THE RELATIONSHIP BETWEEN NEIGHBORHOOD QUALITY AND OBESITY AMONG CHILDREN.[1]

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Abstract

It has long been posited by scientists that we need to have a better understanding in the role that larger contextual factors – like neighborhood quality and the built environment – may have on the nation's obesity crisis. The purpose of this paper is to explore whether maternal perceptions of neighborhood quality affect children's bodyweight outcomes, and moreover, whether racial and ethnic differences in such perceptions may explain any of the hitherto unexplained gap in bodyweight and obesity prevalence among whites and minorities. The project uses data from the NLSY79 and the CoNLSY datasets. Results indicate that overall neighborhood quality is not significantly related to children's bodyweight, but one particular characteristic – whether or not there is enough police protection in the neighborhood – is, indeed related. Lack of police protection has robust and significant effects on the BMI-percentile of the children, though it has less robust effects on the risk of becoming obese per se. Additionally, lack of police protection also appears to be associated with more time spent by children watching television. Finally, there are differences in perceptions about adequate police protection between whites and minorities which remain after controlling for other socio-economic factors, and these differences do explain part of the unexplained gap in bodyweight between white and minority children.

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"Overweight and obesity are among the most important of these new health challenges. Our modern environment has allowed these conditions to increase at alarming rates and become highly pressing health problems for our Nation. At the same time, by confronting these conditions, we have tremendous opportunities to prevent the unnecessary disease and disability that they portend for our future."

Secretary of Health and Human Services, Tommy G. Thompson, in 'The Surgeon General's call to action to prevent and decrease overweight and obesity.' (2002)[2].

INTRODUCTION.

The prevalence of overweight and obesity has increased markedly in the U.S. over the last three decades, and is considered to be a leading health problem. Data from the National Health and Nutrition Examination Survey (NHANES) shows that the percentage of obese adults (age 20-74 years) increased from 14.6 percent in 1971-74 to 23.3 percent in 1988-94 to 30.4 percent in 1999-2002.[3] The trend in childhood obesity mirrors increases similar to adult obesity. Among 6-11 year olds, the percent of obese children increased from 4 percent in 1971-74 to 11.3 percent in 1988-94 to 16 percent in 1999-2002.[4] Including children who are at risk of obesity overweight increases the size of the group dramatically -- for example, Hedley et al (2004) reports that in 1999-2002, 31 percent of all children aged 6-11 were either obese or at risk of obesity.[5]

It is widely recognized that obesity is not merely a cosmetic disorder. Obesity has been linked to increased incidence of diabetes, high blood pressure, heart disease, colorectal cancer and gall bladder disease (Powers et al., 1997). An editorial in JAMA (Koplan & Dietz, 1999) reports that approximately 60% of overweight 5- to 10-year-old children already have one associated biochemical or clinical cardiovascular risk factor, such as hyperlipidemia, elevated blood pressure, or increased insulin levels, and 25% have two or more, and that these risk factors in children are very likely to become chronic diseases in adulthood. Allison et al (1999) find that only smoking exceeds obesity in its contribution to total mortality rates in the United States. By

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[2] http://www.surgeongeneral.gov/topics/obesity/calltoaction/toc.htm
[3] http://www.cdc.gov/nchs/data/hus/tables/2003/03hus068.pdf
[4] http://www.cdc.gov/nchs/data/hus/tables/2003/03hus069.pdf
[5] Unlike adults, there are no specific BMI cut-offs that denote obesity among children. Instead, sex-specific BMI-for-age growth charts based on national data from 1963-1994 (provided from CDC) are used, and the convention is that children who are at or above the 95th percentile of the sex-specific BMI for their age-group are classified as 'overweight' or 'obese', and children who are at or above the 85th percentile but less than the 95th percentile are classified as 'at risk of overweight' in some studies, and 'at risk of obesity' in others.

some estimates, the direct and indirect costs of obesity account for 10 percent or more of the national health care budget in the U.S. The hospital costs associated with childhood obesity alone were estimated at $127 million during 1997–1999 (in 2001 dollars), up from $35 million during 1979–1981 (U.S. Department of Health & Human Services).

Given the epidemic proportions of this problem, it is imperative from a policy-making perspective to decipher the factors that influence the likelihood of obesity in children. A report from the National Center for Environmental Health (Cummins & Jackson, 2004) recognizes that community and neighborhood can potentially play important roles in child health – including obesity. However, the report recognizes that there has been relatively limited research that actually documents the nature of the relationship between community, neighborhood, and various aspects of child health, and concludes that “This new research field is wide open.” Particularly, we were able to identify just one study that explored the relationship between neighborhood quality and obesity in children (Lumeng et al, 2006) using data from 10 cities.

In this study, we extend this research by exploring the relationship between children’s body-mass index (BMI) as well as probability of obesity with different aspects of the neighborhood as reported by the mother using linked data from the National Longitudinal Survey of Youth 1979 (NLSY79) and the Children of NLSY79 (CoNLSY). We also analyze the extent to which hitherto ‘unexplained’ differences in the prevalence of obesity between non-Hispanic white children and minority children may be explained by the differences in neighborhood quality. We use several years of data where the mothers in the NLSY79 are asked about how they rate their neighborhood as a place to raise children, and also asked about several specific characteristics about their neighborhood, such as whether run-down buildings, lack of jobs, lack of police, inadequate transport, indifferent neighbors and so forth are a problem. Our results find that overall maternal rating of the neighborhood as a place to raise children is a significant predictor of the child’s BMI or obesity-risk in some models, but that these results are not robust, nor are they statistically significant in models that control for unobserved heterogeneity via ‘fixed effects’. However, one key neighborhood quality – whether the mother believes that there is sufficient police protection in the neighborhood – plays a significant role in predicting child BMI and remains robust across a range of model specifications. Furthermore, it appears that racial and ethnic differences in perceived lack of police protection do, indeed, explain part of the unexplained gap in prevalence of obesity. Finally, we find that this perceived lack of police protection is positively associated with increases in one particular sedentary activity among children – the hours they spend watching television.

BACKGROUND.

Neighborhood Quality, Physical Activity, Obesity.

There is an emerging consensus in the scientific community that environmental factors play a role in the obesity epidemic, and that environmental solutions will be needed to address the problem. Thus, there is growing interest in understanding what is an “obesogenic environment” (Glass et al, 2006), with a focus both on characteristics of the built environment – such as transportation or availability of physical activity facilities, as well as socio-economic deprivation at the community level. Several studies have explored the relationship between neighborhood characteristics and physical activity, though the results have not always been consistent. For example, a report the Centers for Disease Control and Prevention (1999) using data from the Behavioral Risk factor Surveillance System found that higher levels of perceived neighborhood safety correlated with higher levels of physical activity for adults. In contrast, Romero et al (2001) found that children’s own perceptions of neighborhood safety were actually inversely related to self-reported physical activity and BMI. Another study by Brownson et al (2001) found no statistical correlation between neighborhood crime rates and adult physical activity. A review of 19 quantitative studies by Humpel et al (2002) found that neighborhood safety had positive associations with physical activity in some studies, and no association in others, though no negative association was found in any study. Recent work by Gordon-Larsen et al (2006) found that inequality in access to physical-activity facilities were a major predictor of obesity-risk as well as physical activity, and that low socio-economic status neighborhoods as well as high-minority neighborhoods were less likely to have good access to physical-activity facilities. A study by Glass et al (2006) using data on elderly adults in the Baltimore area found that residents of neighborhoods that ranked high in psychosocial hazards had higher BMI, less physical activity, and less healthy diets than their peers in neighborhoods ranking lower in psychosocial hazards, even after controlling for race-ethnicity, education, household wealth and substance use. However, one problem that few of these studies are able to address is the potential endogeneity between neighborhood characteristics and either physical activity or obesity.

Namely, persons with unmeasured personal or cultural propensities for physical activity and energy-balanced lifestyles might be more likely to live in neighborhoods that facilitate the same.

Two recent studies directly test the relationship between neighborhood perceptions and obesity. The first of these, by Burdette et al (2006) use data from the Fragile Families and Child Well-being study. Perceptions of the mothers in that survey about the neighborhood are measured using two separate indexes – a 'neighborhood safety/social disorder' scale based on eight items, like how often the women saw loitering people, drunks/drug dealers, gang activities, and disorderly/misbehaving people in the neighborhood, and a 'collective efficacy' scale based on whether the mothers felt that their neighbors could be trusted, and whether the neighbors would intervene in situations like a fight breaking out in near vicinity or children loitering around. The study finds that mothers living in neighborhoods that they perceived to be relatively unsafe were more likely to be obese than counterparts living in neighborhoods they perceived to be safe, even after controlling for indicators of socio-economic status (SES) like income, education, race/ethnicity and marital status. The second study by Lumeng et al (2006), use a sample of 768 children from 10 cities in the USA, who were part of the National Institute of Child Health and Human Development Study of Early Child care & Youth Development. They obtain neighborhood quality perceptions using a 16-item measure of neighborhood characteristics, that was completed by the mother and at least one other adult guardian in the household (father, stepfather, grandparent) when the child was in the first grade. The items are then divided into two scales – the 'neighborhood safety subscale' and the 'neighborhood social involvement subscale'. They find that, among 7 year old children, those residing in neighborhoods were the perceived neighborhood safety index was in the lowest quartile had a higher risk of being obese than counterparts in other neighborhoods, and this relationship held after controlling for parental marital status, education, race\ethnicity, and child's participation in after-school activities. This study is based on a relatively small sample of children that is 85 percent white, thus its results may not be generalizable.

Finally, extant studies have found a correlation between time spent watching television and obesity among children (Dietz & Gortmaker, 1985; Robinson et al, 1993). There is also some evidence based on randomized controlled trial (Robinson, 1997) suggesting that reducing television viewing may be effective in reducing childhood obesity. However, we are not aware of any study that explores the relationships between parental neighborhood perceptions and the amount of time children spend watching television, and this study contributes towards filling that gap in the literature.

Race-Ethnicity, Socio-Economic Status (SES) & Obesity Among Children

It is well established that obesity disproportionately affects certain minority youth populations. Results from the 1999-2002 National Health and Nutrition Examination Survey (NHANES) found that African American and Mexican American adolescents ages 12-19 were more likely to be overweight (21 percent and 23 percent respectively) than non-Hispanic White adolescents (14 percent). In children 6-11 years old, 22 percent of Mexican American children and 20 percent of African American children were overweight, compared to 14 percent of non-Hispanic white children.[6] Furthermore, the prevalence at which obesity has been increasing in children in the recent years has been even more pronounced and rapid among minority children: between 1986 and 1998, obesity prevalence among African Americans and Hispanics increased 120 percent, as compared to a 50 percent increase among non-Hispanic Whites (Strauss and Pollack, 2001).

A comprehensive review of literature by Stobal and Stunkard (1989) finds that, among adults, there is a consistent negative relationship between higher socioeconomic status (SES) (as measured by income, education, or occupation status) and being obese, but the relationship appears weaker and less consistent in children. While many studies in the above review find that SES is negatively associated with children's obesity risk, other research suggests that this relationship varies by ethnicity. Specifically, the negative relationship between better SES and prevalence of obesity seems more apparent among white children and adolescents, but much less apparent among Black or Mexican-American (and presumably other Latino) adolescents (Troiano and Fegal, 1998). In other words, black and Latino children from families with higher SES are no less likely to be overweight or obese than those in families with lower socioeconomic status. It has been speculated that the difference in the relationship between SES and obesity may be driven by cultural differences in eating habits as well as attitudes towards body weight (Strauss & Knight, 1999). We speculate that one other factor may play a role – specifically, neighborhood quality. Extant research finds that white families are more likely than black and Latino families to move into better and 'non-poor' neighborhoods, even after accounting for

[6] http://www.cdc.gov/nchs/products/pubs/pubd/hestats/overwght99.htm

income (South & Crowder, 1997; Hango, 2002), and that black families are less likely than non-black families to convert dissatisfaction with neighborhood to an actual move (South & Deane, 1993). If better neighborhood quality is negatively related to childhood obesity, then racial and ethnic differences in neighborhood quality among families of comparable SES might explain some of the racial and ethnic differences in children's obesity among families of comparable SES.

DATA & METHODS.

Theoretical Framework & Empirical Models

In this paper, we focus instead on estimating a simple "production function" of a child's BMI percentile (or, alternatively a dummy variable for obesity) as a function of measurable activities (essentially TV watching), the mother's perception of neighborhood safety characteristics, and various other family characteristics that might have a bearing on exercise and eating patterns.

We posit a very simple model that is broadly within the framework of Grossman's model of health, where parents attempt to optimize 'healthy weight' for the child, where the arguments in the production function for healthy weight include the child's caloric intake, and caloric expenditure through exercise and activity. Thus, the child's BMI can be written as a 'production function' of these inputs:

$$BMI = F(C_{(+)}, E_{(-)}, S_{(+)}; R) \qquad \text{(i)}$$

Where C represents caloric intake, E represents time spent in energetic activity, and S represents time spent in sedentary activities.[7] R represents other 'residual' unobserved factors, including genetics. The signs in parenthesis indicate whether each of these components is expected to increase or decrease BMI. Fully specifying and expanding the model -- which would yield demand functions for caloric intake and types of activities as functions of the market prices, shadow prices of time, and income – is beyond the scope of this paper. However, we can posit that neighborhood quality is a component in the demand functions of each of the above, since it plays a role in determining the 'price' of each of the components.

[7] Of course, assuming that all available time in a day is divided either into sedentary activities or energetic activities, these could be seen as mutually exclusive and exhaustive. Therefore, including both in the function might be considered redundant.

Specifically, C = C (N, X) ; E = E (N, X); S = S (N, X). (ii)

Where 'N' is neighborhood quality, and 'X' represents other demographic and socio-economic characteristics that play a role in determining market or shadow prices, as well as income and preferences.

Poor-quality and dangerous neighborhood quality could make outdoor activities – be it playing outdoors or walking to schools and recreational facilities -- riskier and hence more 'costly'. Thus children may be kept indoors more often by parents, and spend more time in a sedentary state. Poor-quality and dangerous neighborhoods may also make it more difficult for parents to acquire healthy foods like fresh produce, which in turn could contribute to an unhealthy diet by the children. On the other hand, it could be argued that, if older children in particular had more license to be outdoor and to walk to various places, then they may also be able to go to stores or fast-food establishments and buy calorically dense foods without their parents' supervision. Furthermore, it could be argued that other neighborhood characteristics – for example, the lack of sidewalks – could make the issue of outdoor activities moot even if the neighborhood was otherwise perceived as high-quality and safe. Thus, it is difficult to predict *a priori* what effects neighborhood quality will have on each of the arguments in the production function for healthy-weight, and thus, ultimately, how neighborhood quality will affect a child's weight, and this question must be empirically determined.

To explore this empirically, we start by Substituting (ii) into (i) and creating a reduced-form BMI production function as

$$BMI = F(N, X, R) \quad \text{(iii).}$$

Based on equation (iii), we posit a simple linear specification model such that the BMI of the i^{th} child in the t^{th} period is expressed as

$$BMI_{it} = \alpha N_{it} + X_{it}\beta + R_{it} + \varepsilon_{it} \quad \text{(iv)}$$

Empirical studies on children's weight often use dichotomous models to investigate what covariates influence the odds of children being obese or overweight. However, a recent study by Field et al (2005) reports that, simply being in the upper half of the age and gender specific BMI distribution is a good predictor of becoming obese as an adult as well as developing health problems like hypertension in early adulthood. This suggests that, in addition to investigating what factors correlate with the risk of obesity/overweight in children, researchers should also be concerned about what factors simply predict a higher BMI in children. Hence, we estimate models with continuous measures of BMI (specifically, the BMI percentile score as well as the BMI-z score), in addition to linear probability models when the dependent variable is a binary indicator of whether the child is obese or not. To account for the fact that there are repeated observations for each child, as well as multiple children of the same mother in the data, standard errors are clustered at the maternal level.

We face the standard dilemma here that R_{it}, which represents unobserved determinants of the child's obesity, may also be correlated to neighborhood quality. The choice of neighborhood is not a purely exogenous variable. For example, it may be speculated that families who have unobserved preferences for sedentary pastimes may disproportionately select into neighborhoods which are not conducive to outside activities. It may also be speculated that there may be certain maternal characteristics -- for example, unobserved mental-health issues, that may correlate both to her perceiving the neighborhood to be unsafe and her being unable to properly monitor the caloric intake and physical activities of her children. Thus, failing to account for these unobservables are likely to result in biased estimates of the effects of neighborhood quality on child bodyweight. We initially approach this problem by explicitly controlling for past maternal BMI in the model. The argument here is that past maternal BMI may serve both as a proxy for the genetic endowments in the family as well as the mother's unobserved preferences for caloric intake and physical activity, but it will not in itself be affected by current neighborhood quality (though one might argue that some mothers will continue to be in neighborhoods that are identical or very similar to the ones they grew up in themselves). Thereafter, we also use the fairly standard methods of 'fixed effects' models, where we first estimate the models after including mother-level fixed effects, and thereafter we estimate them including child-level fixed effects. We have a slight preference for the former -- since the neighborhood quality is based on the mother's reports, arguably the primary concern is the correlation of maternal unobserved characteristics with her perceptions about the neighborhood as well as her children's bodyweight outcomes. We recognize the inherent shortcomings of the fixed effects methods -- their failure to account for unobservables that may be time-variant over the period of study, their tendency to accentuate the effects of measurement error, and the loss of statistical power they result in.

However, we believe that they are the best method we have to minimize the effects of bias-inducing unobservables in this study.[8]

One of the specific contributions of this paper is to explore whether differences in neighborhood quality can explain any of the hitherto unexplained differences in BMI and obesity-risk between minority and non-minority children. To do this, we start by estimating the following empirical model:

$$N_{it} = M_i\mu + X_{it}\lambda + u_{it} \qquad \text{(v)}$$

Where M_i are binary indicators of the race-ethnicity of the mother – one binary indicator to denote whether she is black, and one binary indicator to denote whether she is of Hispanic origin. X_{it} is now defined (with slight abuse of notation) as a vector of indicators of socio-economic and demographic status other than race-ethnicity. The purpose is to statistically test whether the above minority populations are likely to have worse perceptions of their neighborhood compared to their white peers after controlling for the other socio-economic and demographic characteristics.

We follow this up with a Blinder- Oaxaca decomposition. The Blinder-Oaxaca decomposition Blinder (1973) Oaxaca (1973) is a technique that was originally used in labor market analysis to compare mean differences between two groups in the dependent variable of a regression model. Here we use the technique to examine mean differences in the BMI percentile score of groups of children. We compare Non-Hispanic Whites (hereafter, "Whites") to Blacks and, later, "Whites" to Hispanics using the approach discussed in Jann (2008).

The Oaxaca-Blinder decomposition can be summarized with the expression

$$R= [E(X_w) – E(X_b)] B_b + E(X_b)'(B_w – B_b) + [E(X_w – E(X_b]' (B_w-B_b)$$

This can be abbreviated as

$$R = E + C + I$$

Where:

$$E = [E(X_w) – E(X_b)] B_b$$

$$C = E(X_b)'(B_w – B_b) \text{ and}$$

$$I = [E(X_w – E(X_b]' (B_w-B_b)$$

[8] We debated using instrumental-variable techniques, but were not aware of any viable instruments that would correlate to maternal perceptions of the neighborhood, but not have any direct bearing on the BMI of her children.

Assume that we estimated a linear model for the BMI percentile score for Whites (subscript w) and then again for Blacks (subscript b). Here, E represents the difference in the mean values of right hand side regressors $E(X_w) – E(X_b)$ (i.e. the "endowments") multiplied by the regression coefficients of the Black group (B_b). That is, what Blacks would get if their endowments were brought to the White level. C is the mean level of the endowments of the Black group $E(X_b)$ multiplied by the difference in the regression coefficients of the two groups ($B_w – B_b$), that is what Blacks would get from their endowments if their regression coefficients were brought to the White values. I is an interaction term showing the simultaneous effect of differences in endowments and regression coefficients.

Data

The primary sources of data for this project are the National Longitudinal Survey of Youth 1979 cohort (NLSY79) and the Children of the NLSY79 (CoNLSY). We use survey year data from 1992 to 2000, which are the only years when questions were asked about neighborhood quality.

The NLSY79 is a multi-purpose panel survey that originally included a sample of 12,686 individuals who were within the age-range of 14 to 21 years of age on December 31, 1978. This original sample consists of three subsamples: a cross-sectional sample of 6111 individuals representative of the non-institutionalized civilian U.S. population within the prescribed age-range; a supplemental sample designed to oversample Hispanics, blacks, and economically disadvantaged white U.S. population within the prescribed age-range; and a sample of 1280 respondents designed to represent U.S. military personnel within the prescribed age range.

Annual interviews were conducted beginning in 1979, with a shift to a biennial interview mode after 1994. The NLSY79 provides extensive information on all its respondents, including labor force activities, demographic characteristics, marital status, income, education, spousal characteristics, health status, and other socio-economic characteristics. In year 2000, 4,113 of the original 6,283 female respondents remained in the sample. Of the missing 2,170, 441 were members of a military over-sample dropped in 1984, 890 were from an over-sample of economically disadvantaged white people dropped in 1990, and 105 were deceased. The remainder is lost due to attrition

The CoNLSY sample is comprised of all children born to NLSY79 female respondents who live with their mother fulltime or at least part time, who have been independently followed and interviewed in various ways biennially, starting in 1986. Children who cease to live with their mothers altogether following a divorce are no longer included. The records from NLSY79 and CoNLSY can be easily linked via the mother's sample identification number. As of 2000, a total of 11,205 children had been identified as having been born to the original 6,283 NLSY79 female respondents, mostly during the years that they have been interviewed (of course, an unknown number of additional children may have been born to respondents after they attritioned or were dropped from the sample). Given the design of the CoNLSY survey, not all the children are assessed in each survey year. Children 'enter' the dataset after they are born, and once they reach the age of 15, they are dropped from this survey.[9] Given this design, there are more very young children entering the CoNLSY dataset in the early years, when the mothers in the NLSY79 are in their peak childbearing years; whereas in the later years there are fewer children in the dataset overall (since more have exceeded the age of 15), and fewer very young children are entering the dataset since fewer NLSY79 female respondents are giving birth.

Neighborhood Perceptions: In 1992, the NLSY79 started to include a series of questions addressed to the mothers in the dataset about their perceptions about their neighborhood. They were asked how they rated their neighborhoods overall as a place to raise children, with potential answers being 'excellent', 'very good', 'good', 'fair' and 'poor'. Thereafter the respondents are specifically asked about selected issues, including neighbors lacking respect for law and order, crime and violence, abandoned and run down buildings, lack of police protection, lack of public transportation, parents who do not supervise children, neighbors who are indifferent about other neighbors, and people unable to find jobs. For each of these issues, respondents state whether they consider it 'a big problem', 'somewhat of a problem' or 'not a problem' in their neighborhoods. These questions were discontinued after the 2000 survey.

Height & Weight Information: The CoNLSY survey covers numerous developmental and health aspects of the children. For all children below the age of 14, the child's height and weight at the time of interview are recorded. In the majority (approximately 65%) of cases, interviewers measure height by tape measure and weight using a scale. In the remaining cases

[9] Once the children are over the age of 15, they leave the CoNLSY and enter another survey called the 'NLSY79 Young Adults.'

height and weight are reported by the child's mother. We include all child-observations, regardless of whether the height and weight were mother-reported or interviewer-measured. However, we do include an explicit binary indicator to identify those cases where height and weight were interviewer-measured.

While the above height and weight information can be used to create a conventional BMI score using the standard formula of (weight in lbs x 703)/ $(\text{height in inches})^2$, it should be noted that, unlike adults, absolute BMI scores carry less meaning for growing-age children in terms of health-markers. Therefore, we follow the convention in the literature and alternately use BMI-z scores and BMI-percentile scores, which show how the child's BMI compares with his or her age and gender specific BMI distribution.[10] Equation (iv) is estimated using both BMI-z and BMI-percentile scores. We also follow the convention of denoting a child to be obese if his or her BMI is at or above the 95^{th} percentile of the age and gender specific BMI distribution.

Other Variables: We pay special attention to one particular sedentary activity that might contribute to weight gain – television watching. The CoNLSY asks a series of questions in each survey year to the children's mothers about how many hours the child watches TV on a typical weekday, and how many hours the child watches TV on a typical weekend day.

Finally, we draw upon the rich array of information on socio-economic and demographic characteristics that are available in the NLSY79 and CoNLSY for all respondents to control for other socio-economic and demographic characteristics. Since current maternal BMI may also be a function of contemporaneous neighborhood quality (since poor neighborhood quality may also limit adult physical activity), we will use maternal BMI based on height and weight information from the first time it was asked in the NLSY79 – in the 1981 survey.

RESULTS & DISCUSSION

Table 1 presents descriptive statistics. The mean BMI-percentile in the pooled full sample is 56.9, and the obesity rate is about 17 percent. About 56 percent of the pooled full sample report that their neighborhood is a 'very good' or 'excellent' place for children (hereafter referred to as 'very good'), while 23 percent rate it as 'fair' or 'poor' (hereafter referred to as

[10] The BMI-z and BMI-percentile scores were created using SAS programs provided by the CDC at http://www.cdc.gov/nccdphp/dnpa/growthcharts/resources/sas.htm. We acknowledge our debt to Laura Argys, who played a key role in using the programs and generating the BMI-z and BMI-percentile values. These scores were initially created for use in an ongoing project by Argys & Sen (2008).

‘not good’). The remaining rate it as ‘good’. Among the specific characteristics, the one that is perceived as at least somewhat of a problem are ‘unsupervised children’ (45.6 percent), followed by lack of respect for law and order (36.7 percent), jobless people (35.2 percent), indifferent neighbors (33.2 percent), crime & violence (30.4 percent), lack of transport (30.1percent), lack of police protection (25.4 percent) and run-down buildings (19.9 percent). Not surprisingly, the black and Hispanic sub-samples rate their neighborhoods more poorly and report more problems than does the white sub-sample. This is probably due at least in part to the fact that the black and Hispanic sub-samples also have lower family income, lower levels of educational attainment, and higher proportions of them live in central-cities compared to the white sub-sample.

Table 2 presents three sets of results from regressing measures of the child’s bodyweight (BMI-percentile, BMI-z score, and a binary indicator of obesity) upon the overall neighborhood rating and other characteristics. The initial specification includes demographic and geographic characteristics, but no other indicators of socio-economic status. The second specification includes measures of socio-economic status – maternal education, presence of a father in the household, total family income and maternal employment status. The third and final specification additionally includes maternal BMI as measured in 1981. Perceived neighborhood quality is captured by two binary indicators of ‘very good’ and ‘not good’, with the basis for comparison being whether the neighborhood is ‘good’. It can be seen that being in a not-good neighborhood is associated with a higher BMI-percentile in the first two model specifications, and with a higher BMI-z score in the first model specification. However, once the full range of familial socio-economic characteristics as well as maternal BMI from 1981 are controlled for, no further statistical associations remain between any of the outcome variables and the neighborhood quality measures. Models using maternal fixed effects and child fixed effects also failed to find any statistical relationship between the outcome variables and the neighborhood quality measures, and are available upon request.

We repeated the estimations after substituting specific neighborhood characteristics (that is, the binary indicator for whether a specific issue was at least ‘somewhat’ of a problem) in place of the general rankings. These results are presented in Table 3. For brevity, only the results pertaining to the neighborhood characteristics are presented. It is seen that most characteristics do not have any significant relationship to the BMI outcomes or obesity risk, with the exception of the problems of indifferent neighbors and inadequate police protection. The children of mother's who report that indifferent neighbors are a problem on average belong to a 1.84 higher BMI-percentile and are at a 2 percent higher risk of obesity compared to children whose mothers do not report it as a problem. The children of mother's who report that inadequate police protection is a problem on average belong to a 3.65 higher BMI-percentile and are at a 3 percent higher risk of obesity compared to children whose mothers do not report it as a problem.

Thus, we used only these two characteristics to estimate further models, including those that controlled for the mother's BMI from 1981, and those that included maternal and child fixed effects. We found that there no longer remained any significant relationship between the problem of indifferent neighbors and the outcomes. However, inadequate police protection continued to have a significantly negative effect both on the BMI-percentile and BMI-z-scores in almost all the model specifications, though not always on the risk of obesity per se. These results are presented in Table 4. Results pertaining to indifferent neighbors in alternate model specifications are available upon request.

While the above results give reasonably convincing evidence that residing in neighborhoods that mothers perceive as lacking enough police protection can increase a child's bodyweight, it would be useful to be able to surmise whether the causal pathway occurs because, in such neighborhoods, children do not get enough physical activity, or whether it influences their caloric intake. Unfortunately, the CoNLSY datasets provide very limited information in this regard. The only 'pathway' we are able to consider is one particular sedentary activity by children – the hours they spend on average per day during weekdays and weekends watching television. Table 5 presents results from estimating regression equations of hours of TV-watching on inadequate police protection and the set of controls used in earlier models. It is seen that mothers reporting inadequate police protection is associated with children watching about 0.47 hours more television on average during weekdays. The estimated size of the effect falls to 0.32 hours more of television in models that include maternal fixed effects, but it remains significant. It ceases to be significant in models that include child-level fixed effects. No significant relationship exists between inadequate police protection and TV-watching during weekends in either model with fixed effects. This provides some evidence that lack of police protection increases the amount of a particular sedentary activity – TV-watching during weekdays. However, the dataset simply lacks information on a host of other potential sedentary or energetic activities that would be required to provide a more complete picture of the causal pathways through which this particular neighborhood characteristic might affect child bodyweight.

Thereafter, we turn to analyzing whether differences in the levels of police protection as well as differences in the estimated effects of police-protection can explain any part of the variation in children's bodyweight across race-ethnicity. To do this, we first verify that there are, indeed, differences in levels of (perceived) police protection between white mothers, black mothers and Hispanic mothers that cannot be explained by differences in income, education, and other such factors. Table 6 reports results from linear probability models where lack of police protection, and subsequently a general rating of the neighborhood as not good, are both regressed on race-ethnicity as well as all the socio-economic and geographic controls in the other models. Results show that, compared to white mothers, black mothers have a 13 percent higher probability and Hispanic mothers have a 8.2 percent higher probability of reporting that lack of police protection is at least somewhat of a problem in their neighborhood. Results also show that, compared to white mothers, black mothers have about a 16.3 percent higher probability and Hispanic mothers have about a 8.3 percent higher probability of reporting that the overall quality of the neighborhood was not good. This provides support for there being differences across race-ethnicity in the levels of overall neighborhood quality as well as the lack of police protection in the neighborhood that are not explained by differences in socio-economic status across race-ethnicity. This provides motivation for doing an Oaxaca-Blinder decomposition.

As a first step, we re-estimate the models for effects of lack of police-protection on BMI-percentile and the probability of overweight separately for whites, blacks and Hispanics.[11] Lack of police-protection appears to have stronger impacts on the BMI-percentile of black and Hispanic children more so than white children, although the effects on the probability of becoming obese per se are not significant in any of the models. We focus on BMI-percentile for purposes of doing the Oaxaca-Blinder decomposition.

Table 8 shows the Oaxaca-Blinder decomposition results. This is based on a fixed effects model (previously discussed in table 7) where the BMI percentile score is the dependent variable and the mother is the fixed factor for her children. The left hand side of the table (columns 1 to 4) has the White v. Blacks comparison; the right hand (columns 5 to 8) is the White v. Hispanic

[11] We use BMI-percentile in the Oaxaca Blinder decomposition, hence these are the results we report. Results with BMI-z-scores are available upon request.

comparison. As shown in the upper left part of the table, the mean predicted BMI percentile scores of Whites and Blacks are respectively 55.06 and 60.46 with a statistically significant difference (at 5%) of -5.40 BMI percentile points. This difference can be broken into the E part (-2.95, z=-0.96, p=0.338) that is due to differences in the levels of the regression variables, the C part that is due to differences in the regression coefficients (-5.62 , z=-2.69, p=0.007) and the I part (3.16, z=0.86, p=0.388) due to the interaction between levels and coefficients respectively. Only the overall difference due to the regression coefficients is statistically significant.

In the lower part of the table, we further examine the decomposition at the level of the individual variables and their coefficients. We will discuss in detail two variables, police present and Dad present in the home that have important effects.

Let us consider first the effect of the "not enough police" dummy variable. Its mean values for whites and blacks are respectively .165 and .365 and the respective regression coefficients are 1.268 (t=.89, p=0.37) and 2.975 (t=1.86, p=0.06) which we obtain from previous tables _________ . The decomposition effects are the following.

Levels effect: $E_{no\_police} = (.165 - .365) * 2.975 = -.599$ (z=-1.85, p=0.064)

Coefficients effect: $C_{no\_police} = (0.365) * (1.268 – 2.975) = -.626$ (z=0.80, p=0.426)

Interaction effect: $I_{no\_police} = (.165 - .365) * (1.268 – 2.975) = 0.344$ (z=0.80, p=0.426)

$E + C + I = -0.881$

Thus the total effect of not enough police is - 0.599 -.626 + 0.344 = -0.881. That is, the differential perception of the absence of enough police contributes to Black being not quite a full percentile point higher in their BMI percentile scores relative to Whites. However, only the portion due to differences in the levels (-0.599) is statistically significant.

We also briefly discuss one other variable that appeared significant and important in the decomposition -- a dad being present in the home. Here the effects are:

$E_{Dad\ present} = (.772 - .347) * (-6.97) = -2.96$ (z =-2.39, p=0.017)

$C_{Dad\ present} = (0.347) * (-0.101 - -6.97) = 2.36$ (z= 1.99, p=0.046)

$I_{Dad\ present} = (.772 - .347) * (-0.101 - -6.97) = 2.92$ (z = 1.99, p= 0.046)

$E + C + I = 2.33$

Here Dad's presence in the home is statistically significant for the levels, coefficient and interaction effects with the net result being that Black children would be 2.33 percentile points lower in terms of BMI were more Dads present in the home.

The right side of Table X shows the comparison of "Whites" v. Hispanics. Here there is a similar but weaker story. The difference in mean BMI percentile scores (-1.90= 55.05 for Whites – 56.95 for Hispanics) is statistically significant (z=-2.64 p=0.008) but only about one third as large as the White v. Black comparison. Overall, differences in the levels of the variables and in the coefficients were both statistically significant. When we look into the details, the perception that there are not enough police is statistically significant and rather large (-0.57 z=-1.84, p=0.06) in terms of the levels of the variables but not statistically significant in terms of the coefficients or the interaction. The terms related to no Dad being present in the home are not significant in any parts of the decomposition.

Additionally, we ran the decomposition for a simple regression model where the mother's BMI in 1981 (mombmi81) was used as a quasi control for fixed effects. Here the decomposition showed for the White v. Black comparison that differences in the levels and coefficients were both significant overall. The perception of not enough police was itself significant only in the levels. For the "White" v. Hispanic comparison, none of the overall effects were significant. The perception of not enough police was significant only in the levels. Thus for the simple regression model with quasi fixed effects, results were consistent with what we argue to be the 'true' (and preferred) fixed effects model but weaker and less frequently significant. It should also be noted that dad present in the home was not significant in levels, coefficients or the interaction.

CONCLUSION

Our paper addresses the relatively unexplored question of the effects of contextual factors – such as neighborhood quality – on children's bodyweight and obesity-risk. The main advantages of this study include the nationally representative nature of the data, as well as the longitudinal nature of the data, which allows us to control for time-invariant confounding factors at the maternal level. The primary disadvantage is that the key variable of interest – neighborhood quality, is based purely on mother reports with no external validation. In summary, our paper finds that overall neighborhood quality is not a particularly strong determinant of children's bodyweight outcomes. However, one specific neighborhood characteristic – the perceived lack of police protection, is a significant determinant of such bodyweight outcome, and may also be associated with one specific sedentary activity – television watching.

Furthermore, differences in perceived levels of police-protection by whites, blacks and Hispanics do explain a part of the mean difference in bodyweight across these sub-populations.

It is not entirely clear why police protection in particular plays a significant role in effecting children's bodyweight, when other neighborhood characteristics – such as crime and violence, or lack of respect for law and order, do not. One might speculate that, at the margin, visible police presence might reduce certain activities that would make parents fearful of letting their children outdoors -- such as drug-peddling, loitering, or physical violence and bullying on the playground,

Since this is one of the first papers that explore the relationship between neighborhood quality and children's bodyweight outcomes using a national-level dataset, it seems clear that further research is needed on this topic to validate these results before any definitive policy predictions can be made. On the other hand, it can be argued that these results are somewhat promising from a policy perspective, because while policy-makers can probably do little about indifferent neighbors, unsupervised children, or a general lack of respect for law and order, it may be comparatively easy to provide resources that increase police-protection in low-income and minority neighborhoods.

Table 1. Descriptive Statistics

Variable	Description	Full Sample (12256)		White (N=6434)		African-Americans (N=3431)		Hispanic (N=2391)	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
bmipct	Child BMI Percentile	56.904	(34.508)	55.021	(34.002)	60.457	(34.608)	56.871	(35.318)
bmiz	Child BMI-z score	0.134	(1.881)	0.056	(1.783)	0.287	(1.950)	0.125	(2.022)
vow	Binary indicator child is obese	0.171	(0.376)	0.144	(0.351)	0.214	(0.410)	0.180	(0.384)
ngh_rate_n~d	Neighborhood rates ‘fair’ or ‘poor’	0.230	(0.421)	0.123	(0.328)	0.386	(0.487)	0.292	(0.455)
ngh_rate_v~d	Neighborhood rates ‘excellent’ or ‘very good’	0.563	(0.496)	0.702	(0.457)	0.381	(0.486)	0.452	(0.498)
ngh_nolaw	No respect for law & order a problem	0.367	(0.482)	0.283	(0.451)	0.504	(0.500)	0.394	(0.489)
ngh_crime	Crime and violence a problem	0.304	(0.460)	0.191	(0.393)	0.473	(0.499)	0.365	(0.481)
ngh_bldg	Run-down buildings a problem	0.199	(0.400)	0.139	(0.346)	0.307	(0.462)	0.206	(0.405)
no_police	Lack of police protection a problem	0.252	(0.434)	0.165	(0.371)	0.365	(0.482)	0.323	(0.468)
no_trans	Lack of transport a problem	0.301	(0.459)	0.262	(0.440)	0.373	(0.484)	0.299	(0.458)
no_super	Unsupervised children a problem	0.456	(0.498)	0.394	(0.489)	0.571	(0.495)	0.459	(0.498)
no_care	Uncaring neighbors a problem	0.332	(0.471)	0.263	(0.440)	0.426	(0.495)	0.383	(0.486)
no_jobs	Too many jobless people a problem	0.354	(0.478)	0.213	(0.410)	0.556	(0.497)	0.443	(0.497)
male	Child is male	0.505	(0.500)	0.506	(0.500)	0.489	(0.500)	0.526	(0.499)
afra	Mother is African-American	0.281	(0.450)	0.000	(0.000)	1.000	(0.000)	0.000	(0.000)
hisp	Mother is Hispanic	0.195	(0.396)	0.000	(0.000)	0.000	(0.000)	1.000	(0.000)
childage	Child’s age	7.197	(2.531)	7.017	(2.535)	7.469	(2.518)	7.291	(2.503)
scaletape	BMI based on scale & tape measures by interviewer	0.697	(0.459)	0.679	(0.467)	0.730	(0.444)	0.700	(0.458)
mom_age	Mother’s age	26.585	(3.881)	27.169	(3.752)	25.766	(3.935)	26.196	(3.881)
no_smsa	Does not live in MSA	0.173	(0.378)	0.207	(0.405)	0.158	(0.365)	0.103	(0.304)
cen_city	Lives in central city	0.164	(0.371)	0.079	(0.269)	0.294	(0.456)	0.207	(0.405)
momnowork	Mother not employed outside home	0.215	(0.411)	0.199	(0.400)	0.220	(0.415)	0.250	(0.433)
dadpresent	Father in household	0.628	(0.483)	0.772	(0.420)	0.347	(0.476)	0.647	(0.478)
tnfaminc_r~l	Annual family income (real)	60883.070	(104320.200)	73692.610	(118856.400)	40655.150	(72355.050)	55639.230	(96230.120)
momed12_15	Mother has some college	0.700	(0.458)	0.680	(0.467)	0.737	(0.440)	0.701	(0.458)
momed16_20	Mother has at least 4 yrs of college	0.189	(0.392)	0.264	(0.441)	0.116	(0.320)	0.096	(0.294)
mombmi81	Mother’s BMI, 1981	21.887	(3.509)	21.388	(3.270)	22.604	(3.857)	22.196	(3.387)

Table 2. Regression Results for Child BMI & Overall Neighborhood Ratings.

	Model 1			Model 2			Model 3		
	BMI-percentile	BMI-z score	Obese	BMI-percentile	BMI-z score	Obese	BMI-percentile	BMI-z score	Obese
	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)
ngh_rate_n~d	2.421 (2.24)	0.024 (2.25)	0.059 (0.98)	2.350 (2.13)	0.017 (1.56)	0.072 (1.21)	1.710 (1.57)	0.043 (0.73)	0.011 (0.99)
ngh_rate_g~d	0.999 (1.03)	0.017 (1.70)	0.029 (0.56)	0.792 (0.81)	0.011 (1.08)	0.027 (0.53)	0.309 (0.32)	0.005 (0.11)	0.006 (0.61)
male	0.306 (0.37)	0.028 (3.28)	0.058 (1.41)	0.413 (0.51)	0.029 (3.34)	0.064 (1.55)	0.567 (0.70)	0.071 (1.73)	0.030 (3.59)
afra	4.461 (3.64)	0.070 (5.52)	0.200 (3.20)	4.052 (3.18)	0.064 (4.79)	0.196 (3.02)	2.613 (2.08)	0.130 (2.03)	0.050 (3.78)
hisp	2.261 (1.63)	0.046 (3.55)	0.101 (1.42)	2.064 (1.47)	0.039 (2.96)	0.103 (1.45)	1.173 (0.86)	0.062 (0.90)	0.030 (2.29)
kidage	1.379 (5.76)	-0.007 (-2.83)	0.068 (5.46)	1.314 (5.46)	-0.007 (-2.97)	0.066 (5.22)	1.058 (4.44)	0.054 (4.24)	-0.010 (-4.14)
scaletape	-7.114 (-9.36)	-0.085 (-9.97)	-0.369 (-8.93)	-7.135 (-9.41)	-0.085 (-10.06)	-0.368 (-8.96)	-7.040 (-9.34)	-0.364 (-8.87)	-0.084 (-10.04)
mom_age	0.155 (0.71)	0.000 (-0.07)	0.005 (0.43)	0.193 (0.87)	0.001 (0.44)	0.005 (0.47)	-0.001 (0.00)	-0.004 (-0.32)	-0.001 (-0.47)
no_smsa	0.361 (0.28)	0.006 (0.50)	0.049 (0.71)	0.220 (0.17)	0.002 (0.16)	0.047 (0.69)	-0.431 (-0.35)	0.017 (0.26)	-0.005 (-0.38)
cen_city	1.423 (1.18)	0.011 (0.80)	0.055 (0.88)	1.359 (1.13)	0.010 (0.76)	0.056 (0.89)	0.874 (0.74)	0.034 (0.55)	0.005 (0.42)
momnowork				-4.605 (-4.40)	-0.028 (-2.85)	-0.231 (-4.01)	-4.386 (-4.22)	-0.221 (-3.83)	-0.026 (-2.68)
dadpresent				-0.872 (-0.83)	-0.002 (-0.20)	-0.009 (-0.17)	-0.900 (-0.86)	-0.011 (-0.20)	-0.003 (-0.24)
tnfaminc_r~l				0.000 (-0.73)	0.000 (-2.81)	0.000 (-1.05)	0.000 (-0.38)	0.000 (-0.69)	0.000 (-2.47)
momed12_15				-0.702 (-0.47)	-0.011 (-0.67)	0.018 (0.21)	-0.086 (-0.06)	0.046 (0.52)	-0.005 (-0.33)
momed16_20				-1.797 (-0.96)	-0.051 (-2.59)	-0.006 (-0.06)	-0.623 (-0.34)	0.047 (0.46)	-0.039 (-2.06)
mombmi81							1.470 (10.05)	0.067 (8.72)	0.015 (9.97)

Notes: All models also include region fixed effects and year fixed effects. Standard errors clustered upon mothers.

Table 3. Child BMI, Obesity Risk, and Specific Neighborhood Characteristics.

		BMI-percentile	Obese
		β (t-stat)	β (t-stat)
ngh_nolaw	No respect for law & order a problem	0.94 (1.11)	-0.004 (-0.50)
ngh_crime	Crime and violence a problem	1.13 (1.27)	0.007 (0.82)
no_super	Unsupervised children a problem	0.27 (0.33)	-0.001 (-0.33)
ngh_bldg	Run-down buildings a problem	0.44 (0.43)	-0.005 (-0.49)
no_jobs	Too many jobless people a problem	1.09 (1.19)	0.01 (0.99)
no_trans	Lack of transport a problem	0.39 (0.52)	-0.003 (0.39)
no_care	Uncaring neighbors a problem	1.84 (2.23)	0.02 (2.31)
no_police	Lack of police protection a problem	3.65 (3.98)	0.03 (2.82)

Notes: All models also control for the variables included in model 2, Table 2, as well as region and year fixed effects. Standard errors clustered upon mothers.

Table 4. Child BMI, Obesity Risk, and Lack of Police Protection.

	BMI-percentile	BMI-z score	Obese
	β (t-stat)	β (t-stat)	β (t-stat)
Models excluding mother's BMI	3.65 (3.98)	0.17 (3.33)	0.03 (2.82)
Models including mother's BMI	3.10 (3.46)	0.14 (2.85)	0.02 (2.27)
Models with maternal fixed effects	2.44 (2.64)	0.12 (2.30)	0.016 (1.45)
Models with child fixed effects	1.93 (2.04)	0.102 (1.75)	0.011 (1.08)

Notes: All models also control for the variables included in model 2, Table 2, as well as region and year fixed effects. Standard errors clustered upon mothers.

Table 5: Estimated Relationship Between TV-Watching & Lack of Police Protection.

	Regular Model		Maternal Fixed Effects		Child Fixed Effects	
	tv_wkday	tv_wkend	tv_wkday	tv_wkend	tv_wkday	tv_wkend
	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)	β (t-stat)
no_police2	0.470 (3.15)	0.420 (3.48)	0.316 (2.29)	-0.017 -(0.15)	0.201 (1.32)	-0.033 -(0.28)
male	0.094 (0.94)	0.173 (2.07)	0.120 (1.14)	0.122 (1.45)	--	--
afra	1.981 (10.63)	1.966 (12.54)	--	--	--	--
hisp	1.113 (5.71)	0.896 (5.65)	--	--	--	--
kidage	0.296 (8.69)	0.340 (12.30)	0.032 (0.27)	0.080 (0.85)	0.055 (0.27)	-0.105 -(0.65)
scaletape	0.134 (1.21)	0.149 (1.71)	0.138 (1.33)	0.095 (1.15)	0.115 (0.95)	0.102 (1.10)
mom_age	-0.030 -(1.02)	0.003 (0.13)	-0.261 -(2.20)	-0.224 -(2.37)	-0.064 (0.00)	0.370 (0.00)
no_smsa	-0.027 -(0.17)	-0.090 -(0.67)	-0.241 -(1.06)	-0.284 -(1.57)	-0.284 -(1.10)	-0.342 -(1.71)
cen_city	0.060 (0.32)	0.112 (0.70)	0.252 (1.30)	-0.019 -(0.12)	0.359 (1.63)	-0.006 -(0.04)
momnowork	0.228 (1.47)	-0.012 -(0.09)	0.012 (0.07)	-0.116 -(0.84)	-0.173 -(0.89)	-0.156 -(1.03)
dadpresent	-0.195 -(1.30)	-0.361 -(2.96)	0.279 (1.38)	0.035 (0.22)	0.140 (0.50)	0.088 (0.41)
tnfaminc_r~l	0.000 -(1.86)	0.000 -(1.38)	0.000 (0.37)	0.000 (0.51)	0.000 (0.12)	0.000 (0.54)
momed12_15	-1.141 -(4.32)	-0.788 -(3.74)	-0.232 -(0.36)	0.259 (0.50)	-0.173 -(0.22)	-0.092 -(0.15)
momed16_20	-2.558 -(9.13)	-1.758 -(7.65)	-0.026 -(0.03)	0.177 (0.22)	0.119 (0.10)	-0.159 -(0.18)

Notes: All models also control for region and year fixed effects. Standard errors clustered upon mothers.

Table 6: Predictors of Neighborhood Perceptions.

	Lack of Police Protection A Problem	Overall Neighborhood Rating 'Fair' or 'Poor'
	β (t-stat)	β (t-stat)
afra	0.129 (7.07)	0.163 (9.03)
hisp	0.083 (3.77)	0.082 (4.09)
kidage	0.003 (1.03)	-0.004 (-1.22)
mom_age	-0.001 (-0.32)	-0.003 (-1.10)
no_smsa	0.047 (2.49)	-0.029 (-1.85)
cen_city	0.119 (6.52)	0.116 (6.20)
momnowork	0.044 (2.51)	0.056 (3.58)
dadpresent	-0.035 (-2.33)	-0.125 (-8.61)
tnfaminc_r~l	0.000 (-2.91)	0.000 (-5.63)
momed12_15	-0.108 (-4.11)	-0.115 (-4.59)
momed16_20	-0.180 (-6.18)	-0.191 (-7.07)

Notes: All models also control for region and year fixed effects. Standard errors clustered upon mothers.

Table 7: **Child BMI, Obesity Risk, and Lack of Police Protection, By Race & Ethnicity**

	BMI-percentile	Obese
	β (t-stat)	β (t-stat)
Non-Hispanic Whites		
Models excluding mother's BMI	2.45 (1.64)	0.02 (1.94)
Models including mother's BMI	1.72 (1.18)	0.02 (1.46)
Models with maternal fixed effects	1.26 (0.89)	0.02 (1.11)
Models with child fixed effects	0.51 (0.37)	0.01 (0.60)
African-Americans		
Models excluding mother's BMI	3.09 (2.14)	0.02 (1.34)
Models including mother's BMI	2.65 (1.91)	0.01 (0.79)
Models with maternal fixed effects	2.97 (1.86)	0.02 (0.94)
Models with child fixed effects	2.94 (1.95)	0.02 (0.91)
Hispanics		
Models excluding mother's BMI	5.32 (2.84)	0.03 (1.52)
Models including mother's BMI	4.67 (2.51)	0.03 (1.29)
Models with maternal fixed effects	3.68 (.185)	0.01 (0.46)
Models with child fixed effects	2.64 (1.36)	0.01 (0.44)

Notes: All models also control for the variables included in model 2, Table 2, as well as region and year fixed effects. Standard errors clustered upon mothers.

Table 8: Oaxaca-Blinder Decomposition using Lack of Police Protection.

	Non-Hispanic Whites v. Black				Non-Hispanic Whites v. Hispanic			
	1	2	3	4	5	6	7	8
	Differential	Levels	Coefficients	Interaction	Differential	Levels	Coefficients	Interaction
	b/(z)	b/(z)	b/(z)	b/(z)	b/(z)	b/(z)	b/(z)	b/(z)
Prediction_1	55.06*				55.06*			
	(-155.27)				(-155.27)			
Prediction_2	60.46*				56.97*			
	(-112.72)				(-90.58)			
Difference	-5.40*				-1.91*			
	(-8.40)				(-2.64)			
no_police2		-0.60+	-0.63	0.34		-0.57+	-0.77	0.37
		(-1.85)	(-0.80)	-0.8		(-1.84)	(-0.98)	-0.98
male		0	0.72	0.02		-0.08	-1.58	0.06
		(-0.03)	-0.85	-0.73		(-1.34)	(-1.56)	-1.1
kidage		0.24	3.4	-0.2		-0.36	-10.36	0.38
		-0.34	-0.24	(-0.24)		(-0.70)	(-0.66)	-0.65
scaletape		0.34*	0.2	-0.02		0.15+	0.56	-0.02
		-3.37	-0.15	(-0.15)		-1.89	-0.43	(-0.42)
mom_age		-2.72	32.95	1.75		0	-18.57	-0.68
		(-1.23)	-0.66	-0.66		0	(-0.33)	(-0.33)
no_smsa		0.16	-0.64	-0.19		0.11	-0.18	-0.19
		-0.91	(-0.99)	(-0.98)		-0.26	(-0.39)	(-0.39)
cen_city		0.95*	0.99	-0.72		-0.43	-0.91	0.57
		-1.98	-1.12	(-1.12)		(-1.14)	(-1.24)	-1.24
momnowork		0.05	-0.1	0.01		0.2	0.31	-0.06

		-0.92	(-0.16)	-0.16		-1.35	-0.39	(-0.39)
dadpresent		-2.97*	2.37*	2.92*		0.19	-1.05	-0.2
		(-2.39)	-1.99	-1.99		-0.51	(-0.47)	(-0.47)
tnfaminc_real		0.25	-0.16	-0.13		-0.03	0.29	0.09
		-0.76	(-0.37)	(-0.37)		(-0.18)	-0.5	-0.5
momedu		-1.74	0.23	0.92		-1.56	6.56	0.76
		(-0.89)	-0.03	-0.4		(-0.67)	-0.75	-0.27
region		1.15	2.84	-0.91		-2.89	-19.61+	5.82
		-0.65	-0.37	(-0.43)		(-0.80)	(-1.83)	-1.44
years		1.94*	-7.08	-0.64		1.06	1.01	0.32
		-2.6	(-1.12)	(-0.76)		-1.21	-0.14	-0.33
Total		-2.95	-5.62*	3.16		-4.2	-4.94*	7.23
		(-0.96)	(-2.69)	-0.86		(-0.96)	(-1.99)	-1.45
_cons			-40.71				39.38	
			(-0.68)				-0.59	
r2								
N	9803				8738			

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