

Maternal Depression and Childhood Health Inequalities *

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Maternal Depression and Childhood Health Inequalities

An increasing body of literature documents considerable inequalities in the health and wellbeing of young children in the United States, though maternal depression is one important, yet often overlooked, determinant of children's health. In this paper, I use data from the Fragile Families and Child Wellbeing Study (N = 4,048) and find that maternal depression, particularly depression that is recurrent or chronic, puts children at risk of having unfavorable health when they are five years old. This finding persists despite adjusting for a host of demographic characteristics of the mothers and children and a lagged indicator of children's health, and is consistent across multiple health outcomes. Family instability, maternal health and, especially, socioeconomic status account for the association between maternal depression and children's health.

Maternal Depression and Childhood Health Inequalities

An increasing body of literature documents considerable inequalities in the health and wellbeing of young children in the United States (Aber et al. 1997). These inequalities begin as early as infancy (Braveman et al. 2001), and persist and intensify as individuals progress throughout the life course (Bloom, Cohen, and Freeman 2009). It is well documented that racial minorities, children in single-mother families, and children in poor households experience particular vulnerabilities with respect to their health status (Bloom et al. 2009). Children in poor households, for example, are more than five times as likely as children in non-poor families to have parent-reported fair or poor health, creating a large public health burden in already disadvantaged families and communities (Bloom et al. 2009). Because poor health in childhood may lead to poor health and low socioeconomic status in adulthood, it is particularly crucial to understand the determinants of early childhood health (Case, Fertig, and Paxson 2005; Haas 2006).

Maternal depression is one important, yet often overlooked, determinant of children's health (for exceptions, see Angel and Worobey 1988; Casey et al. 2004). However, there is reason to believe that maternal depression may lead to impairments in young children's health. Symptoms of depression – including fatigue, difficulty concentrating, or losing interest in daily activities – may influence a mother's ability to make and keep doctor's appointments for her children, adhere to treatment regimes for sick children, or notice health problems as they arise (DiMatteo, Lepper, and Croghan 2000). Additionally, research consistently finds that depression may increase economic insecurity (Marcotte and Wilcox-Gok 2001), impede union formation or contribute to conflict in already established unions (Kim and McHenry 2002; Tietler and Reichman 2008), and foster additional health problems (Aneshensel, Frerichs, and Huba 1984),

all of which have been independently linked to health problems in children. Indeed, though little research links maternal depression to children's health, a large body of literature suggests that depression among mothers can have other harmful consequences for children. Children of depressed mothers are more likely than other children to have impaired social, behavioral, and cognitive outcomes in infancy, childhood, adolescence, and adulthood (Goodman and Gotlib 2002). Though maternal depression, particularly depression that persists across multiple years, is consistently associated with more mental health and behavioral problems in young children (Kiernan and Huerta 2008; Meadows, McLanahan, and Brooks-Gunn 2007; blinded for review), we know little about how maternal depression may matter for children's physical health.

Thus, in this paper, I examine one potentially important predictor of health inequalities in early childhood, maternal depression, using data from the Fragile Families and Child Wellbeing Study. The Fragile Families study is a longitudinal, recent birth cohort of about 5,000 children born in urban areas between 1998 and 2000. This paper makes several contributions to the literature. First, I use longitudinal data to examine how chronic, persistent maternal depression and intermittent, short-term maternal depression may lead to inequalities in five-year-old children's health. The main analyses examine mother-reported general child health (ranging from fair/poor to excellent), and additional analyses consider specific health conditions (i.e., asthma) and health care utilization (i.e. going to the emergency room). The analyses also adjust for a lagged indicator of child health to better estimate the causal direction of the relationship between maternal depression and children's health. In addition, I extend prior research by examining the mechanisms underlying the association between maternal depression and children's health. Finally, this paper extends prior work by using a diverse sample of children, many born to unmarried mothers. Understanding the outcomes of children born to unmarried parents is

important, as this is an increasing demographic group (Hamilton, Martin, and Ventura 2010), these children may be particularly vulnerable (Sigle-Rushton and McLanahan 2004), and we know little about the consequences of maternal depression for these children (Goodman and Gotlib 2002).

Background

Importance of Understanding Inequalities in Child Health

Understanding the correlates of physical health in young children is important because early health inequalities are reproduced throughout the life course. Some argue that early childhood health sets the stage for school readiness (Padilla, Hamilton, and Hummer 2009), and poor health in kindergarten is associated with behavioral and cognitive difficulties (Wertheimer et al. 2003). Additionally, children with health problems experience more school absences than their healthy counterparts and are less likely to be involved in school activities (Blanchard, Gurka, and Blackman 2006). Given that experiences in elementary school place children on a trajectory to experience additional advantages or disadvantages in the educational system and beyond, these early health disparities may have implications for stratification across the life course (Entwisle and Alexander 1989). Thus, it is not surprising that poor health in childhood has also been linked to a host of disadvantages in adulthood. Those who experience poor health as children, for example, are likely to have poor health and lower socioeconomic status in adulthood (Case et al. 2005; Haas 2006). The consequences of poor child health also extend to children's parents. Having a child in poor health may cause parents to divorce (Mauldon 1992), experience difficulty sustaining employment (Corman, Noonan, and Reichman 2005), and necessitate a reliance on welfare (Reichman, Corman, and Noonan 2006).

Maternal Depression and Children's Health

The life course perspective has emerged as the dominant framework for understanding human development. This perspective highlights the intergenerational transmission of advantage and disadvantage as well as the interdependence of social relationships; thus, the mental health of mothers may be linked to the wellbeing of their children (Elder 1998). As discussed earlier, a growing body of literature documents the consequences of maternal depression for children's mental health, including behavioral problems. Among young children, maternal depression leads to both internalizing and externalizing behavior problems (Kiernan and Huerta 2008; Meadows et al. 2007; blinded for review). Maternal depression is also associated with greater reports of antisocial behavior (Kim-Cohen et al. 2005), anxiety (Meadows et al. 2007), and conduct disorder (Marmorstein et al. 2004).

Though a robust body of literature suggests depression in mothers may lead to mental health problems in their children, researchers have paid less attention to the consequences of maternal depression for children's physical health. Theoretically, there are strong reasons why maternal depression may lead to impairments in child health. Symptoms of depression – including fatigue, difficulty concentrating, or losing interest in daily activities – may influence a mother's ability to make and keep doctor's appointments for her children or adhere to treatment regimes for sick children (DiMatteo et al. 2000). Depression in mothers may also lead to less engagement with children (Lovejoy et al. 2000). Given that mothers are often primary caregivers for young children, disengagement may translate to less physical activity for children or a reduced likelihood of mothers noticing health problems (Frech and Kimbro 2010).

There are several examinations of the link between maternal depression and child health. Angel and Worobey (1988), in their cross-sectional study of Mexican children in the Hispanic Health and Nutrition Examination Survey (Hispanic HANES), find that maternal depression is

one of the largest predictors of poor health among children ages six months to 11 years. Additionally, another study finds that maternal depression is associated with fair or poor child health among children under the age of three, though this study uses a cross-sectional, convenience sample of children who visited hospital clinics or emergency departments in six urban areas (Casey et al. 2004). Regional studies come to similar conclusions. Evidence from a sample of 150 mostly white, middle- to upper-class children with a family history of asthma shows that asthma diagnoses by age eight are higher in children of depressed mothers (Klennert et al. 2001). Depressed mothers in inner-city Baltimore are less likely to adhere to a pediatric asthma routine when their elementary school children have the condition (Bartlett et al. 2004). Greater depressive symptoms in mothers are associated with more visits to hospital emergency departments (Minkovitz et al. 2005; Bartlett et al. 2004), more hospitalizations (Casey et al. 2004), and fewer well-child visits (Minkovitz et al. 2005). Thus, though there is evidence that maternal depression may lead to health problems in children, the existing literature is often based on small, cross-sectional, homogenous, or select samples of children.

Children who reside with chronically depressed mothers may be more vulnerable than children of mothers who experience short-term, fleeting depression. When depression is chronic and recurrent, mothers may experience a more persistently stressful and less supportive social context than when depression is intermittent (Turner and Lloyd 1999), which may reduce mothers' capacities to engage in preventative health measures with their children. Research points to the detrimental consequences of chronic maternal depression for children's behavioral outcomes (blinded for review), and these consequences may extend to children's physical health outcomes. Indeed, other research shows that mothers chronically but not intermittently depressed are more likely to smoke and less likely to have a car seat for their child (Leiferman 2002). This

is consistent with a life course perspective that suggests the accumulation of disadvantage may be especially detrimental to children (Elder 1998).

Potential Mechanisms Linking Maternal Depression to Children's Health

A life course model allows for an examination of the ways that children's and mothers' social structural conditions may serve as mechanisms through which maternal depression influences children's health. Depression in mothers may lead to low socioeconomic status, family instability, or less favorable health among mothers, all of which may contribute to poor health outcomes among children. Though these potential mechanisms are not exhaustive of all pathways, they provide a useful starting point for understanding the intergenerational transmission of health.

Socioeconomic status. To begin with, there is a robust link between socioeconomic status and depression or depressive symptoms. Though low socioeconomic status may lead to depression (Heflin and Iceland 2009), there is also evidence that depression contributes to low socioeconomic status (Marcotte and Wilcox-Gok 2001). Low socioeconomic status is also associated with less favorable health outcomes in children (Bloom et al. 2009; Case, Lubotsky, and Paxson 2002), and employed mothers generally have healthier children (Osborne and Knab 2007). Health insurance may also link maternal depression to children's physical health, as maternal mental illness is associated with a lower likelihood of having private health insurance (Noonan et al. 2010) and health insurance may make it easier to engage in preventative health care for children (Berk and Schur 1998).

Family instability and change. Family instability may be another mechanism through which maternal depression is associated with children's outcomes. A robust literature describes how the consequences of psychological wellbeing for union formation. Depressed individuals are

less likely to form unions and are more likely to divorce (Forthofer et al. 1996; Simon 2002; Teitler and Reichman 2008). Another body of literature documents the protective effects of marriage and the deleterious effects of family structure transitions for children's physical health (Angel and Worobey 1988; Bzostek and Beck 2010; Harknett 2009). Multi-partnered fertility and relationship quality are also associated with maternal depression and children's outcomes (Bronte-Tinkew, Horowitz, and Scott 2008; Hanson 1999; Wade and Pevalin 2004). Additionally, children of depressed mothers may experience frequent residential mobility (McLanahan and Sandefur 1994).

Maternal health and health behaviors. Finally, maternal health and health behaviors may mediate the association between maternal depression and child health. Depression is correlated with health problems (Aneshensel et al. 1984). Substance use is often co-morbid with depression and strongly correlated with children's outcomes (Osborne and Berger 2009), and depression may inhibit a mother's ability to engage in physical activity with her child (Frech and Kimbro 2010).

Additional Correlates of Maternal Depression and Children's Health

Additional individual-level characteristics may render the association between maternal depression and children's health spurious. Race and immigrant status are important correlates of both depression and child health (Roxburgh 2009). Black and Hispanic children have worse general health than White children (Bloom et al. 2009), and children of immigrants have worse physical health than their native-born counterparts (Crosnoe 2006). The association between age and depression is nonlinear (Kessler and Zhao 1999), and children of older mothers may have more favorable health outcomes (Furstenberg, Brooks-Gunn, and Chase-Lansdale 1989).

Additional characteristics of the family environment such as number of siblings may be inversely

associated with child wellbeing (Downey 1995). The multivariate analyses also control for whether the child is the mother's first birth, given that first-time mothers likely encounter more challenges in parenting (Cowan and Cowan 1992), as well as whether the mother smoked while pregnant (Fox, Sexton, and Hebel 1990). Child characteristics such as gender and birth weight are known correlates of health (Bloom et al. 2009; Nepomnyaschy and Reichman 2006).

Research Questions

In this paper, I examine two research questions. First, what is the relationship between maternal depression over time and five-year-old children's health? I expect that children of never depressed mothers, compared to their counterparts with mothers who experience any episode of depression, will have worse health. I also expect that children of chronically depressed mothers will have worse health than all other groups of children. Second, to what extent do socioeconomic status, family instability and change, and maternal health and health behaviors explain the association between maternal depression and children's health? I expect all three sets of mechanisms will independently explain at least part of the association between maternal depression and children's health.

The main analyses operationalize children's health as mother-reported general health status. Though a large body of research finds adult self-reported health status to be a valid indicator of wellbeing and an important predictor of mortality (Idler and Benyamini 1997), much less research examines the validity of parent-reported child health. There is some evidence, though, that parent-reported health is a reliable indicator of wellbeing. Parent-reported health, for example, is correlated with doctor reports of child health (Case et al. 2002). Others find that parental reports of child health are associated with health care utilization (Cafferata and Kasper 1985; Monette et al. 2007), children's functional limitations (Arcia 1998), asthma (Monette et al.

2007), and other acute and chronic medical conditions (Arcia 1998; McCormick et al. 1993; also see Smith 2007; Spencer and Coe 1996). Because it is possible that depressed mothers may have negative, distorted perceptions of their children, I also consider a series of additional, more objective indicators of health (asthma attack, hay fever or respiratory allergy, and eczema or skin allergy in the past year) and health care utilization (dentist visit, emergency room visit, and doctors visits in the past year) that may be subject to environmental influences.

Though paternal depression may be independently linked to children's health and is an important direction for future research (Phares and Compas 1992), these analyses focus solely on maternal depression. Understanding maternal depression is particularly important because nearly all children live with their mothers and fewer than half are co-resident with their fathers, and because mothers are nearly twice as likely as fathers to report depression (DeKlyen et al. 2006). Additionally, prior research suggests maternal depression is a stronger predictor of children's outcomes than paternal depression (Meadows et al. 2007).

Method

Data

I use data from the Fragile Families and Child Wellbeing Study, a longitudinal survey of nearly 5,000 new and mostly unmarried parents in 20 U.S. cities that were stratified by labor market conditions, welfare generosity, and child support policies (Reichman et al. 2001). Births to unmarried mothers were oversampled and comprise about 76% (n = 3,712) of the initial sample; therefore, the sample over-represents minority children, economically disadvantaged children, and children with non-residential fathers. Mothers completed a 30- to 40-minute in-person interview at the hospital after the birth of their child, between February 1998 and September 2000. Fathers were interviewed as soon as possible after the child's birth. Mothers

and fathers were interviewed by telephone when their children were approximately one, three, and five years old. Response rates varied by marital status and gender, but were still relatively high (Bendheim-Thoman Center for Research on Child Wellbeing 2008).¹

The analytic sample for this paper comprises 4,048 observations. I delete the 850 observations missing data on children's general health at the five-year survey. The majority of these missing cases result from the mother not completing the survey at one or more of the follow-up waves, though 91 cases were excluded because the child was not living with the mother at least half of the time. Importantly, mothers in the analytic and full samples report similar levels of depression, child health, and most demographic and socioeconomic characteristics. Mothers in the analytic sample have greater educational attainment ($p < .05$).

Measures

Child health. The main analyses consider a measure of general child health. At the one-, three-, and five-year surveys, mothers were asked to rate the child's general health (poor, fair, good, very good, or excellent). Because relatively few children were in fair or poor health, I collapse these response categories (1 = *fair or poor*, 2 = *good*, 3 = *very good*, 4 = *excellent*). In additional analyses, I examine three additional indicators of children's health: asthma attack in the past year; hay fever or respiratory allergies in the past year; and eczema or skin allergies in the past year. I also examine three indicators of health care utilization in the past year: visit to the dentist for a check-up; visit to the emergency room; and number of doctor's visits due to illness, accident, or injury. All six variables were measured at the five-year survey, and all are dummy variables except for the number of doctor's visits that ranges from 0 to 25).

Maternal depression. The measure of maternal depression comes from mothers' responses to the Composite International Diagnostic Interview Short Form (CIDI-SF) Version

1.0 November 1998 (Kessler et al. 1998). Mothers were asked if, at some time during the past year, they had feelings of depression or were unable to enjoy things that were normally pleasurable. Those who experienced at least one of these two conditions most of the day, every day for a two-week period were asked additional questions (about losing interest in things, feeling tired, experiencing a change in weight of at least 10 pounds, having trouble sleeping, having trouble concentrating, feeling worthless, or thinking about death), and those who answered affirmatively to three or more of these questions are considered depressed. Although limitations to the CIDI-SF exist (Link 2002), it is commonly used in large-scale community surveys. Based on mothers' responses at the one-, three-, and five-year surveys, I create a series of mutually exclusive variables that capture the chronicity of depression: never depressed (reference category), depressed at one time period, depressed at two time periods, and depressed at three time periods.

Socioeconomic status. The multivariate analyses include five indicators of socioeconomic status at the five-year survey. First, I include a dummy variable indicating the respondent worked during the week prior to the interview. Second, I include a series of dummy variables that capture educational attainment: less than high school diploma (reference category), high school diploma or GED, and post-secondary education. Third, I include income-to-poverty ratio, which is the ratio of the total household income to the official poverty thresholds established by the U.S. Census Bureau. Fourth, I include an indicator of material hardship. Mothers were asked if, at some point in the past 12 months, they experienced certain events because there was not enough money, such as received free food or meals or did not pay the full amount of rent or mortgage. Mothers' answers to these 12 questions were summed to create an indicator of material hardship, with greater values indicating more material hardship. Finally, I include a

series of dummy variables representing the child's health insurance status: private health insurance, public health insurance, and no health insurance (reference category).

Family instability and change. The multivariate analyses include five indicators of family instability and change. First, I include a series of dummy variables that capture the relationship between the child's biological mother and father at the five-year survey: married, cohabiting, and nonresidential or no relationship (reference category). I also control for the number of family structure transitions the child experienced from birth through the five-year survey: no transitions (reference category), one transition, and two or more transitions. Dummy variables indicate the child's mother has a new romantic partner at the five-year survey, the mother has children by more than one partner, and the presence of a new child in the household. Hostility in the current relationship comprises an average of responses to the following questions (0 = *no relationship*, 1 = *never*, 2 = *sometimes*, 3 = *often*): he/she insults or criticizes your ideas; he/she tries to keep you from seeing friends or family; he/she tries to prevent you from going to work or school; and he/she withholds money or tries to take your money ($\alpha = .926$). Finally, number of residential moves the child made through the five-year survey is a continuous variable.

Health and health behaviors. Four indicators of health and health behaviors, measured at the five-year survey, are included in the multivariate analyses. I include a dummy variable that indicates the mother reports a serious health problem (defined as asthma, diabetes, high blood pressure, or heart disease) that limits the amount of work she can do, as well as a dummy variable indicating the mother smoked in the past month. I also control for the mother having a substance abuse problem, defined as an affirmative responses that drinking, being hungover, or using drugs interfered with school, work or home in the last 12 months.² Finally, I include a

variable that captures how many days in a typical week the mother plays outside in the yard, park, or playground with her child.³

Controls. I control for a host of maternal characteristics measured at baseline, which ensures that they are as exogenous as possible from the dependent variable and that they were measured prior to reports of depression. Mother's race is represented by a series of dummy variables: White (reference category), Black, Hispanic, and other race. A dummy variable indicates the respondent was born outside of the United States. I control for mother's age, a continuous variable, and include a squared term in the multivariate analyses. A series of dummy variables indicates the mother's and father's relationship status at birth: married, cohabiting, and nonresidential or no relationship (reference). Number of children in the household is a continuous variable, and a dummy variable indicates the child was the mother's first birth. I control for several indicators of socioeconomic status, including a series of dummy variables for education (less than high school diploma (reference category), high school diploma or GED, and post-secondary education), a dummy variable indicating the birth was paid for by Medicaid, and a continuous income-to-poverty ratio. Dummy variables indicate the mother reported fair or poor health and that the mother reported smoking during her pregnancy. Finally, the multivariate analyses include a dummy variable indicating the child is male and a dummy variable indicating the child was born low birth weight (less than 2,500 grams at birth).⁴

Analytic Strategy

In Table 1, I present weighted and unweighted descriptive statistics of all variables. This table also includes descriptive statistics of all variables by the chronicity of maternal depression. I use chi-square tests or t-tests, depending on the distribution of the outcome variable, to examine how children of never depressed mothers compare to other groups of children.

The multivariate analyses proceed in three parts. In the first part, in Table 2, I estimate the relationship between maternal depression and children's general health with ordered logistic regression models, which estimate the cumulative probability of being at or below a particular category (i.e., very good health) as a function of the covariates. Ordered logistic regression models are appropriate, because higher values indicate more favorable health and because the distance between categories may not be the same. The coefficients can be used to interpret the direction, statistical significance, and magnitude of the relationship between maternal depression and child health. The distance between the categories of health are unknown, and the intercepts presented show the estimated cutpoint of the latent variable used to distinguish the categories (i.e., excellent from very good, good, and fair/poor) (Allison 1999; Borooah 2002).

In all ordered logistic regression models, I include dummy variables for maternal depression: never depressed, depressed at one wave, depressed at two waves, and depressed at three waves. Model 1 presents the bivariate association between chronicity of maternal depression and child health. Model 2 includes the following variables, all measured at baseline: mother's race, mother's immigrant status, mother's age, mother's age squared, mother's marital status at birth, number of children in the household, child is mother's first birth, mother's education, birth was paid for by Medicaid, mother's income-to-poverty ratio, mother in fair or poor health, mother smoked while pregnant, child is male, and child born low birth weight. Model 3 includes these variables as well as a lagged indicator of child health (measured when children were about one year old). Table 3, which displays predicted probabilities for each of the four categories of child health by maternal depression, is based on estimates from Table 2.

In the second part of the analyses, presented in Table 4, I estimate six additional indicators of health (asthma attack, hay fever or respiratory allergy, and eczema or skin allergy in

the past year) and health care utilization (dentist visit, emergency room visit, and doctor visits due to illness, accident, or injury in the past year). I use logistic regressions to predict all outcomes except for the number of doctor visits; for this outcome, I use Poisson regression models to account for the skewed nature of this variable. These analyses have two limitations. First, with the exception of asthma, these questions were only asked of mothers who participated in the In-Home survey.⁵ Additionally, these questions were only asked at one point in time, which makes it impossible to adjust for lagged indicators.

In the final stage, presented in Table 5, I examine mechanisms that may explain the association between maternal depression and children's health. In this table, models include all control variables and the lagged indicator of children's health. The first model includes indicators of socioeconomic status, the second model includes family instability and change, and the third model includes maternal health and health behaviors. The last model includes all potential mechanisms.

Because observations are clustered within 20 cities, I use clustered standard errors and include city fixed-effects in all models. The multivariate estimates do not use survey weights because I adjust for all variables used in creating the weights (race/ethnicity, education, marital status, and age). All control variables were missing fewer than 3% of observations, and I use the *ice* command in Stata to impute missing data (Royston 2004). I use 10 datasets and, in the imputation model, include all variables used in the analyses (Allison 2002). Analyses that use listwise deletion produce consistent estimates.

Sample Description

In Table 1, I present descriptive statistics of all variables included in the analyses. About 64% of children in the weighted analytic sample are in excellent health at the five-year survey,

25% are in very good health, 10% are in good health, and 2% are in fair or poor health. With respect to specific health conditions, about 7% of children had an asthma attack, 13% had hay fever or respiratory allergies, and 16% had eczema or skin allergies in the past year. Notably, more than 34% of children have a mother who reported at least one episode of depression during the first five years of their lives. The majority of mothers in the weighted analytic sample are minorities; about 34% are Black, 29% are Hispanic, and 8% are other race. About 27% of mothers are foreign-born. They are 27 years old, on average, at the birth of the focal child, and about 40% are first-time parents. About 60% did not receive education beyond high school, and about 54% of births were paid for by Medicaid.

[Table 1 about here.]

Table 1 displays sharp differences in five-year-old children's health by the chronicity of maternal depression. When mothers experience chronic depression (i.e., they report depression at the one-, three- and five-year survey), their children are more likely than children of never depressed mothers to be in fair or poor health (5%, compared to 1%) and less likely to be in excellent health (47%, compared to 65%). Children of chronically depressed mothers, compared to their counterparts with never depressed mothers, are about twice as likely to have had an asthma attack, hay fever or respiratory allergies, or eczema or skin allergies in the past year. Children's health also suffers when their mothers report depression that is recurrent (reported at one or two time periods) but not necessarily chronic.

Both chronic and recurrent depression is associated with additional disadvantages for children, according to Table 1. Children of never depressed mothers, compared to their counterparts of mothers who report at least one episode of depression, have a larger income-to-poverty ratio, experience less material hardship, and are more likely to have private health

insurance at the five-year survey. These children also experience more stability in their familial environment (i.e., fewer family structure transitions and residential moves) and their mothers are less likely to smoke or have a substance abuse problem.

Results

Estimating Children's General Health as a Function of Maternal Depression

The prior table suggests inequalities by maternal depression in children's general health. These descriptive differences in children's health may be driven by additional factors associated with children's health or maternal depression, which I consider in Table 2. In Model 1, the difference in health between children of never depressed mothers and children of mothers depressed at one wave is only marginally significant ($p < .10$). However, when mothers report depression at two or three time periods, compared to when mothers never report depression, children have worse health. Depression at two points in time is associated with 0.652 ($\exp^{-.427}$) times the odds of rating children's health above a given category ($p < .05$). When mothers are depressed at three points in time, they have .447 times the odds of rating children's health above a given category ($p < .001$). In Model 2, which accounts for a host of demographic characteristics, the coefficients for maternal depression at two time periods and three time periods remain statistically significant. The final model, the most rigorous test of this association, includes the demographic characteristics and a lagged indicator of children's health.⁶ Net of demographics and prior health, compared to children of never depressed mothers, children of mothers who report depression at two time periods (OR = .718, $p < .05$) or three time periods (OR = .569, $p < .001$) have worse health. Table 3 shows that the predicted probability of being in excellent health is .923 for children of never depressed mothers and .871 for children of chronically depressed mothers.

[Table 2 about here.]

[Table 3 about here.]

The models in Table 2 compare children of never depressed mothers to all other groups of children. When I rotate the reference category (results not shown), I find chronic depression is especially detrimental to children's health. In the full model, children of chronically depressed mothers have worse health than children of mothers depressed at one time period ($-.472, p < .05$). Children are also disadvantaged when mothers report depression at two time periods. These children have worse health than children of never depressed mothers ($-.332, p < .05$), and have similar health to when mothers are chronically depressed ($-.256, n.s.$).

Estimating Robustness of Association Between Children's Health and Maternal Depression

In Table 4, I present estimates for additional health and health care utilization outcomes. Turning first to the three health outcomes, results are generally consistent with estimates of mother-reported general health. Adjusting for demographic characteristics, children of mothers depressed at two time periods are more likely to have had hay fever or a respiratory allergy (OR = 1.889, $p < .001$) and eczema or a skin allergy (OR = 1.492, $p < .01$) than their counterparts with never depressed mothers. When mothers are chronically depressed, children are more likely to have had an asthma attack (OR = 1.946, $p < .01$), a respiratory allergy (OR = 2.237, $p < .01$), and a skin allergy (OR = 2.020, $p < .01$).

[Table 4 about here.]

I turn next to the three health care utilization outcomes. Children of mothers depressed at one time period, compared to their counterparts with never depressed mothers, are less likely to have been to the dentist for a regular check up in the past year. The coefficient for maternal depression at two time periods is only marginally significant and, contrary to expectations,

children of chronically depressed mothers and never depressed mothers are equally likely to have gone to the dentist. Children of mothers depressed at two or three survey waves are more likely to have gone to the emergency room in the past year, and the association between maternal depression and doctor visits is only marginally significant.

I perform two additional robustness checks. First, I substitute maternal reports of children's general health with paternal reports of children's general health. Given that nonresidential fathers likely have different perspectives on children's health than residential fathers or mothers, I restrict this analysis to children with co-residential parents and nonmissing data on paternal reports of children's health at the five-year survey ($n = 1,619$). These reports of child health are not a perfect substitute for maternal reports, as mothers' and fathers' reports of children's health are only moderately correlated ($r = .238$). Interestingly, the correlation is stronger for depressed mothers ($r = .265$) than nondepressed mothers ($r = .233$). In the final model, maternal depression at two points in time is associated with worse father-reported health in children ($-.478, p < .01$). The association between chronic maternal depression and father-reported general health in children falls below significance, though this may be an artifact of the reduced sample size (only 49 mothers are in category).

Finally, it is possible that having a child with health problems may lead to depression in mothers. I address this in Table 2 by including a lagged indicator of children's health. Additionally, in supplemental analyses, I estimate maternal depression at the five-year survey as a function of children's health at the three-year survey. Net of demographic controls, children's health is inversely associated with maternal depression; when children are in worse health, compared to their counterparts in better health, their mothers are more likely to be depressed ($p <$

.01). However, this association disappears after adjusting for a lagged indicator of depression, suggesting that children's health problems do not lead to depression.

Mechanisms Underlying Association between Maternal Depression and Children's Health

The analyses presented in Tables 2 and 4, as well as a series of robustness checks not presented, suggest that maternal depression, especially chronic maternal depression, is associated with impaired health in children. The next set of analyses, presented in Table 5, considers the following mechanisms: 1.) socioeconomic status, 2.) family instability and change, and 3.) health and health behaviors. Accounting for five-year socioeconomic status in Model 1 attenuates the negative consequences of depression. Compared to the final model in Table 3, the coefficients for depression at two and three time periods, respectively, decreases by 38% and 28%. Maternal depression at two or three time periods is no longer significantly associated with children's health. The next two models adjust for family instability and maternal health. Both sets of mechanisms attenuate the coefficient for depression at two time periods. However, these proposed mechanisms do little to attenuate the link between chronic maternal depression and child health, reducing this coefficient by only 9% (family instability) and 4% (health).

[Table 5 about here.]

The final model, which includes all possible mechanisms, shows no statistically significant association between maternal depression, even chronic maternal depression, and child health. Combined, the mechanisms explain 57% of the effect of depression at two time periods and 34% of the effect of depression at three time periods. According to the final model of Table 5, the predicted probability of being in excellent health is .927 for children of never depressed mothers, .918 for children of mothers depressed at one time period, .908 for children of mothers depressed at two time periods, and .896 for children of chronically depressed mothers (not

presented). Interestingly, when father-reported health is substituted for mother-reported health, these mechanisms do not completely attenuate the coefficient of maternal depression at two time periods.

In the full model, few mechanisms are independently associated with children's health. The exceptions all work in the expected direction. First, independent of other factors, greater material hardship is associated with worse health. Children's health also suffers when mothers are in a relationship with someone other than the child's biological father and when mothers report a serious physical health condition. Consistent with expectations, prior child health is associated with child health at the five-year survey (.665, $p < .001$). Though economic resources or marriage may buffer children from the deleterious consequences of depression, there is no evidence that the association between maternal depression and children's health varies by mother's education, poverty status, or marital status at birth (results available upon request).

Discussion

I use data from the Fragile Families survey, a birth cohort of children born in urban areas between 1998 and 2000, to examine the link between maternal depression and children's health at the beginning of elementary school, a period in the life course that has been repeatedly linked to future life course trajectories. The first goal of the paper was to document the association between maternal depression over time and children's health. Consistent with a life course perspective that highlights the interdependency of parents and children, as well as how an accumulation of disadvantages may render children vulnerable, I found that maternal depression, particularly depression that is recurrent or chronic, puts children at risk of having unfavorable health when they are five years old. This finding persists despite accounting for a host of demographic characteristics of the mothers and children, as well as adjusting for a lagged

indicator of children's health. However, children's health does not suffer when maternal depression is short-lived.

The association between maternal depression and children's health is consistent across a variety of health outcomes and is robust to several different model specifications, which strengthens the argument that maternal depression may render children vulnerable. When mothers experience depression that persists across more than one survey wave, children are more likely to have asthma, hay fever or respiratory allergies, and eczema or skin allergies. Results also provide some evidence that children of depressed mothers are less likely to receive preventative care (i.e., a dentist visit in the past year) and more likely to receive acute care (i.e., going to the emergency room). Children of chronically depressed mothers are not more or less likely to go to the doctor because of an illness, accident, or injury. Though children of depressed mothers are more likely to experience health conditions that may warrant a doctor's visit (i.e., asthma or allergies), depression may impair a mother's ability to take her child to the doctor.

Taken together, these findings are consistent with a growing body of literature that suggests wide-ranging consequences of maternal depression for child wellbeing. Prior research has found maternal depression to be a risk factor for young children's mental health (Goodman and Gotlib 2002; Meadows et al. 2007), and I find similar patterns with respect to children's physical health. These findings are also consistent with other research that documents an association between maternal depression and children's health (Angel and Worobey 1988; Casey et al. 2004). Additionally, the fact that chronic or recurrent maternal depression is more harmful than short-lived, episodic depression for children's general health is consistent with other research suggesting detrimental effects of chronic depression for children (blinded for review).

There are many reasons to expect why maternal depression may influence children's health, as discussed earlier, and a second goal of this paper was to examine three possible sets of mechanisms: 1.) socioeconomic status, 2.) family instability and change, and 3.) maternal health and health behaviors. I find that socioeconomic status account for a large portion of the association between maternal depression and children's health. Given that socioeconomic status is linked to both depression and children's health (Case et al. 2002; Marcotte and Wilcox-Gok 2001), it is not surprising that socioeconomic status is one pathway through which maternal depression influences children. Depression may hinder a mother's ability to maintain a steady income, and this financial insecurity may impede a mother's ability to provide her child care for acute or chronic conditions.

Family instability and maternal health and health behaviors attenuate the association between recurrent (i.e., depressed at two time periods) but not chronic depression and children's health. Depression may destabilize partner relationships (Simon 2002) and family instability may undermine child health (Bzostek and Beck 2010). Similarly, mothers who are coping with their own health conditions may be less attune to problems in their children or may be physically unable to engage in health-promoting behaviors in their children. These mechanisms do not independently ameliorate the negative consequences of chronic depression. Perhaps the origins of depression and family instability, of which a thorough examination is beyond the scope of this paper, are similar, and thus accounting for instability only marginally diminishes the already deleterious consequences of depression. Future research would benefit from examining the upstream factors associated with depression among mothers of young children, as these factors may shed light on the broader processes operating in these families. Also, given that the three

sets of mechanisms examined are not exhaustive, future research would benefit from exploring additional mechanisms such as social support or parenting behaviors.

Several limitations should be kept in mind when interpreting the results. To begin with, there are shortcomings regarding the measurement of some variables. The dichotomous measure of depression does not allow for the possibility of looking at mothers who do not meet the criteria for Major Depressive Disorder but still exhibit some symptoms of depression (Mirowsky and Ross 2002). Additionally, as discussed earlier, these analyses do not provide causal conclusions about the effect of maternal depression on children's health. These models are limited because there may be additional, unobserved characteristics that are unaccounted for in the models. It is worth noting, though, that the estimates of mother-reported children's general health are robust to propensity score matching techniques. Finally, little research has examined the cognitive processes through which parents report their children's health, and future research would benefit from understanding the meanings behind parental reports of children's health and the validity of parent-reported health.

Despite these limitations, this paper contributes to a growing body of literature on the consequences of maternal depression for children and families. To begin with, to my knowledge, this is one of the first studies to use a large, diverse sample of mothers and their children to examine the link between maternal depression and children's health. Additionally, the longitudinal data allow me to examine both transitory and chronic depression and to address the potential endogeneity between depression and child health by adjusting for a lagged indicator of child health in the analyses. Finally, this paper contributes to the existing literature by examining potential mechanisms that link maternal depression and child health. Findings suggest that maternal depression negative ramifications for the health of five-year-old children, and these

disparities may become more pronounced as children age (and may experience the onset of chronic conditions). Given that poor childhood health may lead to additional disadvantages throughout the life course, such as difficulty progressing through the educational system and reduced socioeconomic status in adulthood, early intervention and treatment of maternal depression may be one way to reduce inequalities.

Notes

¹ Of mothers sampled to participate in the baseline interview, about 82% of mothers married at baseline and 87% of mothers unmarried at baseline participated. Of mothers who responded to the baseline interview, 89% (90% of married mothers and 89% of unmarried mothers) participated in the one-year survey, 86% (89% of married mothers and 86% of unmarried mothers) participated in the three-year survey, and 85% (85% of married mothers and 84% of unmarried mothers) participated in the five-year survey.

² Unfortunately, the five-year survey does not contain clinical indicators of drug or alcohol dependence. Mothers were, however, asked about heavy episodic drinking and illicit drug use. In supplemental analyses not presented, I substitute these indicators for the indicator of substance abuse problems discussed above. The results are substantively similar.

³ It is possible that some of the mechanisms considered, such as income-to-poverty ratio or mother's reports of her own health, may be endogenous to maternal depression. However, because the indicator of maternal depression is cumulative – capturing mother's depression when their children are about one, three, and five years old – the mechanisms, in many cases, are measured after the mother reports depression. If endogeneity does exist, the mechanisms underlying the association between maternal depression and children's health may be overestimated.

⁴ It is possible that children's mental health may be associated with their general health. Thus, in supplemental analyses not presented, I control for maternal reports of children's internalizing and externalizing behaviors. Including these behaviors does not attenuate the association between maternal depression and children's general health, so I do not include these indicators in the models presented because they are only available for a subset of children.

⁵ The In-Home Longitudinal Study of Pre-School Aged Children consists of a subsample of families who participated in the Fragile Families survey. When children were approximately five years old, researchers administered a questionnaire in the child's home. Of the 3,700 families contacted to participate in the five-year In-Home survey, 81% agreed to participate (Bendheim-Thoman Center for Research on Child Wellbeing 2009).

⁶ In supplemental analyses, I instead use an indicator of child health measured temporally closer to the outcome variable, when children are about three years old. These results are consistent with those presented in Table 2.

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Table 1. Descriptive Statistics of Variables Included in Analyses, Entire Sample and By Maternal Depression.

Variable	Weighted		Unweighted					
			By chronicity of maternal depression					
	Entire sample	Entire sample	Never	1 time period	2 time periods	3 time periods		
	% or M	(SD)	% or M	(SD)	% or M	% or M	% or M	
<i>Child health</i>								
General health (y1)								
Fair or poor	2.0%		2.8%		2.0%	3.2% *	3.6% **	8.7% ***
Good	11.7%		10.4%		9.5%	10.8%	10.4%	13.0%
Very good	18.9%		20.8%		20.4%	19.8%	31.8%	24.2%
Excellent	67.3%		66.0%		68.1%	66.2%	54.2% *	54.0% ***
General health (y5)								
Fair or poor	1.7%		2.1%		1.4%	2.7% *	4.8% **	5.0% ***
Good	9.7%		9.5%		8.4%	8.5%	11.3%	16.1% **
Very good	25.0%		26.6%		25.4%	27.1%	22.3% *	32.3%
Excellent	63.7%		61.8%		64.8%	61.8%	61.6% ***	46.6% ***
Asthma attack in past year (y5)	6.7%		8.2%		7.5%	7.6%	8.9%	15.5% ***
Hay fever or respiratory allergies in past year (y5)	13.1%		13.1%		11.6%	13.8%	19.4% ***	22.2% ***
Eczema or skin allergies in past year (y5)	16.0%		16.4%		14.5%	18.2% *	23.1% ***	30.2% ***
Dentist in past year (y5)	81.7%		80.4%		82.7%	75.7% ***	76.9% *	77.8%
Emergency room in past year (y5)	20.9%		23.7%		21.5%	23.3%	29.4% **	35.7% ***
Number of doctor visits in past year (y5)	1.250	(2.091)	1.244	(2.059)	1.175	1.327	1.488 *	1.754 **
<i>Maternal depression</i>								
Chronicity (y1, y3, y5)								
Never depressed	72.9%		66.3%					
Depressed at 1 time period	16.0%		19.9%					
Depressed at 2 time periods	7.0%		9.4%					
Depressed at 3 time periods	4.1%		4.5%					
<i>Socioeconomic status</i>								
Employed (y5)	58.4%		59.6%		63.4%	55.5% ***	50.6% ***	52.2% **
Education (y5)								
Less than high school	23.8%		26.2%		24.3%	26.9%	26.1%	24.4%
High school diploma or GED	24.4%		21.8%		22.3%	20.0%	21.6%	19.4%
Post-secondary education	51.8%		52.1%		53.4%	53.1%	52.3%	56.3%
Income-to-poverty ratio (y5)	2.668	(3.280)	1.965	(2.261)	2.177	1.726 ***	1.551 ***	1.434 ***
Material hardship (y5)	1.438	(1.799)	1.849	(2.008)	1.407	2.237 ***	3.246 ***	3.720 ***
Child health insurance (y5)								
Private	43.5%		36.9%		41.7%	31.2% ***	26.8% ***	26.1% ***
Public	50.7%		55.9%		51.4%	61.5% ***	67.9% ***	68.1% ***
None	5.8%		7.2%		6.9%	7.3%	5.3%	5.8%
<i>Family instability and change</i>								
Relationship with child's father (y5)								
Married	51.5%		31.8%		36.7%	24.8% ***	23.6% ***	23.8% **
Cohabiting	9.5%		13.1%		13.2%	14.3%	11.3%	8.8%
Nonresidential relationship	39.0%		55.2%		50.1%	61.0% ***	65.1% ***	67.5% ***
Number of family structure transitions (b, y1, y3, y5)								
None	56.2%		46.1%		53.9%	47.3% **	48.8%	44.1% *
One	21.0%		28.8%		30.7%	35.2% *	35.1%	39.8% *
Two or more	22.7%		25.1%		15.3%	17.5%	16.1%	16.1%
Mother in new relationship (y5)	18.3%		26.2%		23.9%	29.0% **	30.4% *	32.3% *
Multi-partnered fertility (y1, y3, y5)	30.1%		41.6%		37.6%	45.5% ***	48.1% ***	53.2% ***
New child in household (y1, y3, y5)	44.6%		39.0%		38.8%	39.0%	38.6%	33.1%
Conflict in current relationship (y5)	0.933	(0.494)	0.845	(0.546)	0.855	0.846	0.865	0.832
Number of residential moves (y1, y3, y5)	1.009	(1.035)	1.220	(1.078)	1.095	1.355 ***	1.586 ***	1.553 ***
<i>Health and health behaviors</i>								
Physical health problem that limits work (y5)	30.1%		3.0%		2.4%	3.4%	5.4% **	4.3%
Smoked in last month (y5)	22.1%		29.7%		25.6%	35.1% ***	42.0% ***	46.6% ***

Substance abuse problem (y5)	0.8%	1.0%	0.5%	1.4% *	3.6% ***	2.5% **
Number of days played outside with child (y5)	3.097 (1.903)	3.248 (1.812)	3.296	3.175	3.065 *	3.273
<i>Baseline controls</i>						
Race (b)						
White	29.3%	21.2%	22.0%	20.0%	25.6%	23.8%
Black	34.0%	48.7%	47.0%	51.6% *	52.7%	55.0%
Hispanic	29.0%	26.5%	27.2%	25.0%	19.6% **	17.5% **
Other race	7.7%	3.6%	3.7%	3.4%	2.1%	3.8%
Immigrant (b)	26.6%	15.1%	16.4%	11.8% **	7.5% ***	10.6% *
Age (b)	27.145 (6.244)	25.186 (6.020)	25.422	24.594 **	24.426 **	25.236
Relationship with child's father (b)						
Married	53.3%	24.9%	28.2%	21.0% ***	17.9% ***	19.9% *
Cohabiting	22.9%	35.9%	34.7%	36.5%	39.3%	37.9%
Nonresidential relationship	23.7%	39.3%	37.1%	42.5% **	42.9% *	42.2%
Number of children in household (b)	2.126 (1.304)	2.252 (1.296)	2.217	2.305	2.367 *	2.248
Mother's first birth (b)	40.3%	38.8%	40.1%	38.5%	36.6%	29.2% **
Education (b)						
Less than high school	28.2%	33.0%	31.0%	34.8%	34.8%	30.0%
High school diploma or GED	31.6%	31.0%	30.9%	31.7%	30.6%	30.6%
Post-secondary education	40.3%	36.0%	38.2%	33.4% *	34.5%	39.4%
Birth paid for by Medicaid (b)	53.9%	61.1%	59.0%	62.9%	62.9%	59.6%
Income-to-poverty ratio (b)	3.188	2.280 (2.444)	2.484	2.112 ***	1.832 ***	1.831 **
Fair or poor health (b)	7.1%	7.3%	5.0%	11.2% ***	10.1% ***	11.9% ***
Prenatal smoking (b)	11.7%	18.6%	15.1%	23.2% ***	28.4% ***	25.5% ***
Child is male (b)	57.1%	52.6%	52.9%	48.5% *	56.8%	52.2%
Child born low birth weight (b)	7.6%	9.4%	9.0%	11.3%	7.4%	8.9%
N	4,048	4,048	2,380	715	336	161

Note: b: measured at baseline survey; y1: measured at 1-year survey; y3: measured at 3-year survey; y5: measured at 5-year survey. Sample sizes across groups do not sum to the total N (4,048) because of missing data on maternal depression. Asterisks compare never depressed mothers to all other groups of mothers. * p < .05, ** p < .01, *** p < .001.

Table 2. Ordered Logistic Regression Models Estimating 5-Year-Old Children's General Health as a Function of Maternal Depression.

Variable	Model 1		Model 2		Model 3	
<i>Maternal depression</i>						
Never depressed (reference)	---	---	---	---	---	---
Depressed at 1 time period	-.229	(.117)	-.121	(.123)	-.094	(.127)
Depressed at 2 time periods	-.427	(.168) *	-.397	(.175) *	-.331	(.161) *
Depressed at 3 time periods	-.805	(.155) ***	-.746	(.184) ***	-.564	(.194) **
<i>Covariates</i>						
Race (b)						
White (reference)			---	---	---	---
Black			-.058	(.196)	-.027	(.208)
Hispanic			-.269	(.295)	-.109	(.309)
Other race			.580	(.339)	.656	(.396)
Immigrant (b)			-.817	(.200) ***	-.723	(.208) **
Age (b)			-.001	(.042)	.030	(.047)
Age squared (b)			-.001	(.001)	-.001	(.001)
Relationship with child's father (b)						
Married			.102	(.134)	.021	(.154)
Cohabiting			-.123	(.091)	-.145	(.101)
Nonresidential relationship (reference)			---	---	---	---
Number of children in household (b)			-.012	(.065)	-.006	(.064)
Mother's first birth (b)			.277	(.112) *	.218	(.122)
Education (b)						
Less than high school (reference)			---	---	---	---
High school diploma or GED			.133	(.134)	.025	(.149)
Post-secondary education			.457	(.133) **	.372	(.147) *
Birth paid for by Medicaid (b)			-.172	(.105)	-.152	(.116)
Income-to-poverty ratio (b)			.107	(.055) *	.093	(.062)
Fair or poor health (b)			-1.062	(.155) ***	-.777	(.146) ***
Prenatal smoking (b)			.344	(.148) *	.253	(.158)
Child is male (b)			-.350	(.103) **	-.275	(.104) **
Child born low birth weight (b)			-.585	(.150) ***	-.307	(.150) *
Child health (y1)					.678	(.077) ***
Intercepts						
1			-7.142		-7.679	
2			-4.047		-4.551	
3			-2.225		-2.643	
N			4,048		4,048	

Note: All models include city fixed-effects and use robust standard errors (in parentheses). * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3. Predicted Probabilities of 5-Year-Old Children's General Health by Maternal Depression, Estimated from Table 2.

	Model 1	Model 2	Model 3
Never depressed			
Fair or poor health	.001	.001	.000
Good health	.016	.013	.011
Very good health	.078	.066	.063
Excellent health	.905	.921	.923
Depressed at 1 time period			
Fair or poor health	.001	.001	.001
Good health	.021	.016	.013
Very good health	.098	.084	.076
Excellent health	.880	.899	.910
Depressed at 2 time periods			
Fair or poor health	.001	.001	.001
Good health	.027	.021	.016
Very good health	.123	.105	.091
Excellent health	.849	.873	.892
Depressed at 3 time periods			
Fair or poor health	.002	.001	.001
Good health	.035	.027	.020
Very good health	.151	.131	.108
Excellent health	.813	.840	.871

Note: Predicted probabilities presented for first imputed data set.

Table 4. Logistic and Poisson Regression Models Estimating 5-Year-Old Children's Health and Health Care Utilization as a Function of Maternal Depression.

Variable	Model 1		Model 2	
Asthma attack in past year (n = 4,048)				
Never depressed (reference)	---	---	---	---
Depressed at 1 time period	.079	(.130)	.040	(.137)
Depressed at 2 time periods	.208	(.166)	.158	(.179)
Depressed at 3 time periods	.714	(.247) **	.666	(.248) **
Hay fever or respiratory allergy in past year (n = 2,959)				
Never depressed (reference)	---	---	---	---
Depressed at 1 time period	.198	(.146)	.290	(.158)
Depressed at 2 time periods	.562	(.162) **	.636	(.177) ***
Depressed at 3 time periods	.728	(.284) *	.805	(.291) **
Eczema or skin allergy in past year (n = 2,958)				
Never depressed (reference)	---	---	---	---
Depressed at 1 time period	.154	(.121)	.127	(.113)
Depressed at 2 time periods	.441	(.112) ***	.400	(.128) **
Depressed at 3 time periods	.734	(.202) ***	.703	(.215) **
Dentist for regular check up in past year (n = 2,949)				
Never depressed (reference)	---	---	---	---
Depressed at 1 time period	-.393	(.121) **	-.328	(.129) *
Depressed at 2 time periods	-.350	(.147) *	-.259	(.150)
Depressed at 3 time periods	-.279	(.279)	-.178	(.285)
Emergency room visit in past year (n = 2,955)				
Never depressed (reference)	---	---	---	---
Depressed at 1 time period	.139	(.110)	.058	(.117)
Depressed at 2 time periods	.386	(.117) **	.294	(.106) **
Depressed at 3 time periods	.654	(.234) **	.550	(.224) *
Number of doctor's visits in past year due to illness, accident, or injury (n = 2,958)				
Never depressed (reference)	---	---	---	---
Depressed at 1 time period	.079	(.064)	.091	(.054)
Depressed at 2 time periods	.174	(.090)	.140	(.093)
Depressed at 3 time periods	.354	(.191)	.334	(.181)

Note: All models include city fixed-effects and use robust standard errors (in parentheses). Poisson regression models estimate the number of doctor's visits in the past year, and logistic regression models estimate the other outcomes. Model 2 includes all variables from Model 2 of Table 2. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 5. Ordered Logistic Regression Models Estimating 5-Year-Old Children's General Health as a Function of Maternal Depression and Mechanisms.

Variable	Model 1		Model 2		Model 3		Model 4	
<i>Maternal depression</i>								
Never depressed (reference)	---	---	---	---	---	---	---	---
Depressed at 1 time period	-.043	(.129)	-.033	(.128)	-.087	(.127)	.010	(.127)
Depressed at 2 time periods	-.204	(.169)	-.263	(.153)	-.297	(.156)	-.143	(.157)
Depressed at 3 time periods	-.405	(.206)	-.515	(.205) *	-.542	(.201) **	-.374	(.219)
Child health (y1)	.672	(.077) ***	.672	(.078) ***	.670	(.075) ***	.665	(.076) ***
<i>Socioeconomic status</i>								
Employed (y5)	.057	(.142)					.048	(.148)
Education (y5)								
Less than high school (reference)	---	---					---	---
High school diploma or GED	-.348	(.267)					-.399	(.279)
Post-secondary education	-.021	(.214)					-.039	(.214)
Income-to-poverty ratio (y5)	.080	(.062)					.066	(.058)
Material hardship (y5)	-.080	(.024) **					-.075	(.027) **
Child health insurance (y5)								
Private	-.154	(.196)					-.152	(.211)
Public	-.362	(.178) *					-.320	(.182)
None (reference)	---	---					---	---
<i>Family instability and change</i>								
Relationship with child's father (y5)								
Married			.238	(.186)			.131	(.200)
Cohabiting			-.219	(.223)			-.327	(.220)
Nonresidential relationship (reference)			---	---			---	---
Number of family structure transitions (b, y1, y3, y5)								
None (reference)			---	---			---	---
One			.048	(.191)			.039	(.185)
Two or more			-.086	(.133)			-.101	(.140)
Mother in new relationship (y5)			-.332	(.144) *			-.403	(.138) **
Multi-partnered fertility (y1, y3, y5)			-.039	(.136)			-.012	(.142)
New child in household (y1, y3, y5)			-.181	(.132)			-.111	(.139)
Conflict in current relationship (y5)			.057	(.152)			.096	(.153)
Number of residential moves (y1, y3, y5)			-.090	(.048)			-.064	(.052)
<i>Health and health behaviors</i>								
Physical health problem that limits work (y5)					-.667	(.182) ***	-.607	(.195) **
Smoked in last month (y5)					-.084	(.114)	-.001	(.127)
Substance abuse problem (y5)					-.088	(.359)	.058	(.392)
Number of days played outside with child (y5)					.048	(.027)	.050	(.026)
<i>Intercepts</i>								
1	-5.019		-5.244		-4.481		-5.493	
2	-1.846		-2.071		-1.307		-2.309	
3	.167		-.062		.699		-.282	
N	4,048		4,048		4,048		4,048	

Note: All models include city fixed-effects and use robust standard errors (in parentheses). All models include all variables from Model 3 of Table 2. * $p < .05$, ** $p < .01$, *** $p < .001$.