feel a sense of confusion, displacement, inadequacy, fear, and rejection while attempting to reestablish bonds with their children and resuming the parental role (Beckerman 1989; Frye and Dawe 2008). Previous prisoners tend to experience a decline in family interaction and support compared to before incarceration (Mowen and Visher 2016). Moreover, as most inmates return to their disadvantaged home communities, there is often no help or services available to them to address the same difficult conditions that result in their commitment to crime in the first place (Travis 2000; Morash, Bynum, and Koons 1998; Prendergast, Wellish, and Falkin 1995). As a consequence, all these stressors may directly exposure children to additional stress as well as indirectly pass on the stress from the returning parents to children. Therefore, the stress associated with parental incarceration continues even when the incarcerated parents return home after serving their sentences.

Obesity can be one of the adverse health ramifications of stress (Bose, Olivan, and Laferrère 2009; Scott, Melhorn, and Sakai 2012). Eating may serve as an ineffective coping strategy for alleviating stress and managing negative emotions (National Institute of Health 2000; Solomon 2001; Timmerman and Acton 2001). Emotional eating as a

response to stress is believed to promote long-term weight accumulation (Geliebter and Aversa 2003; Crowther et al. 2001; Lavery and Lowey 1993; Waters, Hill, and Waller 2001). Further, a direct physiological association between stress and obesity exists for children (Gundersen et al. 2008; Lohman et al. 2009). Biologically, family stress can elevate the levels of cortisol in children, a necessary element for developing concentration of body fat and predisposition for metabolic disorders. Both developments pave the way for childhood obesity (Björntorp 2001; Booth, Carver, and Granger 2000; Dimitriou, Maser-Gluth, and Remer 2003). In addition, human science specialists indicate that stress leads to a higher preference for dense, hedonic foods high in sugar. This tendency may result in excessive energy absorption and the subsequent gradual development of obesity (Torres, Diet, and Nowson 2007; Loureiro and Nayga 2005). Consequently, since children who have incarcerated parents may cope with the stress of parental incarceration by maladaptive eating behaviors, this strain can eventually induce childhood obesity.

Contributions of the Current Study: An expanding, interdisciplinary body of literature investigates the influence of parental incarceration on childhood and adolescent health (Lee, Fang, and Luo 2013; Turney 2014a; Roettger and Boardman 2011). While most studies find that parental incarceration is associated with a wide variety of negative consequences for children and teenagers, scholars have not reached a decisive consensus about whether or not the exposure to parental incarceration is exclusively positive or negative for children (Turney and Wildeman 2013; Wakefield and Wildeman 2011; Wildeman 2010; Hagan and Foster 2012; Geller et al. 2012).

Qualitative research, especially, demonstrates that the secondary experience of incarceration is complex and countervailing (Turney and Wildeman 2013; Giordano 2010; Comfort 2008). In other words, incarceration is usually an ambivalent journey in which one enjoys the temporary comfort away from a destructive family member while suffering from the lasting aftermath of a damaged family life (Turney and Wildeman 2013; Braman 2004).

The impacts of parental incarceration on childhood obesity remain particularly unexplored (Lee, Fang, and Luo 2013). While a limited number of studies provide preliminary evidence that children with a mother or father in prison are more likely to be obese, very few research efforts explore the role of race or ethnicity in this relationship (Roettger and Boardman 2011; Turney 2014a; Lee, Fang, and Luo 2013). Moreover, to my knowledge, no other study particularly asks if the effects of parental incarceration on childhood obesity significantly differ across race or ethnicity. Specifically, I will test the following research hypotheses:

H_1: There is a significant association between parental incarceration and obesity for children aged three to nine years.

H_2: The association between parental incarceration and obesity for children aged three to nine years is significantly different for non-Hispanic Black children compared to non-Hispanic White children.

H_3: The association between parental incarceration and obesity for children aged three to nine years is significantly different for Hispanic children compared to non-Hispanic White children

Apart from adding new knowledge to this topic, this research project makes wider contributions outside of the academia as it speaks directly to numerous macroscopic social issues in the contemporary United States. The difficult experiences of parental incarceration as well as childhood obesity are an everyday reality for numerous disadvantaged Americans of racial and ethnic minorities (Melius 2013; Kimbro and Denney 2013; Glaze and Maruschak 2008; Shaw 2016; Glaze and Kaeble 2014; Ogden et al. 2015). The findings of this research project may shed some light on the complex pathways in which inequality transmits from parents to children. In addition, since this research endeavor is simultaneously relevant to the institutions of corrections, family and health, the results may advance a valuable interdisciplinary conversation that brings policy researchers, administrators and enforcers of different specializations together to make necessary changes to help the disadvantaged populations.

Data and Methods

Description of Data: To test the above research hypotheses, I use nationally representative data from three consecutive waves of the Fragile Families and Child Wellbeing Study (abbreviated as Fragile Families). This panel study collected child- and family-specific data at four time periods – the focal child's birth (between 1998 and 2000) as well as the ages of one, three, five and nine years on a total of 4,898 children. The Fragile Families oversampled children from disadvantaged families, thus it provides data on a large number of children whose parents are not married, minority, and poor (Reichman et al. 2001). Therefore, this study is one of the best sources of secondary data with which to study the effects of parental incarceration on children's health and wellbeing (Western, Lopoo, and McLanahan 2004; Wildeman 2010).

The study first obtained a stratified random sample of large American cities and then randomly selected hospitals within each city. Next, investigators took random samples of births from both married and unmarried couples, according to the ratio of births out of wedlock for that certain hospital in that specific city back then (Reichman et al. 2001). In-person interviews were conducted with both mothers and fathers immediately following the focal child's birth with subsequent follow-up interviews through telephone calls when the child reached one, three and five years of age. In addition, approximately half of the original sample, 2,489 children and their families,

participated in in-home assessments during years three and five (Bendheim-Thoman Center for Research on Child Wellbeing 2008). At year nine, all of the focal children were interviewed without their parents present for the first time since the study began (Bendheim-Thoman Center for Research on Child Wellbeing 2011). It was during those in-person assessments in years three, five and nine that data regarding child's height and weight were collected.

The Fragile Families data offer numerous advantages for exploring the racial and ethnic disparities in the relationship between parental incarceration and childhood obesity, net of other important factors. First, due to the overrepresentation of disadvantaged populations among those who experience parental incarceration and childhood obesity, this dataset is able to capture a sizeable sample of children who are at the highest risk of being exposed to either condition (Reichman et al. 2001; Schmeer 2012; Melius 2013; Kimbro and Denney 2013; Glaze and Maruschak 2008; Shaw 2016). Second, because the Fragile Families study offers ample longitudinal information on parents as well as their children, the data are ideal for investigating the hypothesized association of interest, which occurs across generations (Huebner and Gustafson 2007). Third, the Fragile Families study conducted successive interviews across the entirety of early childhood – beginning at birth and continuing until nine years of age. This is a critical stage of growth and development that sets the stage for future physical, social, and emotional wellbeing, including BMI trajectories across the life course (Schmeer 2012; Reilly and Kelly 2011; Brisbois, Farmer, and McCargar 2012; Singh et al. 2008). Fourth, family context is a crucial determinant of child BMI score for children in this

age range given their high dependency on parental practices of cooking and feeding. Such parental influence may establish lifelong eating behaviors (Schmeer 2012; Burke et al. 2001; Patrick and Nicklas 2005). Finally, as opposed to other surveys used for family research, Fragile Families data are particularly relevant to my research question since investigators asked abundant questions about both maternal and paternal incarceration (Turney 2014a).

Explanation of Measures: In the current study, the dependent variable is a dichotomous indicator of childhood obesity constructed using body mass index (BMI) scores. BMI is calculated by taking weight in kilograms and diving it by height in meters squared (Center for Disease Control and Prevention 2016). Despite some clinical restrictions, BMI is widely endorsed as a valid and reliable indicator of childhood obesity if used in conjunction with age- and sex-specific distributions (Center for Disease Control and Prevention 2000a; Center for Disease Control and Prevention 2000b). The Center for Disease Control (abbreviated as CDC) defines obesity as scoring above the 95th percentile of one's age- and sex-specific BMI distribution (Center for Disease Control and Prevention 2016). Consistent with much of the existing literature on childhood obesity, I adhere to this widely accepted definition of obesity in the current study (Schmeer 2012; Kimbro, Brooks-Gunn, and McLanahan 2007; Lee, Fang, and Luo 2013; Whitaker and Orzol 2006).

In the Fragile Families study, a trained interviewer collected data on height and weight during home visits conducted at years three, five and nine using the official CDC protocols (Kimbro, Brooks-Gunn, and McLanahan 2007). Children were instructed to

stand on an electronic scale and against a portable stadiometer with light clothing during those assessments (Whitaker et al. 2007). If the focal child's BMI fell within the top 5% of all U.S. children of the same age and sex, he or she was considered obese (Center for Disease Control and Prevention 2016). This variable was coded dichotomously (0 = not obese; 1 = obese).

The independent variable of interest is parental incarceration, which for the current study includes both jail and prison confinement. I utilize two distinct measures of parental incarceration to capture differences in exposure over time. The first, lifetime incarceration, indicates whether or not the focal child has ever had at least one parent confined in a correctional facility before. The second measure, current incarceration, captures whether or not the focal child has at least one parent who was spending time behind bars at the time of interview. Both measures are coded as dichotomous variables; with 0 indicating neither parent was or is incarcerated and 1 indicating that at least one parent was or is incarcerated. I design the above two measures to assess if the hypothesized correlation differs by the timing of parental incarceration and whether the impacts are lasting or temporary (Wildeman 2010). Since the Fragile Families study asked both parents about experiences of imprisonment, I am able to generate incarceration measures not only using the self-reports of the parent in prison but also using the survey answers provided by the other, non-incarcerated parent. As previous and current prisoners are typically reserved about sharing information on previous incarceration and difficult to locate through sampling by household, the additional confirmation from the other parent reduces reporting bias and minimizes the

undercounting of incarcerated individuals (Western, Lopoo, and McLanahan 2003; Babinski, Hartsough, and Lambert 2001; Hagan and McCarthy 1997; Nagin, Farrington, and Moffitt 1995). I consider a parent to be incarcerated if he or she self-reports this experience or if the other parent indicates its occurrence.

Another key independent variable in this study is race or ethnicity. In the Fragile Families study, each mother and father (if present) was asked to report his or her race as well as ethnic identity. Thus, my indicator of race or ethnicity refers to parental self-report rather than child's self-report or interviewer-assessed race or ethnicity. The mother's race or ethnicity is presented in four categories that are mutually exclusive, which are non-Hispanic White, non-Hispanic Black, Hispanic and all other racial or ethnic groups. For the purpose of this study, I rely on mother's race exclusively as a proxy for child's race based on the following mutually exclusive categories: non-Hispanic Whites, non-Hispanic Blacks, and Hispanics. I exclude all other respondents who identified as another racial or ethnic group due to small sample sizes (Suglia et al. 2012; Whitaker and Orzol 2006).

In addition to the key variables detailed above, I control for a number of potential confounders in all multivariate regression models including the focal child's gender (male or female) and age (in months), parental marital status (married, cohabitating, single or living with non-parents), maternal and paternal education (some high school, high school, some college or college and graduate school), employment status (employed, unemployed or out of the labor force), household poverty level (under poverty or not), child health insurance coverage (only private, only public, both private

and public or none), and maternal BMI score (Roettger and Boardman 2011; Lee, Fang, and Luo 2013; Turney and Wildeman 2015; Turney 2014a).

Analytical Approach: To construct an analytic sample, I first remove respondents who did not have valid responses for BMI or parental incarceration in any given wave. As previously mentioned, I also limit participants to those whose mothers identified as non-Hispanic White, non-Hispanic Black, or Hispanic. I eventually obtain a final sample of 3,677 children born between 1998 and 2000 and followed over time until their ninth year.

I rely on a series of multilevel logistic regression models with random intercepts to empirically assess the association between parental incarceration and risk of childhood obesity over time. Because I have multiple measures for each child, I cannot assume independence of error terms due to clustering in the data. The multilevel regression approach allows me to take this into consideration by introducing a random intercept term that captures the variation in initial weight status across individual children. Below is a basic equation of the models with random intercepts.

$$logit\left[\Pr\left(y_{ij}=1\right)\right]=\left(\beta_1+\xi_j\right)+\beta_2 x_{2j}+\beta_3 x_{3ij}+\cdots+\beta_n x_{nij}+\beta_{n+1} x_{2j} x_{3ij}$$

The notation i is an indicator of time and j symbolizes each child in the analytic sample. The intercept β_1 captures the average starting weight status at year three among all the participants, while ξ_j creates an individual-specific random error. The first predictor x_{2j} indicates child race or ethnicity and the second one x_{3ij} demonstrates exposure to parental incarceration. The x_{nij} represents additional covariates in my analyses, such as child gender, parental socioeconomic indicators and maternal BMI

score. Finally, the term $x_{2j}x_{3ij}$ illustrates the interaction between child race or ethnicity and a measure of parental incarceration (either lifetime or current).

I calculate robust standard errors using the Huber-White correction method and cluster them at the highest level of aggregation, namely the child. Identical regression analyses are conducted for both parental incarceration measures (lifetime and current) when using continuous child BMI score as the alternative outcome variable.

Results

Descriptive Results: Table 1 presents the descriptive statistics for all the relevant variables in this research project. In this longitudinal sample of 3,677 children and 11,031 cases, 21.07% observations from 1,150 individuals were obese during at least one of the three waves of this study. As for parental incarceration, 66.44% children (1,954 respondents) have at least one parent who has been imprisoned during lifetime. Moreover, 10.09% cases (884 observations from 553 children) had at least one parent who was currently incarcerated at the time of investigation. Given that the Fragile Families data represent a substantial proportion of disadvantaged individuals, 20.72% of children are non-Hispanic White, 51.81% are non-Hispanic Black and 27.47% are Hispanic (Reichman et al. 2001).

The prevalence of childhood obesity and the exposure to parental incarceration differ by child race or ethnicity. Specifically, while 21.07% observations are obese in this analytic Fragile Families sample, the ratios are respectively 15.25%, 20.15% and 27.59% for non-Hispanic White, non-Hispanic Black and Hispanic children. In terms of parental incarceration, 75.37% non-Hispanic Black children have parents who have ever spent time behind bars during their lifetime, in contrast to 62.83% and 48.67% for comparable Hispanic and non-Hispanic White participants. Furthermore, the percentage of parental current incarceration is the highest for non-Hispanic Black individuals at

14.57%, in contrast to 6.21% and 4.55% for their Hispanic and non-Hispanic White counterparts.

Figure 1 demonstrates the growth curves for childhood obesity by child race or ethnicity as well as child age in months. According to the growth curves, Hispanic children have the highest probability of obesity at any point during this time period, followed by non-Hispanic Black participants, while non-Hispanic White respondents have the lowest chance of obesity. Furthermore, non-Hispanic White children have the least steep slope. The slope for non-Hispanic Black children is slightly steeper than that for Hispanic participants and therefore is the steepest of all three groups. Finally, for both non-Hispanic White and Hispanic individuals, risks of obesity first decrease marginally somewhere between 40 to 60 months of age and then rise continuously till nine years of age. However, the rate of obesity increases uniformly from one wave to the next consistently for the non-Hispanic Black subpopulation.

In addition to the above key variables, control variables include child gender and age, parental marital status, child health insurance, maternal BMI score as well as a number of predictors of familial socioeconomic contexts. Variations exist across racial and ethnic groups for control variables too. For example, in this entire analytic sample, 33.53% of cases are married, 29.17% cohabitating, 36.36% single and 0.95% living with non-parents. The most common living arrangement for non-Hispanic White and Hispanic children is with parents who are married, at rates of respectively 58.46% and 38.89%, compared to 20.68% for non-Hispanic Black respondents. Non-Hispanic Black participants, however, have the highest proportion (47.21%) of residing with single

parents. Moreover, with respect to paternal education, the most frequent response category is “some college” for non-Hispanic White parents (34.12%), “high school” for non-Hispanic Black parents (38.35%) and “less than high school” for Hispanic parents (42.75%). As for paternal employment, the ratios of unemployment for non-Hispanic Black (18.80%) and Hispanic (9.73%) children are respectively twice and three times as high as that of similar non-Hispanic White respondents (6.96%). Additionally, the average maternal BMI score is the highest for non-Hispanic Black mothers (31.35) and the lowest for equivalent non-Hispanic White mothers (28.26).

Regression Results: In predicting the relationship between parental lifetime incarceration and childhood obesity, multilevel logistic regression analyses indicate a significant disparity between non-Hispanic Black and non-Hispanic White children. In particular, having a parent who has been imprisoned during lifetime is associated with a declined chance of childhood obesity for non-Hispanic Black respondents, while it is the opposite for similar non-Hispanic White participants. This difference is evident when the exposure is restricted to lifetime as opposed to current parental incarceration. I, do not, however, find any evidence that either type of parental incarceration (lifetime or current) differentially impacts the likelihood of obesity for Hispanic versus non-Hispanic White individuals.

In order to fully delineate the correlation between parental incarceration and childhood obesity, I perform a number of logistic regression models that sequentially incorporate additional covariates to eliminate the effects of potential confounders. The results are presented in Tables 2 and 3. In all the models, parental incarceration is the

predictor of interest and childhood obesity is the outcome variable. Model 1 controls for exclusively child race or ethnicity and child age in months. Model 2 investigates two additional control variables, namely child gender and parental marital status. Model 3 introduces selected control variables to capture parental socioeconomic characteristics, such as education, employment and household poverty level. Model 4, the final model, accounts for maternal BMI score since obesity has proven to have a strong hereditary component (Gibson et al. 2007; Barsh, Farooqi, and O'Rahilly 2000). Furthermore, I estimate each distinct model with and without a multiplicative term that interacts the race or ethnicity of the child with the parental incarceration measure (either lifetime or current). This allows me to determine if the association between parental incarceration and childhood obesity significantly differs according to child's race or ethnicity. I discuss the regression results for both measures of parental incarceration in the following sections.

Parental Lifetime Incarceration: Before introducing the interaction, Model 1 reveals that the coefficient for parental lifetime incarceration is 0.080. This coefficient indicates that compared to having a parent who has never entered a correctional facility during lifetime, the odds of childhood obesity are 1.083 times higher if a child has a parent who has such experience, when all other variables are constant. However, this variable is not significant. Moreover, the coefficients for being non-Hispanic Black as well as Hispanic are significant versus being non-Hispanic White. Specifically, in contrast to non-Hispanic White participants, non-Hispanic Black and Hispanic respondents are respectively 1.822 and 3.535 times as likely to be obese. After including

the interaction, Model 1 presents that parental lifetime incarceration is significant. The coefficient of 0.719 states that relative to having a parent who has never spent time in a jail or prison during lifetime, the odds of childhood obesity are 2.052 times higher if either parent has done so. Furthermore, being non-Hispanic Black and Hispanic continue to be significantly correlated with predicting childhood obesity. Non-Hispanic Black and Hispanic individuals are 3.796 and 3.688 times as probably to be obese compared to non-Hispanic White children. Most importantly, the interaction term for being non-Hispanic Black and parental lifetime incarceration is significant at -1.195. This coefficient corresponds to an odds ratio of 0.621, demonstrating that contrary to a non-Hispanic White child whose parents have never experienced incarceration during lifetime, a non-Hispanic Black child exposed to parental incarceration is 0.621 times as likely to be obese. Additionally, the difference between Hispanic and non-Hispanic White participants is not significant.

In Model 2, parental lifetime incarceration is not significant when excluding the interaction. The coefficient of -0.049 indicates that in contrast to not having a parent who has experienced incarceration, the odds of childhood obesity are 0.952 times higher if a respondent has a parent who has entered a correctional facility during lifetime, when all other variables are constant. Similar to Model 1, being non-Hispanic Black and Hispanic are significant. Non-Hispanic Black and Hispanic participants are 1.752 and 3.391 times as probably to be obese compared to non-Hispanic White children. Moreover, residence with cohabitating as well as single parents each has a significant association with childhood obesity versus living with parents in marriage. After the

addition of the interaction, parental lifetime incarceration is marginally significant at the level of 0.561. This coefficient illustrates that different from not having any exposure to parental incarceration, the odds of childhood obesity are 1.752 times higher if either parent has experienced incarceration during lifetime. Furthermore, being non-Hispanic Black and Hispanic are significant, representing odds ratios of 3.274 and 3.432. In particular, the interaction term for a non-Hispanic Black child whose parent has entered a jail or prison during lifetime is significant. Specifically, this child is 0.555 times as probably to be obese versus a comparable non-Hispanic White individual whose parents have never done so. Besides, the discrepancy between Hispanic and non-Hispanic White respondents is not significant and living with cohabitating parents instead of parents in marriage is not as strongly significant after appending this interaction.

In the absence of the interaction, Model 3 reveals a coefficient of -0.031 for parental lifetime incarceration, illustrating that the odds of childhood obesity are 0.969 times higher if a child has parents who have experienced incarceration during lifetime. However, this variable is not significant. Consistent with the previous models, being non-Hispanic Black and Hispanic relative to being non-Hispanic White have significant correlations with estimating childhood obesity. Particularly, participants who are non-Hispanic Black and Hispanic are 1.616 and 3.442 times as likely to become obese when all other variables are constant. Moreover, father completing less than high school degree versus high school degree and father being unemployed compared to employed are significant as well. Model 3 with the addition of the interaction demonstrates that parental lifetime incarceration is not significant at 0.443. This coefficient indicates that

different from having parents who have never entered jails or prisons during lifetime, the odds of childhood obesity are 1.557 times higher if a respondent's parent has such experience. Furthermore, being non-Hispanic Black and Hispanic are uniformly significant, indicative of odds ratios of 2.872 and 3.080. As the other two control variables continue to be significant after introducing the interaction, the interaction term of being non-Hispanic Black and parental lifetime incarceration is significant too. Specifically, a non-Hispanic Black individual who has experienced parental incarceration is 0.565 times as probably to become obese versus a similar non-Hispanic White child whose parents have never entered any correctional facility. Finally, as confirmed by the above two models, the disparity between non-Hispanic White and Hispanic individuals is not significant and may be due to random chance alone.

Without the interaction, Model 4 provides a coefficient of 0.034 for parental lifetime incarceration, which is not significant. This coefficient illustrates that contrary to a child whose parents have never entered jails or prisons, the odds of childhood obesity are 1.035 times higher if a participant has a parents who has done so. Distinct from the above three models, the coefficient for being non-Hispanic Black is not significant anymore, but the coefficient for being Hispanic still is. In contrast to non-Hispanic White children, non-Hispanic Black and Hispanic respondents are respectively 1.273 and 3.099 times as likely to be obese when all other variables are constant. Apart from father completing less than high school degree versus high school degree and father being unemployed in contrast to employed, maternal BMI score is significantly associated with predicting childhood obesity too. After the inclusion of the interaction,

the coefficient for parental lifetime incarceration is not significant. The coefficient of 0.523 indicates that the odds of childhood obesity are 1.687 times higher for a child whose parent has entered a correctional facility during lifetime versus another child whose parents have no such experience. Being non-Hispanic Black resumes its significance, demonstrating that non-Hispanic Black children are 2.038 times as probably to be obese compared to non-Hispanic White participants. Comparably, being Hispanic continues to be significant, indicating that Hispanic children are 3.267 times as likely to become obese relative to non-Hispanic White children. In addition to the control variables that appear to be significant before adding the interaction, the interaction term for non-Hispanic Black individuals whose parents have entered correctional facilities is significant too. These respondents are 0.712 times as probably to be obese contrary to comparable non-Hispanic White children who have no exposure to parental incarceration. Hispanic children whose parents have been incarcerated during lifetime are 1.429 times as probably to become obese versus non-Hispanic White children who have never experienced parental incarceration before. However, this variation is still not significant.

Parental Current Incarceration: Similarly, I perform the same four models to determine the relationship between parental current incarceration and childhood obesity. Without the interaction, the coefficient for parental current incarceration in Model 1 is -0.138, illustrating that relative to a child whose parent is not currently experiencing incarceration, the odds of childhood obesity are 0.871 times higher if the child's parent is. However, this coefficient is not significantly correlated with predicting childhood

obesity. Moreover, being non-Hispanic Black and Hispanic are significant. Specifically, contrary to equivalent non-Hispanic White participants, non-Hispanic Black and Hispanic respondents are respectively 2.109 and 3.838 times as probably to become obese when all other variables are constant. The addition of the interaction reveals a coefficient of 0.367 for parental current incarceration in Model 1. While the coefficient is not significant, it demonstrates that the odds of childhood obesity are 1.443 times higher if the child's parent is currently imprisoned in a correctional facility. Being non-Hispanic Black and Hispanic have significant associations with estimating childhood obesity. Non-Hispanic Black and Hispanic children are 2.177 and 3.939 times as likely to become obese versus non-Hispanic White individuals. In particular, neither of the interaction terms is significant. For example, non-Hispanic Black children whose parents are currently incarcerated are 0.814 times as probably to become obese compared to non-Hispanic White participants who are not experiencing parental incarceration at the moment. However, this difference may be explained by random chance exclusively.

Next, Model 2 presents that the coefficient for parental current incarceration is -0.210. Though not significant, this coefficient indicates that the odds of childhood obesity are 0.811 times higher if the child's parent is currently confined in a jail or prison. Similar to Model 1, being non-Hispanic Black and Hispanic are both significant versus being non-Hispanic White. When all other variables are constant, non-Hispanic Black and Hispanic children are 1.811 and 3.579 times as probably to be obese in contrast to comparable non-Hispanic White respondents. Furthermore, living arrangements with cohabitating as well as single parents relative to parents in marriage

each has a significantly correlation with predicting childhood obesity too. After adding the interaction, parental current incarceration is not significant. The coefficient of 0.259 is indicative of odds ratio of 1.296, representing that the odds of childhood obesity are 1.296 times higher if the child's parent is experiencing incarceration at present. Same as the previous model, being non-Hispanic Black and Hispanic are significant. In particular, non-Hispanic Black and Hispanic individuals are respectively 1.872 and 3.669 times as likely to become obese relative to non-Hispanic White participants. While the control variables related to parental marital status continue to be significant, the interaction terms do not have statistical significance. For instance, compared to non-Hispanic White children whose parents are not currently imprisoned in correctional facilities, non-Hispanic Black respondents who are experiencing parental incarceration at the moment are 0.759 times as probably to become obese. This disparity, along with that between Hispanic and non-Hispanic White individuals, are not statistically significant.

Then, Model 3 minus the interaction presents a significant parental current incarceration variable. The coefficient of -0.752 reveals that the odds of childhood obesity are 0.471 times higher if the child's parents are currently experiencing incarceration. Moreover, being non-Hispanic Black and Hispanic continue to have significant associations with childhood obesity. While all other variables constant, non-Hispanic Black and Hispanic participants are respectively 1.919 and 3.717 times as likely to become obese versus non-Hispanic White participants. Other than these significant variables, father completing less than high school compared to a high school

degree and father being unemployed in contrast to employed are significant too. The previously significant control variables related to marital status in Model 2 are only marginally significant in Model 3. The inclusion of the interaction yields a non-significant parental current incarceration variable. The odds of childhood obesity are 0.885 times higher if the child's parent is presently confined in a jail or prison than if neither parent is. Consistent with previous models, being non-Hispanic Black and Hispanic are both significantly correlated with childhood obesity. Particularly, non-Hispanic Black and Hispanic respondents are 1.956 and 3.785 times as probably to be obese relative to non-Hispanic White individuals. While all the control variables maintain the same levels of significance, the interaction terms are not significant. Take the interaction term for non-Hispanic Black individuals who are currently experiencing parental incarceration as an example. Those children are 0.450 times as likely to be obese relative to non-Hispanic White children whose parents are not imprisoned by correctional facilities at the moment. However, these variations by race or ethnicity are not significant.

Finally, before appending the interaction in Model 4, the variable for parental current incarceration is significant. At the coefficient of -0.978, the odds of childhood obesity are 0.376 times higher if the child's parent is currently in a jail or prison than if neither parent is. Being non-Hispanic Black and Hispanic are uniformly significant. Compared to similar non-Hispanic White respondents, non-Hispanic Black and Hispanic children are respectively 1.565 and 3.459 times as probably to be obese when all other variables are constant. Additionally, residing with cohabitating as well as single parents

instead of parents in marriage, father completing less than a high school degree compared to a high school degree, father being unemployed versus employed and maternal BMI score are all significantly correlated with predicting childhood obesity. With the addition of the interaction, the variable for parental current incarceration is no longer significant. The coefficient of -0.618 illustrates that the odds of childhood obesity are 0.539 times higher if the child is experiencing parental incarceration at present than if the child is not. Moreover, the coefficients for being non-Hispanic Black and Hispanic are still significant. Non-Hispanic Black and Hispanic individuals are 1.573 and 3.511 times as likely to be obese in contrast to non-Hispanic White respondents. While all the significant control variables maintain their significance, the interaction terms are not significant. In particular, non-Hispanic Black children whose parents are imprisoned in correctional facilities at the moment are 0.398 times as probably to be obese compared to non-Hispanic White children whose parents are not. However, these racial or ethnic disparities do not appear to be statistically significant.

Sensitivity Analyses: I perform a number of sensitivity analyses to examine if the above results remain consistent across different specifications of the dependent variable, childhood obesity. Specifically, I assess if and how regression findings change when the outcome is defined as a categorical indicator of overweight (>85th percentile of age- and sex-specific BMI). Moreover, I perform sensitivity tests on continuous child BMI score as the dependent variable and produce the same findings for both measures of parental incarceration (lifetime and current). Please refer to Tables 4 and 5 for these additional analyses using childhood BMI score as the outcome variable.

Discussion

Substantive Findings: Both childhood obesity and parental incarceration are increasingly prevalent in recent decades, affecting poor and minority populations at disproportionate rates (Glaze and Kaeble 2014; Western 2006; Kimbro and Denney 2013; Singh, Siahpush, and Kogan 2010; Whitaker and Orzol 2006). Existing empirical evidence has shown that parental incarceration is associated with an increased risk of childhood obesity (Roettger and Boardman 2011; Lee, Fang, and Luo 2013). However, very few studies directly consider the importance of race or ethnicity when examining how these two concurrent social trends might influence one another and, to my knowledge, none specifically investigates the extent to which the relationship between parental incarceration and childhood obesity varies across racial or ethnic subpopulations. To answer this research question empirically, I analyze panel data from a nationally representative sample of racially and ethnically diverse, low-income families with young children between the ages of three and nine years (Reichman et al. 2001).

Multilevel logistic regression results indicate that parental lifetime incarceration is not significantly associated with childhood obesity, while parental current incarceration is. Having a parent who is behind bars at the moment is correlated with a significant decline in the risk of childhood obesity. Thus, H_1 is partially supported.

Furthermore, my analyses reveal a disparity between non-Hispanic White and non-Hispanic Black children in using parental incarceration to predict chance of obesity during early life. Specifically, parental lifetime incarceration is associated with a significant increase in the risk of obesity for young non-Hispanic White participants but a significant decrease in the probability of obesity for their non-Hispanic Black counterparts. However, such a variation between those two populations is not evident when estimating parental current incarceration. Therefore, these results partly endorse H_2. Moreover, I find no difference in the influence of parental imprisonment on childhood obesity between non-Hispanic White and Hispanic respondents – for either lifetime or current parental incarceration. As a result, H_3 is completely refuted. Because my research project particularly explores the racial and ethnic variations in the impacts of parental incarceration on childhood obesity, I focus on H_2 primarily in my discussion.

According to the stress process model, excessive levels of stress can contribute to deleterious health outcomes, particularly in the face of few coping resources (Pearlin et al. 1981; Pearlin et al. 2005). As a consequence, in terms of the disparity between non-Hispanic White and non-Hispanic Black children in assessing parental lifetime incarceration, I attempt to offer explanations to what this finding suggests in terms of stress exposure and coping resources. Firstly, the stigma associated with having a parent behind bars may be more severe and extensive for a non-Hispanic White child than a similar non-Hispanic Black child. Due to elevated rates of incarceration among non-Hispanic Black adults, particularly fathers, non-Hispanic Black children might face milder stigma than their non-Hispanic White counterparts do (Western 2006; Uggen,

Manza, and Thompson 2006; Pettit and Western 2004; Western and Pettit 2010). In other words, the normalization of incarceration among non-Hispanic Black residents could eliminate much of the stigmatizing capacity of incarceration as well as that of parental incarceration (Hirschfield 2008; Western 2006). On the contrary, since incarceration is not as normative for non-Hispanic Whites, parental incarceration could be extremely stigmatizing for non-Hispanic White children whose parents have spent time in prison (Hirschfield 2008; Western 2006; LeBel 2012; Harris 1976; Winnick and Bodkin 2009; Pettit and Western 2004; Western 2006).

Research has recognized that the stigma connected to incarceration is sustained and pervasive, such that family members including children of prisoners are vulnerable to its impacts too (Braman 2004; Murray and Murray 2010). The differential level of stigmatization regarding incarceration by race or ethnicity is illustrated in the literature (LeBel 2012; Harris 1976; Winnick and Bodkin 2009; Pettit and Western 2004; Western 2006). Non-Hispanic White ex-offenders are not only subject to more perceived stigma, but are more susceptible to the labeling impact of incarceration as well (LeBel 2012; Winnick and Bodkin 2008; Harris 1976). Moreover, non-Hispanic Whites are more inclined to keep their convict status secretive compared to equivalent non-Hispanic Blacks as a result of the intense sigma related to incarceration (Winnick and Bodkin 2009).

Stigma is a source of severe psychosocial stress, which can expose an individual to either societal, direct negative attitudes or the "internalization" of stereotypes (Stuber, Meyer, and Link 2008; Hackman, Maupin, and Brewis 2016). On the one hand, explicit

discriminatory interactions may lead to mistreatment in medical care (Wahl 1999; LaVeist, Rolley, and Diala 2003). On the other hand, internalization of stigma is connected to declined life quality, depressive behaviors, low self-respect, limited social ties, maladaptive coping styles and deteriorated performance in other social domains (Stuber, Meyer, and Link 2008; Rosenfield 1997; Wright, Grofein, and Owens 2000; Link et al. 1997; Link 1987; Perlick et al. 2007; Link et al. 1989). Therefore, the stress linked to stigma may result in serious adverse health consequences and trigger a host of other stressors in life (Stuber, Meyer, and Link 2008). As a consequence, non-Hispanic White children of imprisoned parents may face higher levels of stress associated with the stigma of imprisonment than similarly situated non-Hispanic Black children. In summary, the intense stigma related to parental incarceration may be a more potent source of stress for non-Hispanic White children than non-Hispanic Black children (Miller and Kaiser 2001; Major and O'Brien 2005).

Secondly, an important and long-standing coping resource that is often observed within non-Hispanic Black communities, particularly those with high concentrations of poverty, are extended kinship ties among close friends and families (Takas 1993; Jarrett 1994; Jarrett 1997). Members of kinship networks may provide social support, in the form of instrumental assistance, financial aid or emotional comfort, to the community member in need (Roschelle 1997). One key benefit of being embedded within strong extended kinship networks is the sharing of childrearing obligations (Cherlin and Furstenberg 1986). Prior research has demonstrated that some of the most frequent and comprehensive child caregiving via kinship ties is found within non-Hispanic Black

communities (Szolnoki and Cahn 2002; Dubowitz, Feigelman, and Zuravin 1993).

The extensive kinship ties can moderate the correlation between stress and declined health conditions, such as childhood obesity (Budescu, Taylor, and McGill 2011). Literature has acknowledged the role of social support as a buffer against deteriorated health in response to stressful life events (Gore 1998; Nuckolls, Cassel, and Kaplan 1972). For the non-Hispanic Black communities, in particular, empirical evidence has suggested that the strong kinship networks may reduce stress in difficult times and offer positive psychological adjustments for adults and children alike (Haxton and Harknett 2009; Taylor and Roberts 1995; Lamborn and Nguyen 2004; Stack 1975). In fact, ethnographic research has illustrated that the expansive kinship systems are so effective in those communities that they are more helpful that any other type of resource. This is especially important for fulfilling the emotional needs of poor, female non-Hispanic Black residents (Taylor 1986; Budescu, Taylor, and McGill 2011; McAdoo 1978).

As for children with absent parents, an ample literature concerning child welfare recognizes the benefits of placing children with kin when the biological parents are unavailable – such as in the case of parental incarceration (Mumola 2000; Johnson and Waldfogel 2002). Such benefits include favorable adaptation to the new households, emotional attachment to the family and less behavioral problems (Hegar and Rosenthal 2009; Wu, White, and Coleman 2015). These advantages are attributed to the dedication of the kinship caregivers, residential stability, and previously established bonds with children (Gleeson 2012). Consequently, extended kinship networks can serve as a

cushion to provide emotional solace that alleviates the stress for non-Hispanic Black children of incarcerated parents (Szolnoki and Cahn 2002).

Among non-Hispanic White families, however, the existence of and reliance on extensive kinship ties, particularly as an effective coping mechanism during parental absence, are far less prevalent than among non-Hispanic Black families (Hill 1999; Lempert 1999; Sudarkasa 1996; Feig 1997). For instance, the percentage of non-Hispanic White children who live with grandparents instead of parents is three times as low as that of their non-Hispanic Black counterparts (Baker, Silverstein, and Putney 2010). Given the many benefits connected to residing with kinship members after the removal of parents, non-Hispanic White children lack such an important coping resource to manage stressful experiences. To summarize, non-Hispanic Black children may cope with the stress associated with parental lifetime incarceration better as a result of the large kinship systems in their communities.

While scholarship has collected some preliminary evidence that exposure to parental lifetime incarceration may lead to an increased risk of childhood obesity, my research project expands this narrative by investigating the impacts of parental current incarceration too. Contrary to the prior literature, I find that parental current incarceration is associated with a declined chance of childhood obesity, while parental lifetime incarceration is not significantly correlated with the probability of childhood obesity (Roettger and Boardman 2011; Turney 2014a; Lee, Fang, and Luo 2013). This finding further confirms the qualitative observation that the indirect influence of incarceration on family members is complicated and countervailing, in that the

temporary and enduring effects could be different (Turney and Wildeman 2013; Giordano 2010; Comfort 2008; Braman 2004).

Moreover, my study contributes to the literature by introducing a new angle into the discussion, namely the racial and ethnic disparities in the impacts of parental incarceration on child physical health. To my knowledge, only one scholarly attempt has indirectly addressed this issue. Gjelsvik, Dumont, and Nunn (2013) assess the effects of childhood residence with incarcerated household member on adult chronic diseases, one of which is childhood obesity. Consistent with my results, these researchers recognize that secondary exposure to incarceration leads to a decreased chance of obesity for non-Hispanic Black respondents, but it is the opposite for non-Hispanic White or Hispanic participants. However, these differences are not statistically significant for their study (Gjelsvik, Dumont, and Nunn 2013). My research project compliments their study by first, restricting the exposure to parental incarceration rather than imprisonment of a household member, and second, scrutinizing the influence in early childhood. Because children's eating behaviors are strongly influenced by parents at an early age, the removal of a parent due to incarceration may induce the development of obesity in children to a greater extent than the confinement of a household member (Savage, Orlet Fisher, and Birch 2007; Schmeer 2012; Burke et al. 2001; Patrick and Nicklas 2005). Furthermore, scholars have proposed that the negative emotions and subsequent internalizing behaviors, for instance binge eating, are more immediate, short-term responses to parental incarceration instead of pervasive, long-term ones (Gaston 2016; Roettger and

Boardman 2011). Thus, exploring the impacts of childhood obesity in early childhood, closer to the exposure of parental incarceration, may yield a stronger connection between parental incarceration and childhood obesity. As a result, the two ways in which my study differs from the Gjelsvik, Dumont, and Nunn (2013) research project may explain why my results are similar to theirs but with stronger levels of statistical significance. Additionally, my research makes a contribution to the limited literature on the effects of parental incarceration on child physical health (Roettger and Boardman 2011).

Limitations: While this study sheds new light on the racial and ethnic differences in the impacts of parental incarceration on the risk of childhood obesity, the findings presented here should be interpreted in the light of some important shortcomings. When trying to isolate the effects of parental imprisonment on child wellbeing, the timing of both incarceration and release should ideally be considered. Unfortunately, I am not able to do this using data from the Fragile Families study with the level of precision I originally hope. Therefore, it is possible that the mother or father finished his or her sentence prior to the child's birth.

However, even in cases where parental incarceration takes place well before the child is born, prior research has found that ex-convicts suffer from tremendous, chronic stress as a result of deteriorated physical, emotional and social wellbeing after release (Schnittker and John 2007; Frye and Dawe 2008; Haney 2001). Furthermore, recidivism rates in the United States are some of the highest in the developed world, at 76.6% and 44.7% for respectively state and federal inmates five years after release

(Durose, Cooper, and Snyder 2014). Because the recidivism rates are so high, it is highly probable that the parent may spend time behind bars again during the child's lifetime. As a result, even if the parent completes his or her time in a correctional facility before the child is born, the long-term negative effects of incarceration may still heavily influence the child's family life till this day and the repeated imprisonment may have direct impacts on the child's life.

Another potential shortcoming stems from the short duration of time children in the Fragile Families study were followed up. Respondents in this study range from three to nine years of age (Reichman et al. 2001). Consequently, my findings, particularly those regarding racial and ethnic disparities in the association between parental incarceration and childhood obesity, may not be applicable to the experiences of older children and adolescents. However, a large body of research supports the idea that childhood obesity essentially sets the stage for the subsequent development of adult obesity (Freedman, Khan, and Serdula 2005; Alcock, Gardner, and Sowers 2009). One out of three children who are obese before starting school are also obese as adults (Serdula et al. 1993). Although this sample does not include more survey waves following the same respondents beyond age nine years, my findings still have some valuable implications on how stressful life event such as parental incarceration affects young children of varying racial or ethnic groups differently at a young age, in ways that may extend far beyond early childhood.

Policy Recommendations: The findings presented here, particularly that the impacts of parental incarceration on childhood obesity is likely to differ – sometimes

dramatically – by race or ethnicity suggest potential policy responses. First, since parental lifetime incarceration is positively correlated with an increased risk of childhood obesity for non-Hispanic White and Hispanic children, health practitioners and social workers should consider early interventions for weight control among these specific populations (Turney 2014a). Secondly, state and federal corrections should organize more family-focused programs and allocate more child-friendly visitation areas to facilitate parenting inside prison, so as to diminish the stress connected to separation from incarcerated parents (Dowdney 2000; Bocknek, Sanderson, and Britner 2009). Thirdly, because reliance on the extensive kinship networks might be a particularly useful coping strategy for children to buffer the negative effects of parental imprisonment, the government should consider offering incentives, financial and otherwise, to encourage and assist close friends or family members to provide help with childrearing responsibilities when mothers or fathers are imprisoned. The scholarship has identified a few drawbacks of childcare provided by kinship network members, including elevated levels of emotional stress and worsening financial problems for caregivers (Bachman and Chase-Lansdale 2005; Kelley et al. 2000). As a consequence, the government should invest in providing support to the kin caretakers to ensure that the large kinship systems continue to moderate the association between stress and negative health outcomes in non-Hispanic Black neighborhoods (Miller-Cribbs and Farber 2008; Budescu, Taylor, and McGill 2011; Gore 1998; Nuckolls, Cassel, and Kaplan 1972).

Conclusion: In conclusion, this study suggests that the negative impacts of

parental incarceration on the risk of childhood obesity are likely to heavily depend on the respondent's race or ethnicity. In particular, I find that non-Hispanic White and Hispanic children whose parents have been imprisoned during lifetime are significantly more likely to become obese before the age of nine years. Non-Hispanic Black children with an imprisoned mother or father, on the other hand, do not experience an increased risk of obesity over the early life course. Because of data limitations, I am unable to more fully investigate why these racial- or ethnic-specific demographic trends concerning child physical health and wellbeing might be emerging as a result of parental incarceration, but this should be more thoroughly delineated in future studies. I suggest that racial or ethnic disparities in the correlation between parental incarceration and childhood obesity might stem from differential levels of stigma across racial or ethnic groups and the reliance on varying coping strategies such as the acquisition of social support via strong kinship network ties. Given the disproportionate prevalence of parental incarceration and childhood obesity across racial or ethnic subpopulations, understanding the complex relationship between these two phenomena might be one step closer towards diminishing the widening racial and ethnic inequalities in current society (Mehta et al. 2013; Case and Paxson 2010; Haas 2007; Palloni 2006; Turney 2014a; Bureau of Labor Statistics 2015).

Appendix: Tables and Figures

Table 1: Descriptive statistics for Fragile Families respondents by child race and ethnicity, Years 3, 5 and 9

		White	Black	Hispanic
Child race and ethnicity				
Non-Hispanic White	20.72	-	-	-
Non-Hispanic Black	51.81	-	-	-
Hispanic	27.47	-	-	-
Child is obese	21.07	15.25	20.15***	27.59***
Parent is incarcerated during lifetime	66.44	48.67	75.37***	62.83***
Parent is incarcerated currently	10.09	4.55	14.57***	6.21*
Child is female	48.03	47.51	47.61	49.21
Child age in months	73.35 (32.16)	72.85 (32.35)	73.10 (31.85)	74.27 (32.63)
Parental Marital Status				
Married	33.53	58.46	20.68	38.89
Cohabitating	29.17	19.22	30.87***	33.73***
Single	36.36	21.75	47.21***	26.67***
Living with non-parents	0.95	0.56	1.24***	0.71+
Maternal education				
Less than high school	25.55	13.10	21.78***	42.81***
High school	26.01	22.74	29.11	22.74
Some college	35.87	32.49	41.69	27.51
College or graduate school	12.58	31.67	7.42	6.94
Paternal education				
Less than high school	26.41	12.87	24.05***	42.75***
High school	31.79	24.54	38.35	25.89
Some college	30.45	34.12	31.38	25.50
College or graduate school	11.35	28.47	6.23	5.86
Maternal employment				
Employed	60.90	62.37	62.16	57.27
Unemployed	19.69	10.28	24.73***	17.30***
Out of the labor force	19.41	27.35	13.10***	25.43
Paternal employment				
Employed	78.69	88.52	70.84	84.59
Unemployed	13.58	6.96	18.80***	9.73**
Out of the labor force	7.73	4.52	10.36***	5.68+
Household under poverty	28.83	13.26	33.61***	33.87***
Child health insurance				
Only private	31.74	57.20	24.40	25.88
Only public	57.89	32.87	66.50***	60.90***
Both private and public	3.29	2.84	3.42***	3.38***
None	7.08	7.09	5.67***	9.84***
Maternal BMI score	30.41 (7.99)	28.26 (7.22)	31.35 (8.30)***	30.17 (7.55)***
N	3677	762	1905	1010

Source: Fragile Families and Child Wellbeing Study, Years 3, 5 and 9
***p < 0.001; **p < 0.01; * p < 0.05; + p < 0.10

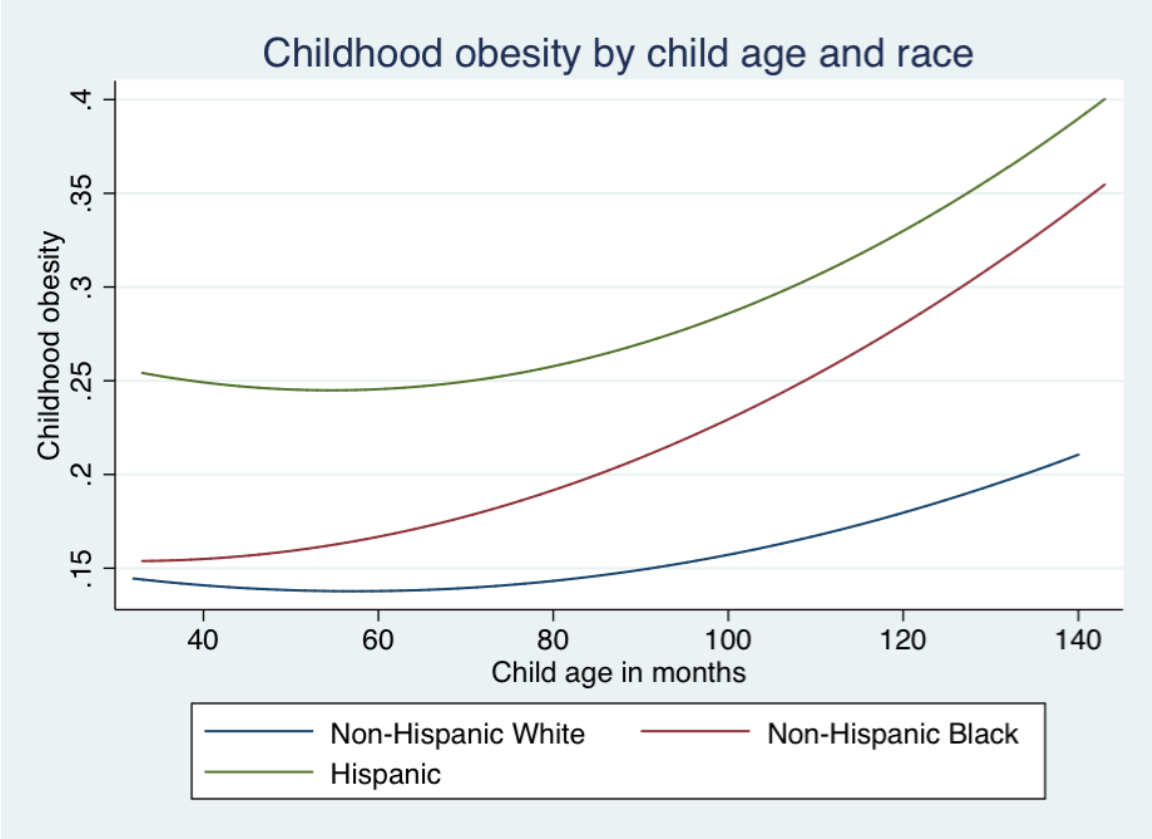

Figure 1: Growth curves for childhood obesity by child age in months and child race or ethnicity, Fragile Families, Years 3, 5 and 9

Table 2: Results from multilevel mixed-effects logistic analyses predicting the differences in the relationship between parental lifetime incarceration and childhood obesity by race or ethnicity, Fragile Families, Years 3, 5, 9

	Model 1				Model 2				Model 3				Model 4			
	Without interaction		With interaction		Without interaction		With interaction		Without interaction		With interaction		Without interaction		With interaction	
	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
Parental lifetime incarceration	0.080	0.135	0.719*	0.291	-0.049	0.147	0.561+	0.305	-0.031	0.174	0.443	0.373	0.034	0.173	0.523	0.383
Child race or ethnicity (non-Hispanic White)																
Non-Hispanic Black	0.600***	0.172	1.334***	0.265	0.467**	0.176	1.186***	0.271	0.480*	0.219	1.055**	0.314	0.241	0.227	0.712*	0.321
Hispanic	1.260***	0.192	1.305***	0.293	1.221***	0.194	1.233***	0.295	1.236***	0.240	1.125**	0.337	1.131***	0.243	1.184***	0.337
Parental lifetime incarceration*child non-Hispanic Black			-1.195**	0.344			-1.150**	0.349			-1.014*	0.415			-0.862*	0.426
Parenal lifetime incarceration*child Hispanic			-0.199	0.386			-0.128	0.389			0.123	0.462			-0.166	0.463
Child age	0.011***	0.001	0.011***	0.001	0.011***	0.002	0.011***	0.002	0.012***	0.002	0.012***	0.002	0.009***	0.002	0.009***	0.002
Child female (male)					0.065	0.125	0.056	0.126	0.205	0.151	0.194	0.151	0.156	0.151	0.149	0.151
Parental marital status (married)																
Cohabitating					0.338*	0.156	0.294+	0.156	0.279	0.189	0.237	0.189	0.358+	0.188	0.326+	0.188
Single					0.422**	0.157	0.383*	0.156	0.300	0.195	0.267	0.193	0.376+	0.195	0.354+	0.193
Living with non-parents					0.856	0.550	0.822	0.543	0.675	0.739	0.657	0.728	0.652	1.742	0.648	1.693
Maternal education (less than high school)																
High school									0.240	0.214	0.214	0.214	0.100	0.214	0.081	0.214
Some college									-0.135	0.208	-0.146	0.209	-0.166	0.210	-0.171	0.210
College and graduate school									-0.297	0.315	-0.280	0.317	-0.131	0.315	-0.096	0.316
Paternal education (less than high school)																
High school									0.555**	0.188	0.528**	0.189	0.490**	0.189	0.473*	0.189
Some college									-0.081	0.204	-0.107	0.205	-0.121	0.209	-0.135	0.209
College and graduate school									-0.214	0.324	-0.189	0.327	-0.158	0.332	-0.120	0.335
Maternal employment (employed)																
Unemployed									0.133	0.181	0.134	0.181	0.165	0.182	0.171	0.183
Out of the labor force									-0.154	0.179	-0.137	0.179	-0.097	0.181	-0.080	0.181
Paternal employment (employed)																
Unemployed									-0.486**	0.181	-0.481**	0.181	-0.423*	0.185	-0.420*	0.185
Out of the labor force									-0.160	0.259	-0.170	0.261	-0.077	0.260	-0.085	0.261
Household under poverty									0.048	0.167	0.075	0.167	0.008	0.171	0.025	0.171
Child health insurance (only private)																
Only public									-0.018	0.185	-0.003	0.185	-0.206	0.183	-0.201	0.183
Both private and public									0.169	0.310	0.165	0.312	0.271	0.301	0.264	0.302
None									0.002	0.283	-0.033	0.285	-0.010	0.289	-0.035	0.290
Maternal BMI score													0.088***	0.011	0.087***	0.011
N of observations	6,390				6,312				3,845				3,540			
N of individuals	2,941				2,920				2,231				2,103			

Note: ***p < 0.001; **p < 0.01; * p < 0.05; + p < 0.10

Table 3: Results from multilevel mixed-effects logistic analyses predicting the differences in the relationship between parental current incarceration and childhood obesity by race or ethnicity, Fragile Families, Years 3, 5, 9

	Model 1				Model 2				Model 3				Model 4			
	Without interaction		With interaction		Without interaction		With interaction		Without interaction		With interaction		Without interaction		With interaction	
	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
Parental current incarceration	-0.138	0.176	0.367	0.494	-0.210	0.180	0.259	0.494	-0.752*	0.331	-0.122	0.910	-0.978**	0.348	-0.618	0.960
Child race or ethnicity (non-Hispanic White)																
Non-Hispanic Black	0.746***	0.160	0.778***	0.164	0.594***	0.166	0.627***	0.170	0.652**	0.208	0.671**	0.209	0.448*	0.220	0.453*	0.221
Hispanic	1.345***	0.181	1.371***	0.183	1.275***	0.182	1.300***	0.184	1.313***	0.226	1.331***	0.227	1.241***	0.235	1.256***	0.235
Parental current incarceration*child non-Hispanic Black			-0.573	0.537			-0.535	0.532			-0.676	0.969			-0.303	1.021
Parenal current incarceration*child Hispanic			-0.588	0.632			-0.536	0.624			-1.009	1.253			-1.028	1.394
Child age	0.011***	0.001	0.011***	0.001	0.011***	0.001	0.011***	0.001	0.012***	0.002	0.012***	0.002	0.010***	0.002	0.010***	0.002
Child female (male)					0.181	0.118	0.179	0.118	0.156	0.141	0.155	0.141	0.132	0.144	0.132	0.144
Parental marital status (married)																
Cohabitating					0.349*	0.139	0.348*	0.139	0.324+	0.174	0.321+	0.173	0.406*	0.177	0.405*	0.177
Single					0.445**	0.139	0.439**	0.139	0.350+	0.179	0.344+	0.179	0.439*	0.182	0.435*	0.182
Living with non-parents					0.736	0.581	0.746	0.587	0.786	0.724	0.784	0.724	0.765	1.801	0.763	1.799
Maternal education (less than high school)																
High school									0.170	0.202	0.165	0.202	0.069	0.206	0.065	0.206
Some college									-0.154	0.197	-0.158	0.196	-0.170	0.202	-0.172	0.201
College and graduate school									-0.330	0.291	-0.325	0.291	-0.189	0.297	-0.186	0.297
Paternal education (less than high school)																
High school									0.597**	0.182	0.592**	0.182	0.555**	0.186	0.551**	0.186
Some college									-0.126	0.197	-0.125	0.196	-0.147	0.206	-0.147	0.205
College and graduate school									0.010	0.299	0.010	0.298	0.043	0.313	0.042	0.312
Maternal employment (employed)																
Unemployed									0.145	0.174	0.151	0.174	0.162	0.179	0.165	0.179
Out of the labor force									-0.114	0.168	-0.113	0.168	-0.066	0.174	-0.063	0.174
Paternal employment (employed)																
Unemployed									-0.551**	0.176	-0.547**	0.176	-0.444*	0.182	-0.438*	0.182
Out of the labor force									-0.119	0.257	-0.112	0.256	0.087	0.261	0.090	0.260
Household under poverty									0.132	0.157	0.126	0.157	0.109	0.164	0.101	0.165
Child health insurance (only private)																
Only public									-0.006	0.172	-0.004	0.171	-0.191	0.174	-0.192	0.174
Both private and public									0.245	0.291	0.250	0.290	0.327	0.288	0.334	0.288
None									-0.068	0.267	-0.070	0.266	-0.154	0.280	-0.155	0.280
Maternal BMI score													0.087***	0.010	0.086***	0.010
N of observations	6,501				6,501				4,203				3,825			
N of individuals	3,510				3,510				2,562				2,369			

Table 4: Results from multilevel mixed-effects logistic analyses predicting the differences in the relationship between parental lifetime incarceration and childhood BMI score by race or ethnicity, Fragile Families, Years 3, 5, 9

	Model 1				Model 2				Model 3				Model 4			
	Without interaction		With interaction		Without interaction		With interaction		Without interaction		With interaction		Without interaction		With interaction	
	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
Parental lifetime incarceration	0.065	0.117	0.428*	0.207	-0.010	0.128	0.361+	0.216	-0.042	0.161	0.025	0.278	0.020	0.156	0.122	0.269
Child race or ethnicity (non-Hispanic White)																
Non-Hispanic Black	0.558***	0.134	1.129***	0.202	0.470**	0.137	1.052***	0.206	0.505**	0.174	0.840**	0.247	0.185	0.167	0.473*	0.240
Hispanic	1.021***	0.156	0.833***	0.215	0.995***	0.156	0.798***	0.214	0.945***	0.201	0.555*	0.262	0.813***	0.191	0.555*	0.253
Parental lifetime incarceration*child non-Hispanic Black			-0.892**	0.271			-0.900**	0.272			-0.540	0.331			-0.478	0.320
Parenal lifetime incarceration*child Hispanic			0.219	0.309			0.241	0.309			0.687+	0.381			0.465	0.372
Child age	0.040***	0.001	0.040***	0.001	0.040***	0.001	0.040***	0.001	0.041***	0.002	0.041***	0.002	0.037***	0.002	0.037***	0.002
Child female (male)					0.157	0.109	0.144	0.109	0.231+	0.133	0.222+	0.133	0.145	0.128	0.140	0.128
Parental marital status (married)																
Cohabitating					0.144	0.123	0.113	0.123	0.130	0.155	0.101	0.155	0.202	0.154	0.176	0.153
Single					0.224+	0.127	0.198	0.127	0.158	0.167	0.142	0.166	0.262	0.166	0.250	0.165
Living with non-parents					0.601	0.522	0.587	0.518	0.461	0.733	0.475	0.730	1.818+	0.972	1.895*	0.947
Maternal education (less than high school)																
High school									0.289	0.183	0.271	0.182	0.160	0.179	0.147	0.179
Some college									-0.014	0.183	-0.022	0.183	-0.039	0.178	-0.042	0.178
College and graduate school									-0.213	0.256	-0.231	0.258	-0.107	0.250	-0.111	0.252
Paternal education (less than high school)																
High school									0.418**	0.160	0.396*	0.160	0.323*	0.155	0.307*	0.155
Some college									0.054	0.180	0.034	0.179	-0.004	0.177	-0.018	0.177
College and graduate school									-0.310	0.261	-0.327	0.263	-0.242	0.257	-0.251	0.260
Maternal employment (employed)																
Unemployed									0.096	0.135	0.093	0.135	0.105	0.136	0.106	0.136
Out of the labor force									-0.044	0.139	-0.030	0.139	0.004	0.139	0.017	0.138
Paternal employment (employed)																
Unemployed									-0.175	0.150	-0.174	0.150	-0.138	0.155	-0.138	0.155
Out of the labor force									-0.092	0.242	-0.100	0.242	-0.112	0.249	-0.119	0.248
Household under poverty									-0.049	0.127	-0.026	0.127	-0.129	0.130	-0.110	0.130
Child health insurance (only private)																
Only public									0.091	0.151	0.115	0.150	-0.084	0.150	-0.065	0.150
Both private and public									0.332	0.350	0.329	0.350	0.457	0.362	0.449	0.362
None									-0.004	0.203	-0.026	0.202	0.017	0.210	-0.007	0.210
Maternal BMI score													0.105***	0.010	0.104***	0.010
N of observations	6,390				6,312				3,845				3,540			
N of individuals	2,941				2,920				2,231				2,103			

Note: ***p < 0.001; **p < 0.01; * p < 0.05; + p < 0.10

Table 5: Results from multilevel mixed-effects logistic analyses predicting the differences in the relationship between parental current incarceration and childhood BMI score by race or ethnicity, Fragile Families, Years 3, 5, 9

	Model 1				Model 2				Model 3				Model 4			
	Without interaction		With interaction		Without interaction		With interaction		Without interaction		With interaction		Without interaction		With interaction	
	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
Parental current incarceration	-0.059	0.143	0.702	0.459	-0.100	0.147	0.636	0.459	-0.372+	0.216	0.133	0.590	-0.382+	0.210	-0.052	0.556
Child race or ethnicity (non-Hispanic White)																
Non-Hispanic Black	0.740***	0.132	0.787***	0.135	0.670***	0.140	0.718***	0.144	0.639***	0.174	0.656***	0.179	0.299+	0.169	0.311+	0.174
Hispanic	1.112***	0.152	0.154***	0.154	1.087***	0.153	1.128***	0.155	0.975***	0.193	0.991***	0.196	0.818***	0.185	0.826***	0.188
Parental current incarceration*child non-Hispanic Black			-0.857+	0.485			-0.828+	0.482			-0.558	0.621			-0.369	0.588
Parenal current incarceration*child Hispanic			-0.910	0.607			-0.878	0.605			-0.675	0.710			-0.384	0.692
Child age	0.041***	0.001	0.041***	0.001	0.041***	0.001	0.041***	0.001	0.041***	0.001	0.041***	0.001	0.038***	0.001	0.038***	0.001
Child female (male)					0.304**	0.112	0.302**	0.112	0.204	0.130	0.203	0.130	0.132	0.126	0.132	0.126
Parental marital status (married)																
Cohabitating					0.108	0.118	0.106	0.118	0.139	0.149	0.137	0.149	0.222	0.149	0.221	0.149
Single					0.225+	0.126	0.219+	0.126	0.179	0.162	0.175	0.162	0.273+	0.162	0.271+	0.162
Living with non-parents					0.460	0.534	0.469	0.538	0.343	0.707	0.340	0.703	1.813+	0.948	1.819+	0.946
Maternal education (less than high school)																
High school									0.164	0.187	0.162	0.187	0.078	0.183	0.078	0.183
Some college									-0.126	0.187	-0.128	0.186	-0.125	0.182	-0.125	0.182
College and graduate school									-0.326	0.253	-0.321	0.254	-0.212	0.245	-0.210	0.245
Paternal education (less than high school)																
High school									0.455**	0.163	0.452**	0.163	0.378*	0.159	0.377*	0.159
Some college									-0.016	0.179	-0.017	0.178	-0.056	0.177	-0.056	0.177
College and graduate school									-0.285	0.249	-0.285	0.249	-0.214	0.250	-0.214	0.250
Maternal employment (employed)																
Unemployed									0.100	0.134	0.103	0.135	0.107	0.137	0.108	0.137
Out of the labor force									0.048	0.138	0.049	0.138	0.062	0.140	0.063	0.141
Paternal employment (employed)																
Unemployed									-0.244+	0.147	-0.243+	0.147	-0.166	0.153	-0.167	0.153
Out of the labor force									-0.084	0.252	-0.085	0.252	-0.023	0.261	-0.022	0.262
Household under poverty									-0.023	0.124	-0.026	0.125	-0.099	0.128	-0.100	0.129
Child health insurance (only private)																
Only public									0.060	0.148	0.062	0.148	-0.115	0.148	-0.114	0.148
Both private and public									0.448	0.343	0.451	0.343	0.588+	0.355	0.589+	0.355
None									-0.080	0.192	-0.080	0.192	-0.102	0.200	-0.101	0.200
Maternal BMI score													0.106***	0.010	0.106***	0.010
N of observations	6,501				6,501				4,203				3,825			
N of individuals	3,510				3,510				2,562				2,369			

Note: ***p < 0.001; **p < 0.01; * p < 0.05; + p < 0.10

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