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Association of Maternal Depressive Symptoms and Offspring Physical Health in Low-Income Families

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Abstract

Objectives The present study sought to examine the association between maternal depressive symptoms and characteristics of offspring physical health, including health status, health behaviors, and healthcare utilization, among low-income families. Maternal engagement was explored as a mediator of observed effects. **Methods** Cross-sectional survey data from a community sample of 4589 low-income women and their preschool-age children participating in the WIC program in Los Angeles County were analyzed using logistic, Poisson, and zero-inflated negative binomial regression. Mediation was tested via conditional process analyses. **Results** After controlling for the effects of demographic characteristics including maternal health insurance coverage, employment status, education, and preferred language, children of depressed women ($N = 1025$) were significantly more likely than children of non-depressed women ($N = 3564$) to receive a “poor” or “fair” maternal rating of general health (OR 2.34), eat fewer vegetables (IRR: 0.94) more sweets (IRR: 1.20) and sugary drinks daily (IRR: 1.32), and consume fast food more often (OR 1.21). These children were also less likely to have health insurance (OR 1.59) and more likely to receive medical care from a public medical clinic or hospital emergency room (OR 1.30). Reduced maternal engagement partially mediated associations between maternal depressive symptoms and several child health outcomes including poor diet, health insurance coverage, and use of public medical services. **Conclusions for Practice** Maternal depressive symptoms are associated with poor health among preschool-age children in low-income families. Prevention, screening, and treatment efforts aimed at reducing the prevalence of maternal depression may positively affect young children’s health.

Keywords Maternal depression · Health behaviors · Healthcare · Low-income

Significance

Although maternal depression is associated with poor mental health among offspring, its impact on children’s physical health is not well-established, particularly among low-income families for whom the risk of parental depression is heightened. Findings support associations between maternal depression and metrics of offspring physical health, including poorer nutrition and decreased likelihood of insurance

coverage, and provide preliminary evidence that maternal engagement may mediate this relationship. Results highlight the broad influence of maternal mental health on family well-being and suggest that identifying women at risk for depression, implementing prevention efforts, and increasing treatment access will benefit children’s mental and physical health.

Introduction

Maternal depression is a highly prevalent condition with serious consequences for children. Approximately 10% of American mothers experience depression each year (Ertel et al. 2011), and children of depressed women are more likely to experience psychopathology than other youth (Goodman et al. 2011). However, the association between maternal depression and children’s physical health is less clear.

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Two studies have suggested that children of depressed women are more likely to exhibit poor health based on maternal ratings (Casey et al. 2004; Turney 2011). Research exploring the impact of maternal depression on offspring weight has been mixed (Gibson et al. 2007; Gunderson et al. 2008; Wang et al. 2013), and studies exploring the influence of maternal depression on behavioral practices that affect children's well-being, such as breastfeeding, has also produced equivocal results (Chung et al. 2004; McLearn et al. 2006). However, several studies have concluded that depressed women are less likely to utilize recommended infant sleep practices (Balbierz et al. 2015; Chung et al. 2004; McLearn et al. 2006). Beyond infancy, evidence indicates that depressed women are less likely to have rules about children's food consumption, and families with depressed mothers are less likely to eat dinner together (Leiferman 2002; Morrissey 2014).

To date, the most extensive research supporting an association between maternal depression and offspring health relates to healthcare utilization. Children of depressed women are more likely to be hospitalized and use acute care services than other children (Casey et al. 2004; Chung et al. 2004; Flynn et al. 2004; Minkovitz et al. 2005; Sills et al. 2007). Youth with a history of maternal depression are also less likely to receive preventative services such as vaccinations (Minkovitz et al. 2005; Sills et al. 2007), and healthcare expenditures for children are significantly higher among families with parental depression (Brooks et al. 2015).

Together, these findings suggest that while there is some evidence for the deleterious effects of maternal depression on offspring physical health, additional research is needed to fully understand this relationship, including the impact of poor childhood health on maternal depression (Berge et al. 2006), the contribution of environmental variables to both maternal depression and poor child health (Bronte-Tinkew et al. 2007), and the mechanisms through which maternal depression might impact offspring health. Maternal engagement with children is a promising potential mechanism given established associations between depression and diminished engagement among mothers, including reduced likelihood of playing with or reading to children and less verbal interaction with infants (Lovejoy et al. 2000; McLearn et al. 2006). Studies have demonstrated that parenting behaviors and maternal engagement partially mediate the association between maternal depression and youth psychopathology (Ewell Foster et al. 2008; Kiernan and Huerta 2008), although little is known about how decreased engagement among depressed mothers impacts physical health. The single existing study on the topic found that reduced parenting quality mediated the association between maternal depression and higher childhood body mass index (BMI; McConley et al. 2011).

Of note, the influence of maternal depression on children's health is particularly relevant among low-income families. Low-income mothers are at increased risk for depression (Ertel et al. 2011), and depressed women are more likely to experience changes in economic status that can affect health, including reduced welfare support and loss of food stamp benefits (Casey et al. 2004). Additionally, maternal depression may be one pathway through which poverty influences children's well-being, including obesity, food insecurity, psychopathology, and cognitive development (Kiernan and Huerta 2008; McCurdy et al. 2010), and the association between maternal depression and reduced engagement is strongest among low-income women (Lovejoy et al. 2000). Thus, studies that clarify the specific effects of maternal depression on children in low-income families are greatly needed.

The present study seeks to address notable gaps in the literature by examining the influence of maternal depression on offspring physical health, including health status, health behaviors, and healthcare utilization, in a low-income sample. Additional analyses explore maternal engagement as a mediator. We hypothesized that maternal depressive symptoms would be associated with poorer offspring physical health, less healthy nutrition behaviors, reduced utilization of appropriate healthcare services, and lower maternal engagement. Additionally, we predicted that reduced engagement would mediate the association between maternal depressive symptoms and poor offspring physical health.

Methods

Participants

The present study uses data collected from participants in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) as part of the 2014 Los Angeles County (LAC) WIC survey (Public Health Foundation Enterprises WIC Program 2014). The WIC program is a supplemental food and nutrition education program for women, infants, and children under age 5 who are low-income (up to 185% of the Federal Poverty Level) and at nutritional risk. The 2014 LAC WIC survey collected data from 4990 WIC participants, including a cross-sectional sample of 4691 participants randomly selected from among individuals receiving WIC services in LAC in January 2014 and an additional 299 participants from Antelope Valley, LAC's least populous region.¹

¹ Los Angeles County is divided into eight Service Planning Areas (SPA). The cross-sectional sample was taken from all eight SPAs. The SPA of Antelope Valley was oversampled to include enough participants from the area for research and planning purposes.

A total of 4658 participants (93.3%) were biological mothers of children enrolled in the WIC program. Of these women, 69 were missing data regarding depressive symptoms. Thus, the present analyses include 4589 women who provided demographic and health information on themselves and one child who was randomly selected from among all children in the family enrolled in the WIC program.

Procedure

The present study is comprised of secondary data analyses using the 2014 LAC WIC Survey. The LAC WIC survey was based on the 2005 LAC Health Survey (LAC Department of Public Health, 2005) and adapted with input from the California State WIC Division and WIC Local Agency staff. The objective of the survey is to assess health indicators, health behaviors, and home and community environments related to the well-being of families participating in the WIC program.

Survey interviews were conducted by Field Research Corporation, an independent public opinion research organization, using computer-assisted telephone interviewing. Telephone interviews averaged 20–25 min in length and were conducted in English or Spanish, according to participant preference. Up to sixteen attempts were made to reach eligible WIC participants. Of the women reached by phone, 87% completed the survey. The total survey response rate was 51%, as many participants were never reached by phone.

Maternal depressive symptoms were assessed using the Patient Health Questionnaire-2 (PHQ-2; Kroenke et al. 2003). Women who reported experiencing at least one symptom for several days or more over the past 2 weeks (i.e., PHQ-2 score of 1 or more) were coded as experiencing current depressive symptoms ($N = 1025$, 22.3%).

Most offspring health variables were based on maternal report. Physical health status was assessed using maternal ratings of general health and calculations of BMI based on children's height and weight as measured during their usual WIC appointment, typically within 6 months of the survey date. BMI analyses were confined to children over age 2.0, based on recommendations by the American Academy of Pediatrics (Daniels and Hassink 2015). Health behaviors included nutrition behaviors such as consumption of fruits and vegetables, sweets, and fast food. Healthcare utilization was examined by assessing whether children had health insurance, the location where they typically receive medical care, and whether they had ever visited the dentist. Few children typically received care at a hospital emergency room ($N = 83$, 1.8%) or hospital clinic ($N = 229$, 5.0%), so these individuals were combined with children who typically received care at county or community clinics to assess receipt of healthcare from public vs. private sources. Maternal engagement was measured using 5 items, which were drawn from work examining school readiness. Items

included the frequency with which children were read to, told stories, taught letters, words, and numbers, or played music by an adult in the home in addition to the frequency with which women reported praising their child.

Statistical Analyses

In the initial set of analyses, maternal depression status was dichotomized and used to predict metrics of offspring physical health. Due to variability in the frequency with which various responses were endorsed, categorical outcome variables were dichotomized and examined using logistic regression. Most analyses predicting count outcomes utilized Poisson regression. However, the variable representing average daily sugary drinks was over-dispersed, so zero-inflated negative binomial regression was employed. Results are presented in the form of odds ratios (categorical outcome variables) and incidence rate ratios (count outcome variables) and include 95% confidence intervals (CIs).

Additional analyses assessed maternal engagement as a mediator of obtained direct effects. These analyses utilized a composite variable created by summing the five maternal engagement items. Conditional process analyses were conducted using the PROCESS macro for SPSS (Hayes 2013), which employs bootstrapping ($N = 1000$ resamples) to estimate direct and indirect effects. Bias-corrected 95% CIs determined the statistical significance of obtained effects. Indirect effects in which the 95% CI did not include zero supported maternal engagement as a mediator.

All analyses included several covariates: preferred language (English vs. Spanish), maternal education (less than high school vs. high school graduate or higher), maternal employment (employed vs. unemployed), maternal health insurance coverage (insured vs. uninsured), family income (< 50% of the 2014 Federal Poverty Level (FPL) vs. 50.1–100% of FPL vs. > 100% of FPL), child gender (male vs. female), whether the child's father was actively involved in his or her life (involved vs. uninvolved), maternal age, and child age.

Results

Descriptive Statistics

Most women identified as Hispanic ($N = 3887$, 84.7%), while the remainder identified as African-American ($N = 338$, 7.4%), Caucasian ($N = 211$, 4.6%), Asian or Pacific Islander ($N = 101$, 2.2%), or other ($N = 45$, 1.0%). Women in the present sample ranged in age from 15 to 51 years with an average age of 30.51 ($SD = 6.58$). Children ranged in age from less than 1 year to 5.0 years with an average age of 2.42 ($SD = 1.43$). Most women had graduated from high school

Table 1 Demographic characteristics of survey respondents by maternal depression status

Demographic characteristics	Total (<i>N</i> = 4589)		Maternal depressive symptoms ^a (<i>N</i> = 1025)		No maternal depressive symptoms (<i>N</i> = 3564)	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Language of interview***						
English	2457	53.5	493	48.1	1964	55.1
Spanish	2132	46.5	532	51.9	1600	44.9
Maternal education ^{b,***}						
Less than high school graduate	1643	35.9	450	44.2	1193	33.6
High school graduate or more	2930	64.1	569	55.8	2361	66.4
Maternal employment ^{b,*}						
Employed	1688	36.9	349	34.1	1339	37.7
Unemployed	2888	63.1	674	65.9	2214	62.3
Maternal health insurance ^{b,***}						
Insured	3085	67.7	645	63.3	2440	69.0
Uninsured	1471	32.3	374	36.7	1097	31.0
Child gender						
Female	2245	48.9	506	49.4	1739	48.8
Male	2344	51.1	519	50.6	1825	51.2
Father involved in child's life ^{b,*}						
Uninvolved	679	14.9	173	17.0	506	14.3
Involved	3874	85.1	842	83.0	3032	85.7
	Mean	SD	Mean	SD	Mean	SD
Maternal age ^{b,***}	30.51	6.58	31.13	6.85	30.33	6.49
Child age***	2.42	1.43	2.59	1.41	2.37	1.43

* $p < .05$; ** $p < .01$; *** $p < .001$ ^aWomen who received a score of 1 or higher on the PHQ-2 are coded as experiencing depressive symptoms^bValues for some demographic characteristics do not match the total number of participants due to missing data. The number of missing values in the overall sample ranges from 0 to 36

($N = 2930$, 64.1%), and a majority were not currently working ($N = 2888$, 63.1%). Most women ($N = 3085$, 67.7%) and children ($N = 4306$, 94.1%) had health insurance. Most women reported that their family income fell at or below 100% of the FPL ($N = 3383$, 77.1%). The 2014 FPL for a family of four was \$23,550.

Table 1 displays the demographic characteristics of the sample by maternal depression status. Statistically significant differences between depressed and non-depressed women were observed for all variables other than child gender, with depressed women demonstrating the most marked differences in preferred language of the interview (52 vs. 45% conducted in Spanish), education (56 vs. 66% high school graduates), and health insurance status (37 vs. 31% uninsured). Table 2 provides descriptive statistics for outcome variables by maternal depression status, highlighting several significant group differences including the likelihood of receiving medical care in a public setting (52% of children of depressed women vs. 43% of children of non-depressed women).

Maternal Depressive Symptoms and Offspring Physical Health

Analyses predicting offspring physical health indicated that preschool-age children of depressed women were 2.34 times more likely to be rated by their mothers as having poor or fair health (95% CI 1.65–3.33; Table 3) than children of non-depressed women. Children of depressed women also ate vegetables at a reduced daily rate vegetables (IRR: 0.94, 95% CI 0.89–0.98) compared to other children and demonstrated 1.18 times the daily rate of eating sweets such as cookies, candy, and sweetened cereal (95% CI 1.10–1.27). Additionally, children of depressed women exhibited 1.33 times the daily rate of consuming sugary drinks such as soda, chocolate milk, or Gatorade (95% CI 1.18–1.49) and were 1.21 times more likely to eat fast food at least once per week (95% CI 1.04–1.42).

Healthcare utilization also varied by maternal depressive symptoms. Children of depressed women were 1.66 times more likely to be uninsured (95% CI 1.25–2.20) and were

Table 2 Offspring well-being by maternal depression status

Offspring well-being	Total (<i>N</i> = 4589)		Maternal depressive symptoms (<i>N</i> = 1025)		No maternal depressive symp- toms (<i>N</i> = 3564)	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Maternal rating of general health ^{a,***}						
Excellent, very good, or good	4441	96.8	960	93.8	3481	97.7
Fair or poor	145	3.2	63	6.2	82	2.3
Weight status ^b						
Normal weight	1859	71.9	468	74.1	1391	71.2
Overweight or at risk of overweight	727	28.1	164	25.9	563	28.8
Health insurance ^{a,***}						
Insured	4306	94.1	937	91.6	3369	94.8
Uninsured	269	5.9	86	8.4	183	5.2
Typical location of medical care ^{a,***}						
Private doctor's office	2373	55.0	464	48.4	1909	56.8
County, community, or hospital clinic or hospital ER	1944	45.0	495	51.6	1449	43.2
Ever visited the dentist ^{a,*}						
Yes	2244	48.9	534	52.2	1710	48.0
No	2342	51.1	489	47.8	1853	52.0
Fast food consumption ^{a,**}						
Less than once per week	2410	56.6	499	51.7	1911	58.0
Once per week or more	1851	43.4	466	48.3	1385	42.0
Days read to by adult in home ^{a,***}						
≥ 3	3426	77.8	701	72.4	2725	79.3
< 3	979	22.2	267	27.6	712	20.7
Days told stories by adult in home ^{a,***}						
≥ 3	3083	67.3	641	62.7	2442	68.7
< 3	1495	32.7	381	37.3	1114	31.3
Days taught letters, words, or numbers by adult in home ^{a,**}						
≥ 3	3580	78.2	771	75.3	2809	79.1
< 3	997	21.8	253	24.7	744	20.9
Days play music or sing songs with adult in home ^{a,**}						
≥ 3	3812	83.2	822	80.4	2990	84.0
< 3	769	16.8	201	19.6	568	16.0
Praised by mother ^{a,**}						
Almost everyday	3224	71.9	684	68.1	2540	73.0
Several times per week or less	1260	28.1	320	31.9	940	27.0
	Mean	SD	Mean	SD	Mean	SD
Daily servings of fruit ^a	2.89	1.53	2.85	1.53	2.91	1.53
Daily servings of vegetables ^{a,**}	2.22	1.32	2.10	1.41	2.25	1.30
Daily servings of sugary drinks ^{a,***}	0.60	1.07	0.79	1.30	0.54	0.99
Daily servings of sweets ^{a,***}	0.78	0.80	0.93	0.88	0.73	0.78

* $p < .05$; ** $p < .01$; *** $p < .001$ ^aValues for some outcome variables do not match the total number of participants due to missing data. The number of missing values in the overall sample ranges from 3 to 394^bAnalyses examining youth weight status are limited to children over age 2.0 ($n = 2586$)

Table 3 Effect of maternal depressive symptoms on offspring well-being

Offspring well-being	Adjusted odds ratio or incidence rate ratio for children of depressed women ^a (95% CI)
Physical health status	
Maternal rating of general health as poor or fair***	2.34 (1.65–3.33)
Overweight or at risk of overweight ^b	0.82 (0.67–1.02)
Health behaviors	
Average daily servings of fruit	0.98 (0.94–1.02)
Average daily servings of vegetables**	0.94 (0.89–0.98)
Average daily servings of sugary drinks***	1.33 (1.18–1.49)
Average daily servings of sweets***	1.18 (1.10–1.27)
Eats fast food once per week or more*	1.21 (1.04–1.42)
Healthcare utilization	
No health insurance***	1.66 (1.25–2.20)
Typically receives medical care at a county, community, or hospital clinic or emergency room*	1.23 (1.05–1.44)
Ever visited the dentist	0.95 (0.79–1.15)
Maternal engagement	
Read to by adults in home ≥ 3 days/week***	0.70 (0.59–0.83)
Told stories by adults in home ≥ 3 days/week**	0.80 (0.68–0.93)
Taught letters, words, or numbers by adults in home ≥ 3 days/week**	0.78 (0.65–0.93)
Play music or sing songs with adults in home ≥ 3 days/week	0.86 (0.71–1.05)
Receives praise from mother almost everyday	0.87 (0.74–1.03)

* $p < .05$; ** $p < .01$; *** $p < .001$

^aAll reported results are adjusted for the language in which the interview was conducted, maternal education, maternal employment status, maternal health insurance coverage, family income, child gender, whether the child's father was an active part of his or her life, maternal age, and child age. Odds ratios (OR) were calculated for all dichotomous outcome variables, while incidence rate ratios (IRR) were calculated for count outcome variables (i.e., consumption of fruit, vegetables, sugary drinks, and sweets)

^bAnalyses examining youth weight status are limited to children over age 2.0 ($n = 2586$)

1.23 times more likely to receive care at a county, community, or hospital clinic or an emergency room vs. a private doctor's office (95% CI 1.05–1.44). Finally, women who endorsed depressive symptoms reported that their preschool-age children were significantly less likely to be read to (OR 0.70, 95% CI 0.59–0.83) or told stories (OR 0.80, 95% CI 0.68–0.93) at least three or more days per week. Children of depressed women were also less likely to be taught letters, words, or numbers at home on three or more days per week (OR 0.78, 95% CI 0.65–0.93).

Maternal Engagement as a Mediator

Maternal engagement mediated several of the observed associations between maternal depression and offspring physical health (Table 4), including average daily vegetable consumption (95% CI -0.06 to -0.02), average daily sugary drink consumption (95% CI 0.01–0.02), and average daily sweets consumption (95% CI 0.002–0.01). Maternal engagement also mediated the association between maternal depression and child health insurance coverage (95% CI 0.01–0.06) and

the likelihood of receiving medical care from a public source (95% CI 0.005–0.04). In all instances, maternal depression was associated with reduced engagement, which was linked to negative health outcomes (i.e., reduced vegetable consumption, heightened sweets intake, higher likelihood of being uninsured, etc).

Discussion

The present study sought to clarify the impact of maternal depressive symptoms on offspring physical health among low-income families. Consistent with hypotheses, preschool-age children of depressed women exhibited poorer mother-rated general health, less healthy eating habits, and reduced likelihood of having health insurance or receiving care from a private doctor compared to offspring of non-depressed women. Children of depressed women were also less likely to be read to, told stories, or taught letters, words, and numbers at home. Furthermore, lower maternal engagement mediated the link between maternal depression and

Table 4 Indirect effects of maternal depressive symptoms on offspring physical well-being via maternal engagement

Offspring well-being	Indirect effect ^a			Direct effect ^a		
	Effect	SE	95% CI	Effect	SE	95% CI
Physical health status						
Maternal rating of general health as poor or fair	0.02	0.02	(−0.004 to 0.06)	0.83*	0.18	(0.48 to 1.18)
Health behaviors						
Average daily servings of vegetables	−0.04*	0.01	(−0.06 to −0.02)	−0.10*	0.05	(−0.20 to −0.005)
Average daily servings of sugary drinks	0.01*	0.005	(0.01 to 0.02)	0.18*	0.04	(0.10 to 0.25)
Average daily servings of sweets	0.01*	0.003	(0.002 to 0.01)	0.13*	0.03	(0.08 to 0.19)
Eats fast food once per week or more	0.01	0.01	(−0.006 to 0.02)	0.19*	0.08	(0.03 to 0.35)
Healthcare utilization						
No health insurance	0.03*	0.01	(0.01 to 0.06)	0.48*	0.14	(0.20 to 0.77)
Typically receives medical care at a county, community, or hospital clinic or emergency room	0.02*	0.01	(0.005 to 0.04)	0.19*	0.08	(0.03 to 0.35)

*Significant effect as evidenced by 95% confident interval that does not include zero

^aAll reported results are adjusted for the language in which the interview was conducted, maternal education, maternal employment status, maternal health insurance coverage, family income, child gender, whether the child's father was an active part of his or her life, maternal age, and child age

several outcomes, including reduced vegetable consumption, increased consumption of sugary drinks and sweets, and increased likelihood of being uninsured or receiving medical care from a public source. Of note, all effects were observed after controlling for maternal education, employment status, preferred language, age, and health insurance coverage in addition to family income, child age, child gender, and involvement of the child's father in his or her life. Findings suggest that offspring physical health and maternal engagement are linked to maternal depression and indicate that diminished engagement may be one pathway through which depressed women negatively affect their children's physical health.

The relationship between maternal depressive symptoms and offspring physical health is complex and bidirectional (e.g., Berge et al. 2006). The present results suggest that depressed women are more likely to rate their preschool-age children as being in poor health and exhibiting unhealthy eating behaviors, which may be due to characteristics of both the child (e.g., chronic health conditions, failure to meet expected developmental milestones) and the mother (e.g., negative cognitive biases associated with depression, less willingness to enforce healthy eating). This association is also affected by access—children of depressed women in the present study were less likely to have health insurance and more likely to receive medical services in a community or hospital clinic, which may be related to motivational features of depressed women (e.g., less energy and interest in seeking out better healthcare options) and environmental factors that simultaneously reduce healthcare access and decrease mood (e.g., distance from a private doctor's office, complex insurance paperwork).

The present results suggest that intervening at the level of the mother, child, or environment would help to improve outcomes among low-income families, and failing to intervene may condemn low-income children to a lifetime of poor health and other negative consequences, including reduced educational and wealth attainment (Haas 2006). Independent of maternal depression, children from low-income families exhibit markedly poorer physical and mental health into adulthood (Case et al. 2005), and specific behaviors that were found to be associated with maternal depression in the present study, such as unhealthy eating habits, can have negative long-term consequences including increased risk of cardiovascular disease (Lanigan and Singhal 2009). Thus, maternal depression may disadvantage low-income children even further. Additionally, the transactional nature of these variables over time (i.e., depressed women are less likely to engage in behaviors that contribute to positive offspring health; less healthy children require additional care that overtaxes maternal resources resulting in increased depression) may contribute to adverse outcomes for the family as a whole, including reinforcing cycles of poverty and poor health across generations.

Furthermore, the results suggest that depressed women are less likely to engage in enrichment activities with their children and that reduced maternal engagement might partially explain the link between maternal depression and several negative health outcomes. These findings corroborate a prior study that found parental quality mediated the association between maternal depression and child BMI (McConley et al. 2011) in addition to research highlighting the role of engagement as a mechanism of maternal depression's effect on offspring psychopathology. The present results are the

first to extend this research to other health-related domains, including healthcare utilization, and findings highlight the dual influence of both micro- and macro-level factors on child physical health (i.e., environmental factors and within-family factors associated with depressive symptomatology among mothers). Future research should continue to explore potential mechanisms of the association between maternal depression and poor offspring health, including parental modeling of ineffective health behaviors (Rhee 2008).

Strengths of the present study include the use of a large, highly diverse community sample and the ability to examine the effects of maternal depression on offspring over and above the influence of relevant demographic characteristics. The sample included a relatively high proportion of women who endorsed at least one depressive symptom, allowing for greater understanding of the link between maternal depression and offspring health. The focus on low-income women and children, a population particularly vulnerable to poor physical and mental health, is also a major strength.

The use of cross-sectional, self-report data is an important study limitation. Causal relationships cannot be ascertained, and negative cognitive biases associated with depression may have influenced women's report of their child's health. Therefore, the findings likely overestimate the association between maternal depression and offspring health. Additionally, cross-sectional data cannot definitely rule out a causal association opposite to that tested, in which poor child health leads to increases in maternal depression (e.g., Berge et al. 2006). The present study was unable to assess chronic health conditions among children that may have contributed to maternal depressive symptoms and could not rule out other variables that may negatively impact both maternal mental health and offspring physical well-being (e.g., limited access to affordable healthcare or healthy food). Furthermore, mediation cannot be definitively established within cross-sectional datasets. Future studies should employ longitudinal designs to establish clear temporal associations between maternal depression, offspring physical health, and possible mediators.

Given the survey's broad focus, a more comprehensive depression scale could not be included. Maternal depressive symptoms were measured using two items, and women were coded as depressed if they endorsed at least one item on "several days" or more in the last 2 weeks. Therefore, the threshold above which women were characterized as experiencing depressive symptoms was quite low, and the psychometric properties of this measure among low-income women are unknown. However, given the low threshold required to meet criteria for depressive symptoms in the present study, the negative health outcomes among children of depressed women are notable and suggest that mothers with clinically-significant levels of depression may be even more likely to contribute to poor child health than is represented here.

While maternal depressive symptoms only accounted for a small proportion of the relative risk of negative offspring health outcomes in the present study, the results suggest that reducing depressive symptoms among low-income women could have implications beyond the health of the women themselves. Increased implementation of interventions designed to prevent and treat depression among low-income women could improve current and long-term physical and mental health among children, in addition to reducing poverty across the lifespan (Haas 2006). Both medication and psychotherapy have been identified as effective interventions among depressed, low-income women (Miranda et al. 2006; Zlotnick et al. 2006), and studies have found that administering brief screening measures to pregnant women in obstetric care settings can accurately identify women at risk for depression (Marcus et al. 2004). Unfortunately, many individuals suffering from maternal depression have never received treatment (Marcus et al. 2004), highlighting the need for broader screening, increased prevention efforts among at-risk women, and greater access to affordable treatments. Partnerships between WIC sites and managed care providers could provide a venue for low-income women to access mental health treatment while taking positive steps toward their children's health.

The present results suggest that providing depressed women with effective, low-cost treatment is a public health issue with implications beyond the immediate well-being of the mother. Interventions targeting maternal depression may also improve child physical health, nutrition, and healthcare utilization. Longitudinal studies aimed at clarifying the temporal and causal relationships among maternal depression and offspring physical health must be conducted to inform policy that will enhance quality of life among low-income women and their children.

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