

Material Hardship and the Physical Health of School-Aged Children in Low-Income Households

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In 2005, 17.6% of US children and adolescents younger than 18 years lived below the federal poverty line (\$19 350 for a family of 4 including 2 children),¹ and 7.7% lived in extreme poverty (50% below the federal poverty line).² Studies have repeatedly shown that mortality and morbidity are higher among poor children than among nonpoor children.^{3–9} However, the health of children within a given income category has also been shown to vary. According to data reported in the 2005 National Health Interview Survey (NHIS), 4.7% of children living in poverty were in fair or poor health, and 39.3% were in excellent health.³ Although predictors and correlates have not been adequately explored, other health indicators have shown similar variation.^{5,10}

In the majority of studies examining health disparities among children, conventional measures of socioeconomic status (SES), such as family income, parental education, and parental employment, have been used as predictors.^{11–13} However, some researchers suggest that such measures are “distal” in nature and that proximal measures of economic well-being, including material hardship, may be more informative in assessments of health variations among low-income children.^{14–16}

Most studies that have shown significant associations between material hardship and children’s physical health have focused on a single type of hardship.^{17–21} Studies on housing hardship have investigated the effects of housing instability, poor-quality housing, and overcrowding on children’s physical health separately. Overall, studies have shown that children living in poor-quality or overcrowded housing are more likely than are children living in better housing conditions to be in poor health and to experience accidents and injuries, infectious diseases, and lead poisoning.^{22–27} Most studies on housing instability and children’s physical health have focused primarily on homeless children. Although these studies have produced inconsistent results, generally they

Objectives. We examined the relationship between material hardship reported by low-income caregivers and caregivers’ assessments of their children’s overall health.

Methods. We used logistic regression techniques to analyze data from 1073 children aged 5 through 11 years whose caregivers participated in multiple waves of the Illinois Families Study.

Results. Caregivers’ reports of food hardship were strongly associated with their assessments of their children’s health. Other sources of self-reported material hardship were also associated with caregivers’ assessments of their children’s health, but the effects disappeared when we controlled for caregiver physical health status and mental health status. Proximal measures of material hardship better explained low-income children’s health than traditional socioeconomic measures. There were no statistically significant cumulative effects of material hardships above and beyond individual hardship effects.

Conclusions. Our findings highlight the importance of developing and supporting programs and policies that ensure access to better-quality food, higher quantities of food, and better living conditions for low-income children, as well as health promotion and prevention efforts targeted toward their primary caregivers as ways to reduce health disparities for this population. (*Am J Public Health.* 2009;99:829–836. doi:10.2105/AJPH.2007.119776)

have shown that homeless children are more likely to be in poor health than are children who are not homeless.^{17,18,28–31}

Improvements in food insecurity³² and food insufficiency³³ measures have led to increased research on food hardship and US children’s health in recent years.³⁴ This body of literature shows that children from households experiencing food insecurity or food insufficiency have more acute and chronic health conditions and are in poorer health than are their counterparts not experiencing these conditions.^{19–21,35,36}

The concept of unmet medical needs is generally used to describe the degree to which individuals’ health problems are unaddressed by their health care providers.^{37,38} Approximately 4.7 million (7.3%) children in the United States have at least 1 unmet medical need, and near-poor or poor children are 3 times as likely as nonpoor children to experience unmet medical needs.³⁷ Most research in this area has focused on identifying risk factors associated with unmet medical needs.^{37–41}

Cross-sectional studies examining the effects of unmet medical needs on children’s health have produced inconsistent findings.^{37,38} Although other economic difficulties (e.g., lack of durable goods or limited access to transportation) have also been identified as domains of material hardship,^{15,16} no studies to our knowledge have investigated their associations with health outcomes among children.

Our goal was to use data primarily derived from survey interviews to determine the relative and cumulative effects of material hardship on low-income children’s physical health.

Building from previous studies, we examined how interrelated indicators of material hardship are associated in different ways with children’s health. Our use of multiple indicators reduced concerns related to potential omitted variable bias in our analyses.

We used caregivers’ perceptions of their children’s overall health as a measure of children’s health status. On the basis of recent health theories suggesting the importance of focusing on positive health rather than

illness,^{42,43} we focused on factors distinguishing children reported to be in exceptional physical health from children reported to be in optimal or suboptimal health. Our research questions were as follows:

1. What are the independent effects of different self-reported measures of material hardship on caregivers' assessments of their children's physical health?
2. How do proximal self-reported measures of material hardship differ from traditional SES measures in explaining low-income caregivers' assessments of their children's health?
3. Do these material hardship measures have a cumulative effect on children's physical health above and beyond individual hardship effects?

METHODS

The data for this study were derived from the third (2002) and fourth (2003) waves of the Illinois Families Study (IFS), a 5-year panel investigation examining the effects of welfare reform on welfare recipients and their families. The study involved a representative sample of caregivers who were residing in Illinois and receiving Temporary Assistance to Needy Families cash benefits in late 1998.⁴⁴ A stratified random sampling design was used to ensure inclusion of a sufficient number of caregivers from smaller, nonurban Illinois counties. The stratification was based on 2 geographical designations: Cook County (Chicago metropolitan area) and 8 central Illinois counties (representing nonurban areas).

The wave 1 response rate was 72% (n=1363), and response rates in subsequent study waves were above 90%, comparable to levels observed in other studies of welfare recipients.^{45,46} Statistical weights were used to adjust for the overrepresentation of participants from smaller counties and for attrition and nonresponse.

Information on caregivers and their families was gathered through annual in-person interviews conducted with the participants and through individual-level administrative data obtained from multiple databases maintained by the state of Illinois. In the interviews, respondents were asked to provide information

about all of the children for whom they were the primary caregiver. Data on 2302 children were collected in both the third and fourth waves of the IFS.

Because of the possibility that factors associated with children's health differ according to age and school enrollment, the sample was limited to children who were aged 5 through 11 years and who were enrolled in school at the wave 3 interview. Of the 2302 children for whom data were available, 1110 met these inclusion criteria. Complete data were available for 1073 of these children. In some households, more than 1 child met the inclusion criteria, raising concerns regarding dependence in observations.⁴⁷ We used Huber–White's method for robust standard errors to address this issue.

Measures

Physical health outcomes. Information regarding children's physical health outcomes was extracted from the wave 4 interviews. Caregivers were asked to provide a general assessment of their child's health ("How would you rate your child's overall health?") on a 5-point scale (excellent, very good, good, fair, or poor). In our analyses, we assigned a code of 1 to children reported to be in excellent health and a code of 0 to children in all other rating categories.

Demographic and socioeconomic characteristics. Information for most independent variables was extracted from the wave 3 interviews. Demographic controls included child age and gender; caregiver age, race/ethnicity (African American, Hispanic, non-Hispanic White or other), and marital status (married, cohabiting, single); and family region of residence (Cook County vs central Illinois).

We included 4 traditional SES measures—caregiver income, education, employment, and welfare status—to determine how they differed from material hardship measures in explaining low-income children's health status. Income was an ordinal variable (1=less than \$2500, 15=\$50 000 or more), with caregivers being asked to report their total income from all sources, including earnings, welfare benefits, and child support. A dichotomous variable was used for educational level (0=high school education or more, 1=less than a high school education).

Caregivers identified in Illinois Department of Employment administrative records as having any income during the quarter of their wave 3 interview were classified as currently working. Those identified as receiving welfare cash benefits in the month of their wave 3 interview were considered to be receiving welfare. Welfare status was included as an indicator of SES because welfare recipients may have different characteristics than may those who are not on welfare. For example, on average, welfare recipients in the IFS had significantly lower incomes than did nonrecipients (although not all welfare recipients were in the lowest income category).

Material hardship. We assessed 3 dimensions of housing hardship (housing instability, housing quality, and overcrowding). Children were considered to have an unstable housing situation when their caregiver responded affirmatively to any of 5 housing instability items (e.g., the child had stayed at a homeless or domestic violence shelter, lived in a car or other vehicle, or lived in an abandoned building for 2 or more days). Children whose caregiver responded affirmatively to 2 or more of 7 housing quality items (e.g., leaky roof, ceiling, or walls, broken windows) were regarded as living in poor-quality housing.⁴⁸ Children in households with more than 2 people per bedroom were considered to live in overcrowded households.

Children whose caregivers answered "often" to any of 4 child-specific food-insecurity items derived from the US Department of Agriculture's Core Food Security Module⁴⁹ (rely on a few kinds of low-cost foods to feed your children, unable to provide your children a balanced meal, have to cut the size of or skip children's meals, feel children are not eating enough because there is not enough money) were considered to be experiencing food hardship. Children whose caregivers reported that any essential utilities (e.g., gas, electricity, oil, or telephone) had been turned off since the preceding interview because payments had not been made were considered to live in households that had difficulty paying for utilities (a proxy measure capturing financial struggles in providing basic utilities).

Children of caregivers who were not able to afford medical services from a doctor, prescription drugs, or dental care for any child in

the family were regarded as having unmet medical needs. Three items from the caregiver interviews were used to assess access to transportation. Children whose caregivers did not have a driver's license, did not have regular access to a car, and reported that the public transportation in their neighborhood was "problematic" were considered as experiencing transportation hardships. Finally, a cumulative risk index was created through summing all of the dichotomized material hardship measures.

Other child and caregiver characteristics. Children's health insurance status and caregivers' physical and mental health status have also been found to be associated with children's health.^{7,37,50-53} We considered children who lacked health insurance coverage at the time of the interview or had experienced a gap in coverage during the preceding year as having a gap in their coverage. A general health status question with 5 ordinal responses (ranging from poor to excellent) was used to estimate caregivers' physical health. The summary score from the 20-item Center for Epidemiological Studies depression scale (Cronbach $\alpha=0.89$) was used as a measure of caregivers' mental health symptomatology.⁵⁴

Data Analysis

We used multivariate logistic regression to examine the relative contributions of our independent variables to children's physical health. The results were compared with a traditional SES model to examine which model better explained variations in children's health. We also investigated the cumulative and interaction effects associated with material hardship.

RESULTS

Weighted means, standard deviations, and ranges for the independent and dependent variables, along with the percentages of children experiencing each type of material hardship, are shown in Table 1. The children were, on average, aged 8 years (SD=1.92), and approximately 50% were male. Just under half (46.9%) were reported to be in excellent health, and 4.5% were reported to be in fair or poor health. The percentage of children reported to be in fair or poor health was similar to the 2003 NHIS estimate for low-income

TABLE 1—Sample Characteristics: Illinois Families Study, 2002–2003

	Sample (N = 1073)
Child characteristics	
Boy, %	49.80
Age, y (range, 5–11), mean (SD)	8.05 (1.92)
Health insurance coverage gaps, %	6.70
Child health status (dependent variables), %	
Excellent	46.90
Very good	27.69
Good	20.95
Fair/poor	4.50
Caregiver characteristics	
Age, y (range, 21–55), mean (SD)	31.91 (6.41)
Race/ethnicity, %	
African American	78.61
Hispanic	12.23
White/other	9.16
Marital status, %	
Single	81.37
Married	11.79
Cohabiting	6.84
Cook County (Chicago area) resident, %	90.48
Physical health rating (1 = poor, 5 = excellent), mean (SD)	3.72 (1.21)
CES-D score (range, 0–51), mean (SD)	8.65 (9.65)
High school education or GED, %	70.03
Annual income ranking, mean (SD)	6.46 (2.62)
Employed, %	48.06
Welfare recipient, %	16.28
Material hardship	
Housing instability, %	1.14
Poor housing quality, %	13.70
Overcrowded housing, %	18.65
Food hardship, %	6.92
Difficulty paying for utilities, %	31.40
Unmet medical needs, %	3.32
Lack of adequate transportation, %	5.20
Cumulative no. of material hardships, mean (SD)	0.81 (0.94)
0, %	47.73
1, %	30.79
2, %	16.26
3, %	3.67
4, %	1.55

Note. CES-D = Center for Epidemiological Studies depression scale; GED = general equivalency diploma. ^aIncome was ranked on a 15-point scale ranging from less than \$2500 (1) to \$50000 or more (15; 6 = \$12500–\$14999).

children (4.9%), whereas the percentage of children in excellent health was slightly higher than the 2003 NHIS estimate (40.9%).⁵⁵ The majority of caregivers were African American (78.6%), were not married or cohabiting (81.4%), and resided in Cook County at the time of the wave 1 interview (90.5%).

Univariate effects of caregivers' reports of material hardship on their assessments of their children's health are reported in the first column of Table 2. The findings suggest that children who were reported to live in poor-quality housing (odds ratio [OR]=0.43; 95% confidence interval [CI]=0.20, 0.91; $P<.05$) and children who were reported to experience frequent food hardship (OR=0.17; 95% CI=0.06, 0.47; $P<.05$) were less likely to be in excellent health than were children living in better conditions. The same was true of children whose caregivers reported financial difficulties meeting medical needs (OR=0.18; 95% CI=0.05, 0.62; $P<.05$). These effects remained statistically significant after we controlled for other material hardships (Table 2, model 1) and basic demographic variables (Table 2, model 2).

Although food hardship continued to be a significant independent variable in model 3 (OR=0.21; 95% CI=0.07, 0.65; $P<.001$), housing quality and children's unmet medical needs were no longer statistically significant when caregivers' assessments of their physical and mental health and their children's health insurance status were included in that model. Caregivers' positive assessments of their own physical health were positively associated with ratings of their children's health as excellent (OR=2.18; 95% CI=1.65, 2.88; $P<.001$). Caregivers' mental health and gaps in children's health insurance coverage were not significantly associated with ratings of children's health as excellent.

We compared the full material hardship model (model 3) with the SES model (Table 3, model 4) to assess which set of predictors better explained variations in children's health. As shown in Table 3 (model 4), conventional SES measures were not significantly associated with ratings of excellent health. Similar results were found when number of people living in the household was taken into consideration (results not shown). When fit indices for non-nested models (e.g., the Akaike information

TABLE 2—Caregivers’ Ratings of Their Children’s (N = 1073) Health as Excellent: Illinois Families Study, 2002–2003

	Univariate Analysis ^a		Model 1		Model 2		Model 3	
	b (Robust SE)	OR (95% CI)	b (Robust SE)	OR (95% CI)	b (Robust SE)	OR (95% CI)	b (Robust SE)	OR (95% CI)
Material hardship								
Housing instability	0.04 (1.11)	1.04 (0.12, 9.12)	0.25 (1.41)	1.29 (0.08, 20.55)	0.65 (1.71)	1.91 (0.67, 54.76)	0.50 (1.04)	1.65 (0.21, 12.74)
Poor housing quality	-0.85* (0.39)	0.43 (0.20, 0.91)	-0.77* (0.39)	0.46 (0.22, 0.99)	-0.99* (0.45)	0.37 (0.15, 0.89)	-0.46 (0.51)	0.63 (0.23, 1.72)
Overcrowded housing	-0.18 (0.33)	0.84 (0.44, 1.61)	-0.13 (0.34)	0.87 (0.45, 1.69)	-0.24 (0.34)	0.79 (0.40, 1.55)	-0.25 (0.33)	0.78 (0.41, 1.48)
Difficulty paying for utilities	-0.35 (0.25)	0.71 (0.43, 1.15)	-0.06 (0.26)	0.94 (0.57, 1.56)	-0.19 (0.27)	0.83 (0.49, 1.39)	-0.32 (0.27)	0.72 (0.42, 1.23)
Food hardship	-1.76** (0.51)	0.17 (0.06, 0.47)	-1.78** (0.52)	0.17 (0.06, 0.46)	-1.86** (0.49)	0.16 (0.06, 0.41)	-1.55** (0.57)	0.21 (0.07, 0.65)
Unmet medical needs	-1.71** (0.63)	0.18 (0.05, 0.62)	-1.71* (0.66)	0.18 (0.05, 0.67)	-1.72* (0.68)	0.18 (0.05, 0.67)	-0.83 (0.64)	0.44 (0.13, 1.54)
Missing information on medical needs	-0.74 (0.86)	0.47 (0.09, 2.54)	-0.81 (0.82)	0.45 (0.09, 2.21)	-0.92 (0.91)	0.40 (0.07, 2.39)	-0.21 (0.98)	0.81 (0.12, 5.56)
Lack of adequate transportation	-0.31 (0.58)	0.73 (0.24, 2.27)	-0.15 (0.59)	0.86 (0.27, 2.75)	-0.28 (0.52)	0.75 (0.27, 2.10)	-0.13 (0.57)	0.88 (0.29, 2.68)
Child characteristics								
Gender					0.04 (0.19)	1.04 (0.72, 1.51)	0.19 (0.19)	1.21 (0.83, 1.77)
Age					0.01 (0.04)	1.01 (0.92, 1.10)	0.03 (0.05)	1.03 (0.94, 1.14)
Health insurance coverage gaps							-0.36 (0.54)	0.70 (0.24, 2.00)
Caregiver characteristics								
Age					-0.05* (0.02)	0.95 (0.91, 0.99)	-0.04 (0.03)	0.96 (0.92, 1.01)
Race/ethnicity								
African American (Ref)						1.00		1.00
Hispanic					-0.73 (0.38)	0.48 (0.23, 1.03)	-0.04 (0.41)	0.97 (0.43, 2.16)
White or other race					-0.68 (0.50)	0.51 (0.19, 1.34)	-0.16 (0.63)	0.85 (0.25, 2.93)
Marital status								
Single (Ref)						1.00		1.00
Married					-0.08 (0.38)	0.92 (0.44, 1.93)	-0.09 (0.41)	0.92 (0.41, 2.04)
Cohabiting					0.56 (0.51)	1.75 (0.64, 4.80)	0.59 (0.52)	1.80 (0.66, 4.95)
Cook County resident					1.15** (0.23)	3.16 (2.02, 4.94)	0.76* (0.26)	2.13 (1.27, 3.58)
Physical health rating							0.78** (0.14)	2.18 (1.65, 2.88)
CES-D score							0.00 (0.01)	1.00 (0.97, 1.03)
Constant			0.20 (0.15)		1.02 (0.70)		-2.54 (0.97)	
Log-likelihood (intercept only = -741.962)			-701.76		-664.514		-595.42	

Note. OR = odds ratio; CI = confidence interval; CES-D = Center for Epidemiological Studies depression scale.

^aWith the exception of the children’s unmet medical needs variable, which included the missing medical needs information variable, all material hardship variables in this column were added separately.

P* < .05; *P* < .01.

criterion and the Bayesian information criterion) were compared,⁵⁶ the proximal material hardship model (model 3) emerged as a better fitting model for this sample.

The model examining the cumulative effects of material hardships is presented in Table 4. Because of concerns regarding multicollinearity with the cumulative material hardship measure, the variable representing difficulty

paying for utilities was omitted from the analysis. Results showed that there were no cumulative effects of material hardships on children’s health above and beyond effects of individual hardships. Similar findings were obtained when the 3 significant material hardship variables (poor-quality housing, food hardship, and children’s unmet medical needs) were used to test cumulative effects (results not shown).

We also examined 2-way interaction effects for the 3 significant material hardship variables by including the 3 product terms separately in model 3. A significant interaction effect was found only for housing quality and food hardship (OR = 0.67; 95% CI = 0.51, 0.89; *P* < .01; log-likelihood = -602.86; results not shown), suggesting that children both living in poor-quality housing and experiencing food hardship

TABLE 3—Comparison of Material Hardship and Socioeconomic Status Models as Predictors of Children’s (N = 1073) Health: Illinois Families Study, 2002–2003

	Material Hardship Model (Model 3)		Socioeconomic Status Model (Model 4)	
	b (Robust SE)	OR (95% CI)	b (Robust SE)	OR (95% CI)
Child characteristics				
Gender	0.19 (0.19)	1.21 (0.83, 1.77)	0.10 (0.20)	1.11 (0.75, 1.63)
Age	0.03 (0.05)	1.03 (0.94, 1.14)	0.03 (0.05)	1.03 (0.93, 1.13)
Health insurance coverage gaps	-0.36 (0.54)	0.70 (0.24, 2.00)	-0.47 (0.49)	0.62 (0.24, 1.63)
Caregiver characteristics				
Age	-0.04 (0.03)	0.96 (0.92, 1.01)	-0.04 (0.02)	0.96 (0.92, 1.01)
Race/ethnicity				
African American (Ref)		1.00		1.00
Hispanic	-0.04 (0.41)	0.97 (0.43, 2.16)	0.17 (0.40)	1.19 (0.54, 2.61)
White or other race	-0.16 (0.63)	0.85 (0.25, 2.93)	0.05 (0.59)	1.06 (0.33, 3.36)
Marital status				
Single (Ref)		1.00		1.00
Married	-0.09 (0.41)	0.92 (0.41, 2.04)	-0.12 (0.40)	0.88 (0.40, 1.93)
Cohabiting	0.59 (0.52)	1.80 (0.66, 4.95)	0.43 (0.52)	1.54 (0.56, 4.27)
Cook County resident	0.76** (0.26)	2.13 (1.27, 3.58)	0.68** (0.25)	1.97 (1.20, 3.24)
High school education			0.31 (0.30)	1.37 (0.76, 2.46)
Employed			-0.11 (0.26)	0.90 (0.53, 1.50)
Welfare recipient			-0.15 (0.41)	0.86 (0.38, 1.92)
Income			0.02 (0.04)	1.02 (0.93, 1.11)
Physical health rating	0.78** (0.14)	2.18 (1.65, 2.88)	0.82** (0.13)	2.27 (1.74, 2.95)
CES-D score	-0.00 (0.01)	1.00 (0.97, 1.03)	-0.01 (0.01)	0.99 (0.97, 1.02)
Material hardship				
Housing instability	0.50 (1.04)	1.65 (0.21, 12.74)		
Poor housing quality	-0.46 (0.51)	0.63 (0.23, 1.72)		
Overcrowded housing	-0.25 (0.33)	0.78 (0.41, 1.48)		
Difficulty paying for utilities	-0.32 (0.27)	0.72 (0.42, 1.23)		
Food hardship	-1.55** (0.57)	0.21 (0.07, 0.65)		
Unmet medical needs	-0.83 (0.64)	0.44 (0.13, 1.54)		
Missing information on medical needs	-0.21 (0.98)	0.81 (0.12, 5.56)		
Lack of adequate transportation	-0.13 (0.57)	0.88 (0.29, 2.68)		
Constant	-2.54 (0.97)		-3.11 (1.01)	
Log-likelihood (intercept only = -741.962)		-595.42		-612.41
Akaike information criterion		1230.85		1256.82
Bayesian information criterion		-6157.21		-6151.15

Note. OR = odds ratio; CI = confidence interval; CES-D = Center for Epidemiological Studies depression scale. ***P* < .01.

were less likely to be in excellent health than were children not experiencing any hardships.

DISCUSSION

Our study highlights the unique effects of different types of material hardship on children’s

physical health as reported by their caregivers. Overall, our findings show that caregivers’ reports of food hardship are significantly associated with their assessments of their children’s physical health status. This finding supports previous research identifying food hardship as a major risk factor with respect to children’s

physical health.^{57–61} Although further investigations are warranted, our results highlight the importance of low-income children having access to adequate quantities of food as well as to food that is of high quality.

Caregivers’ reports of poor-quality housing and unmet medical needs were significantly associated with their assessments of their children’s physical health only when measures of their own physical and mental health were not included. There are at least 3 possible explanations for this result.

First, exposure to similar environments and hardships may have a simultaneous impact on both the child’s and the caregiver’s health. Second, caregivers in poor health may have difficulty providing not only economic stability but also adequate care for their children, which may lead to less-optimal health. Third, caregivers who experience significant mental or physical health problems may offer more-negative reports of their family’s living conditions and their children’s health.⁶² However, in a separate analysis involving IFS data, we found that a latent measure that included self-report and medical chart indicators of children’s health was associated with caregivers’ mental and physical health status. This result suggests that associations between caregivers’ and children’s health may be caused by factors other than caregivers’ response bias. Nevertheless, such hypotheses require further testing in future studies that incorporate multiple indicators of health.

We did not find significant cumulative effects of material hardship (above and beyond individual effects) in our analyses. However, the method we used to test cumulative effects, one in which the goal was to determine whether the cumulative measure explained variance in children’s health not explained by individual measures, was rather conservative. When we conducted a more lenient test in which we substituted the individual measures with a cumulative measure, we found the cumulative measure to be inversely associated with ratings of children’s health as excellent (OR = 0.67; *P* < .01; log-likelihood = -602.86; results not shown).

One of the major contributions of this study is our examination of the effects of multiple domains of self-reported material hardship on caregivers’ assessments of their children’s

TABLE 4—Cumulative Effects of Material Hardship: Illinois Families Study, 2002–2003

	b (Robust SE)	Odds Ratio (95% Confidence Interval)
Individual hardships		
Housing instability	0.83 (1.10)	2.29 (0.26, 19.80)
Poor housing quality	-0.13 (0.64)	0.88 (0.25, 3.05)
Overcrowded housing	0.08 (0.45)	1.08 (0.45, 2.61)
Food hardship	-1.22 (0.65)	0.29 (0.08, 1.05)
Unmet medical needs	-0.50 (0.73)	0.61 (0.15, 2.52)
Missing information on medical needs	-0.21 (0.98)	0.81 (0.12, 5.56)
Lack of adequate transportation	0.20 (0.63)	1.22 (0.36, 4.16)
Cumulative effects of hardship	-0.32 (0.27)	0.72 (0.42, 1.23)
Constant		-2.53** (0.97)
Log-likelihood (intercept only = -741.962)		-595.42

Note. CES-D = Center for Epidemiological Studies depression scale. The model controlled for child's gender, age, and health insurance coverage gaps in addition to caregiver's age, race/ethnicity, marital status, region of residence, physical health, and CES-D score. As a result of multicollinearity issues, the difficulty paying for utilities variable was not included.

** $P < .01$.

health. The effects of individual types of material hardship have been examined in previous studies, but it has not been clearly determined how each type of hardship affects children's health when other types of material hardships and control variables are taken into consideration.

Our study also provides an enhanced understanding of within-group variations in health among children from low-income families. A comparison of model fit between a conventional SES model and our material hardship model suggests that in assessments of variations in health among low-income children, more-proximal measures of material hardship may provide greater insight than conventional SES measures.

Limitations

There were several limitations to the study. First, most of the information for our key independent and dependent variables was collected from primary caregivers, and it is possible that this data collection method led to overestimations with respect to the associations observed between the independent and dependent variables.⁶³ It was also difficult to distinguish actual and perceived material hardship conditions and physical health status. Models that incorporate information from multiple informants and sources (e.g., medical records and physical examinations) may yield different results.

Second, although the single-item measure we used to assess children's health has been found to be strongly associated with child morbidity and mortality,⁷ this measure does not provide a clear description of how levels of physical functioning or quality of life differ between children in excellent health and those in other health status categories. However, to assess the robustness of our findings, we conducted a sensitivity test in which the outcome was dichotomized as excellent or very good health versus good, fair, or poor health, and the results of this analysis were similar to those reported here (results not shown).

Third, our study was limited by its cross-sectional design. Lagged predictors of children's health outcomes and analyses of supplementary models that controlled for children's lagged health status were used to investigate this limitation, and findings were similar to those reported here (results not shown). However, longitudinal studies that test complex associations are needed to establish causality.

Fourth, we used data from waves 3 and 4 of the IFS because of limitations in the availability of data on children's health insurance status in earlier IFS waves. Our data may reflect a select group of IFS children: those whose caregivers remained in the study for multiple years. However, the distribution of the health assessments for 5- to 11-year-olds in earlier waves was similar to that of our study.

Finally, our sample was derived from a single state's welfare population. Consequently, the generalizability of our results to welfare populations in other states is not clear, given that each state has its own policies regarding Temporary Assistance to Needy Families, Medicaid, and the State Children's Health Insurance Program. Future studies should seek to address the issues just described with a nationally representative sample.

Conclusions

Health inequality among children has been a major topic in public health research. In this study, the significant negative effects of unmet health care needs among low-income children, as reported by their caregivers and explained by caregivers' own health status, support policies and practices designed to improve the health of children by enhancing both caregivers' and children's access to health care services. However, our findings also suggest consideration of alternative strategies for reducing health disparities among low-income children, such as efforts to ensure that these children have access to better-quality food, higher quantities of food, and better living conditions. ■

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Contributors

J.P. Yoo conducted and synthesized the analyses and led the writing. K.S. Slack and J.L. Holl originated the study, oversaw data collection, and supervised all aspects of study implementation. All of the authors helped to conceptualize ideas, interpret findings, and edit drafts of the article.

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Human Participant Protection

This study was approved by Northwestern University's institutional review board. Written informed consent was obtained from all participants.

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