Food Hardships and Child Behavior Problems among Low-Income Children

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Abstract

Using data from two waves of a panel study of families who currently or recently received cash welfare benefits, we test hypotheses about the relationship between food hardships and behavior problems among two different age groups (458 children ages 3–5-and 747 children ages 6–12). Results show that food hardships are positively associated with externalizing behavior problems for older children, even after controlling for potential mediators such as parental stress, warmth, and depression. Food hardships are positively associated with internalizing behavior problems for older children, and with both externalizing and internalizing behavior problems for younger children, but these effects are mediated by parental characteristics. The implications of these findings for child and family interventions and food assistance programs are discussed.

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INTRODUCTION

In the wake of the 1996 federal welfare reforms, several large-scale, longitudinal studies of welfare recipients and low-income families were launched with the intent of assessing direct benchmarks, such as work and welfare activity, over time, as well as indirect and unintended outcomes related to material hardship and mental health. One area of special concern to many researchers and policymakers alike is child well-being in the context of welfare reforms. As family welfare use and parental work activities change under new welfare policies, family income and material resources may also fluctuate. To the extent that family resources are compromised by changes in welfare assistance and earnings, children may experience direct hardships, such as instability in food consumption, which in turn may affect other areas of functioning. It is also possible that changes in parental work and family welfare receipt influence children indirectly through their caregivers. As parents themselves experience hardships or new stresses, their mental health and interactions with their children may change, which in turn could affect their children's functioning.

This research assesses whether one particular form of hardship, food hardship, is associated with adverse behaviors among low-income children. Specifically, analyses assess whether food hardships have relationships with externalizing (e.g., aggressive or hyperactive) and internalizing (e.g., anxiety- and depression-related) child behavior problems, and whether associations between food hardships and behavior problems are mediated by parental stress, warmth, and depression. The study involves a panel survey of individuals in one state who were receiving Temporary Assistance for Needy Families (TANF) in 1998 and were caring for minor-aged children. Externalizing and internalizing behavior problems associated with a randomly selected child from each household are assessed in relation to key predictors, taking advantage of the prospective study design.

BACKGROUND

Food hardships have been conceptualized by researchers in various ways. For example, food insecurity is defined by the U.S. Department of Agriculture (USDA) as the "limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways" (Bickel, Nord, Price, Hamilton, and Cook, 2000, p. 6). An 18-item scale was developed by the USDA to assess household food insecurity with and without hunger, where hunger represents a potential result of more severe forms of food insecurity, but not a necessary condition for food insecurity to exist (Price, Hamilton, and Cook, 1997). Other researchers have used selected items from the USDA Food Security Module to assess food hardships (Nelson, 2004; Bickel et al., 2000)

The USDA also developed the following single-item question to identify food insufficiency: "Which of the following describes the amount of food your household has to eat….enough to eat, sometimes not enough to eat, or often not enough to eat?" This measure addresses the amount of food available to a household, not assessments about the quality of the food consumed or worries about food (Alaimo, Olson and Frongillo, 1999; Dunifon and Kowaleski-Jones, 2003). The Community Childhood Hunger Identification Project (CCHIP) assesses food hardships using an 8-item measure to determine whether the household as a whole, adults as individuals, or children are affected by food shortages, perceived food insufficiency, or altered food intake due to resource constraints (Wehler, Scott, and Anderson, 1992). Depending on the number of affirmative answers, respondents are categorized as either "hungry," "at-risk for hunger," or "not hungry" (Wehler et al., 1992; Kleinman et al., 1998). Other measures, such as the Radimer/Cornell measures of hunger and food insecurity, have also been created to measure food hardships (Kendall, Olson, and Frongillo, 1996).

In recent years, food hardships in the United States have been on the rise. After declining from 1995 to 1999, the prevalence of household food insecurity in households with children rose from 14.8 percent in 1999 to 16.5 percent in 2002, and the prevalence of household food insecurity with hunger in households with children rose from 0.6 percent in 1999 to 0.7 percent in 2002 (Nord, Andrews, and

Carlson, 2003). A similar trend was also observed using a subset of questions from the USDA Food

Security Module (Nelson, 2004).

Although children are more likely than adults to be buffered from household food insecurity

(Hamilton et al., 1997) and inadequate nutrition (McIntyre et al., 2003), a concerning number of children

are reported to skip meals or have reduced food intake due to insufficient household resources.

Nationally, children in 219,000 U.S. households were hungry at times during the 12 months preceding

May 1999 (Nord and Bickel, 2002).

Food Hardships and Child Behavior Problems

Very little research has been conducted on the effects of food hardship on children's behaviors,

although the existing research suggests that it is associated with adverse behavioral and mental health

outcomes for children. Using data from the National Health and Nutrition Examination Survey

(NHANES), Alaimo and colleagues (2001a) found that family food insufficiency is positively associated

with visits to a psychologist among 6- to 11- year-olds. Using the USDA Food Security Module, Reid

(2002) found that greater severity and longer periods of children's food insecurity were associated with

greater levels of child behavior problems. Dunifon and Kowaleski-Jones (2003) found, using the same

measure, that food insecurity is associated with fewer positive behaviors among school-age children.

Children from households with incomes at or below 185 percent of the poverty level who are identified as

hungry are also more likely to have a past or current history of mental health counseling and to have more

psychosocial dysfunctions than children who are not identified as hungry (Kleinman et al., 1998; Murphy

et al., 1998). Additionally, severe child hunger in both pre-school-age and school-age children is

associated with internalizing behavior problems (Weinreb et al., 2002), although Reid (2002) found a

stronger association between food insecurity and externalizing behaviors than between food insecurity

and internalizing behaviors among children 12 and younger. Other research on hunger has identified

several adverse behavioral consequences for children (See Wachs, 1995 for a review; Martorell, 1996;

Pollitt, 1994), including poor play behaviors, poor preschool achievement, and poor scores on

developmental indices (e.g., Bayley Scores). These studies have largely taken place in developing

countries, where the prevalence of hunger and malnutrition is much greater than in the U.S. population

(Reid, 2002), so it is not known whether similar associations would emerge for children in the United

States. Furthermore, while existing studies point to a relationship between food hardships and adverse

child behavioral outcomes, limitations in design stemming from cross-sectional data, reliance on single-

item measures of food difficulties, or failure to adequately control for factors that may confound the

observed relationships make it difficult to assess the robustness of the findings.

For current and recent recipients of welfare and their families, increased food hardships are a

potential problem, given the fluctuations in benefits and resources that families are likely to experience as

a result of legislative reforms. To the extent that food hardships are tied to economic factors, we may

expect levels of food hardships to increase for families who experience periods of insufficient material

resources, and to decrease for families whose economic situations improve. If levels of food hardship are

associated with the availability of parents and other caregivers, we may find that the provision of food to

children changes as parents work more hours, or as children spend more time in alternative caregiving

arrangements.

Poverty and Child Behavior Problems

When exploring the relationship between food hardships and child well-being, it is crucial to

ensure that factors associated with economic hardship and poverty are adequately controlled, particularly

since poverty has been linked to some of the same outcomes as food hardships. Extensive research has

shown a higher prevalence of behavior problems among children from families of lower socioeconomic

status (McLoyd, 1998; Duncan, Brooks-Gunn, and Klebanov, 1994), and from families receiving welfare

(Hofferth, Smith, McLoyd, and Finkelstein, 2000). This relationship has been shown to be stronger

among children in single-parent households than among those in two-parent households (Hanson,

McLanahan, and Thompson, 1996), and among younger children (Bradley and Corwyn, 2002; McLoyd,

1998), with less consistent findings for adolescents (Conger, Conger, and Elder, 1997; Elder, Nguyen, and Caspi, 1985).

Despite the fact that food hardships have been repeatedly associated with poverty (Alaimo, Olson, Frongillo, and Briefel, 2001b; Dunifon and Kowaleski-Jones, 2003; Nord et al., 2003; Nord, Jemison and Bickel, 1999), it is important to remember that this type of hardship is not necessarily synonymous with general income inadequacy (Bickel et al., 2000; Dunifon and Kowaleski-Jones, 2003). Families may have inadequate food consumption, experiencing deprivation in this area of need, but have adequate resources for other areas of need (e.g., housing). Furthermore, poverty is not deterministic of food hardships—not all poor families are experiencing problems with food consumption. Another issue to consider with respect to the relationship between poverty and food hardships is that some measures (e.g., the USDA Food Security Module, the CCHIP measure) ask about difficulties with food intake *due to lack of resources*. This measurement strategy may result in observed relationships between food insecurity and children's behavior problems that stem from poverty, rather than the experience of food insecurity per se. Given these concerns, understanding the variation in food hardships among low-income families is an important starting point for being able to identify and target families with the greatest needs in terms of their food intake. If relationships between food hardships and children's behavior problems persist when controlling for income and material resources, this would strengthen support for the hypothesized link between the experience of food hardships (as opposed to the experience of poverty, in general) and adverse child outcomes.

Parenting, Parental Mental Health, and Child Behavior Problems

As described above, food hardships may affect children's behavior problems indirectly through caregiver characteristics and parental mental health status. Siefert and colleagues (2001) examined the effect of food insufficiency on welfare mothers' psychological and physical well-being. They found that food insufficiency is positively associated with higher levels of major depression, general anxiety, and physical limitations, and lower levels of self-rated health status among current and former welfare

recipients. A repeated link between more general economic hardship and poor mental health in adults has also been documented. Lower-income adults have higher rates of mental disorders, including depression and antisocial behaviors, than those with higher incomes (Pollak, Danziger, Seefeldt, and Jayakody, 2002; Dohrenwend et al., 1992; Jayakody, Danziger, and Pollak, 2000).

Other research has shown that poor parental mental health is associated with impaired parent-child interactions (McLeod and Nonnemaker, 2000). Specifically, higher rates of parental stress and maternal depression are associated with harsher, inconsistent, and less responsiveness parenting (McLeod and Nonnemaker, 2000; Olson, Ceballo, and Park, 2002; Leadbeater and Bishop, 1994; Petterson and Albers, 2001; Duncan et al., 1994; McLoyd, 1990; Ceballo and McLoyd, 2002; McLoyd and Wilson, 1991). Both maternal depression and parenting behaviors have been shown to mediate the link between poverty and children's behavioral outcomes (Duncan et al., 1994; McLoyd, 1990, 1998; Conger et al., 1997; Elder et al., 1985). Poor economic situations are associated with inconsistent, harsher, and punitive discipline strategies (Hashima and Amato, 1994; Ceballo and McLoyd, 2002), which contribute to children's antisocial behaviors and children's socio-emotional problems (Sutton, Cowen, Crean, and Wyman, 1999; McLoyd, 1990). Positive parenting behaviors may influence child outcomes, as well. Many studies illustrate that parental warmth, which reflects a parent's tendency to be supportive, affectionate, and express positive emotions toward a child, is positively associated with children's psychological adjustments and well-being (Eisenberg et al., 2001; McCabe, Clark, and Barnett, 1999; Hetherington and Clingempeel; 1992 Zhou et al., 2002). Sutton and colleagues (1999) found that lack of parental warmth was strongly associated with child aggression in second- and third-grade children in urban schools. In addition, McCabe and colleagues (1999) found that parental warmth was negatively associated with shy or anxious behaviors among sixth-graders in Detroit.

Taken together, the existing research suggests that food hardships may influence children's behaviors, but the mechanisms underlying this relationship remain unclear. In the present study, we explore this question using data from a panel study of low-income families in Illinois.

HYPOTHESES

Two mechanisms for the link between food hardships and child behavior problems have been proposed (Dunifon and Kowaleski-Jones, 2003; Reid, 2002). First, food hardships and hunger may produce physiological responses in children, such as anxiety, irritability, and/or lethargy, which directly influence behaviors. The second mechanism is indirect, in that food hardships create or co-occur with particular parental characteristics (e.g., depression, stress, and lower levels of parental warmth), and it is these characteristics that affect children's behavior problems in parent-child interactions. Three hypotheses related to food hardships and child behavior problems are tested:

1.   Food hardships are associated with higher rates of externalizing and internalizing child behavior problems, controlling for other indicators of poverty;

2.   The relationship between food hardships and behavior problems is partially mediated by parental mental health and parenting characteristics (e.g., depression, parenting stress, parental warmth); and

3.   The relationship between food hardships and behavior problems is stronger for younger children (ages 3–5) than for older children (ages 6–12).

We first test the hypothesis that food hardships are associated with elevated child behavior problems, controlling for variation in economic circumstances among families (e.g., primary caregiver's income and work status, perceived hardship) (Hypothesis 1). If an effect of food hardships emerges when controlling for the economic circumstances of a family, it suggests that the link to behavior problems, whether direct or indirect, is related to aspects of food intake rather than a more general experience of poverty. If the link between food hardships and behavior problems is more direct in nature, we would expect that effects associated with food hardships would persist when controlling for factors that potentially confound this relationship (e.g., parental characteristics). If food hardships are linked to behavior problems indirectly, through parental characteristics, we would expect the simple relationship reflected in Hypothesis 1 to be at least partially "explained away" or mediated by such factors (Hypothesis 2).

We also propose that younger children may be more vulnerable to food hardships than older children, due to their exposure to fewer alternative food resources (e.g., from friends' houses, school meal programs, etc.). Since children who are not yet in school or are in school only part-time spend more time in their homes than do children attending school full-time, household reports of food hardships are likely to be more reflective of younger children's than older children's food consumption experience (Hypothesis 3).

METHODS

Sample

The data used for this study are from the first and second waves of the Illinois Families Study (IFS), a six-year panel study of families with a primary caregiver transitioning from welfare to work (Lewis et al., 2000). IFS sample members were randomly selected from the September 1998 active welfare recipient population in nine Illinois counties, which together represent approximately 75 percent of the state's TANF caseload. The sample was stratified by two geographic areas: Cook County and eight "downstate" counties ranging from mid-size urban areas to smaller rural counties. Stratification occurred to ensure adequate representation of respondents from outside of Cook County.

A total of 1,363 interviews were conducted in 1999 and 2000 for Wave 1 of the IFS, with an overall response rate of 72.4 percent. Of these respondents, 1,183 were re-interviewed during the second wave of data collection in 2001, a retention rate of 87 percent. All analyses are weighted to adjust for the oversampling of downstate county sample members, nonresponse, and attrition. As a result, the findings from our analyses should more closely represent the nine-county population from which our sample was originally drawn.

In-person interviews with these caregivers were conducted in respondents' homes. Information on basic demographic characteristics, welfare status, workforce attachment, material hardships (including food hardships), and respondent and child well-being were gathered annually. Interviews lasted

approximately 70 minutes, and respondents were compensated with a $30 voucher upon completion of each interview.

For this study, analyses were restricted to children ages 3 to 12 at the time of the Wave 2 interview. Among the 1,183 families who finished both interview waves, 942 families had at least one child in this age range. Children under the age of 3 were excluded from this analysis because the measure used to assess behavior problems in the study was not designed for this very young age group. The analysis was restricted to children younger than 13 because the factors associated with our key outcome variable, behavior problems, are likely to be qualitatively different for this age group than factors that predict behavior problems among adolescents (e.g., child care characteristics may affect behavior problems for younger and pre-teen children, but for adolescents, out-of-school activities, including work, may be more influential) (Quinn, 1999; Silverberg and Gondoli, 1996; Colten and Gore, 1991). Difference of means tests (not shown) comparing the final sample to the other Wave 2 families who lacked a child in either age group were conducted, and with the exception of parental warmth, no other key predictors (i.e., food hardships, parenting stress, and depression) generated statistically significant differences. Parental warmth was slightly lower in the group excluded from the sample. Other variables that generated statistically significant differences included average age of children, respondent's income, and perceived hardship, where the excluded group had older children, lower incomes, and higher levels of perceived hardship.

Measures

Child Behavioral Problems. Children's externalizing and internalizing behavioral problems are the dependent variables used in the analyses. Both were measured in Wave 2 using the Social Skills Rating System-Parent Form (SSRS; Gresham and Elliott, 1990). Based on developmental differences between younger and older children, different versions of the SSRS scale for 3- to 5-year-olds and for 6- to 12-year-olds were administered, resulting in two separate sets of analyses: one for children ages 3–5 (N=458), and one for children ages 6–12 (N=754). These two subsamples do not sum to 942 because

some families had children in each age group. If a family had multiple children in an age range, one child was randomly selected from the family.

The externalizing problem behavior subscale consists of 6 items that assess children's behaviors in the past three months (e.g., "child has temper tantrums," "child fights with others," "child gets angry easily"). The internalizing problem behavior subscale also consists of 6 items (e.g., "child shows anxiety about being with a group of children," "child acts sad or depressed," "child appears lonely"). Internal reliability coefficients range from .79 (ages 3–5) to .80 (ages 6–12) for externalizing behavior problems, and .50 (ages 3–5) to .62 (ages 6–12) for internalizing behavior problems. Content, criterion, and construct validity for these measures has been previously demonstrated (Gresham and Elliott, 1990).

Food Hardship. In the present study, we define food hardship as unstable or insufficient levels of food intake or insufficient variety of food consumed. Our measure of food hardships does not address the nutritional value or quality of food consumed by family members. Items comprising the food hardship measure are derived from the USDA Core Food Security Module (Price and Cook, 1997). We relied on 4 items adapted from this measure, each of which pertains specifically to child food insecurity (rather than adult or household food insecurity), since we wanted to test for a potential direct relationship between food insecurity and child behavior problems in our analyses. Each item assesses either food insecurity without hunger or food insecurity with moderate hunger. Items for food insecurity with severe hunger were not included in the larger study because previous research has demonstrated very low levels of severe food insecurity, even in low-income populations in the United States For example, in 2002, only 1.7 percent of households with children with incomes at or below 185 percent of poverty were identified as food insecure with hunger, a rate that has remained relatively stable since 1999 (Nord and Bickel, 2002; Nord et al., 2003). For the present analyses, we are particularly interested in whether milder forms of food insecurity (which are more prevalent in the U.S. population) are associated with adverse child behavioral outcomes. The items that comprise our food hardship measure assess food difficulties in the past 12 months, and include:

- How often did you have to rely on only a few kinds of low-cost foods to feed your children because there wasn't enough money for food?

- How often were you unable to feed your children a balanced meal because there wasn't enough money for food?

- How often did you have to cut the size of your children's meal or have them skip meals because there wasn't enough money for food?

- How often did you feel that your children were not eating enough because there wasn't enough money to buy more food?

The response options for the above questions are "never," "sometimes," or "often in the past 12 months." These items were summed (Cronbach's alpha = .73 and .79 for the younger and older children's families, respectively) to create the measure of food hardship that we used in our analyses. The Cronbach's alpha for the original 18-item food insecurity scale ranged from .814 to .882 (Hamilton et al., 1997). Construct validity for the USDA food insecurity measure was tested by associating it with weekly food expenditures, household income, and food sufficiency. Modest associations between these three constructs and the USDA food security module were found (Hamilton et al., 1997). Likewise, our food hardship measure was moderately and inversely correlated with the USDA single-item food sufficiency question ($r = -.58$, $p<.001$).

Table 1 presents the distribution of our food hardship measure for both age groups. As depicted, approximately two-thirds of both age groups of children were not classified as having food hardships. Very few children had high levels of food hardship, suggesting mild to moderate levels of difficulty with food intake. Our scale does not enable us to classify children as having different levels of hunger. We experimented with dichotomous versions of this scale using different cut points, but analytical results were similar to the results generated with the summary scale. We opted for the summary scale to make use of the full range of information for this measure.

Economic Circumstances. An ordinal variable capturing $2,500 increments in personal income was created for each respondent for the calendar year preceding their interview for Wave 2 of the IFS. This measure includes income from employment, TANF, and other formal sources. In addition, we

TABLE 1
Distribution of Children's Food Hardships

Food Hardship Scores	Ages 3–5		Ages 6–12	
	Frequency	Percent	Frequency	Percent
4	317	69.20	482	64.62
5	62	13.57	107	14.31
6	34	7.37	71	9.50
7	23	5.12	34	4.52
8	14	3.00	28	3.78
9	7	1.67	12	1.62
10	0	0.00	3	0.34
11	0	0.00	4	0.49
12	1	0.07	6	0.81
Total	458	100.00	747	100.00

include a dichotomous control variable for receipt of financial or in-kind help from a food pantry or soup kitchen, a church or charity organization, or from family and friends, given that past research has shown that families experiencing economic hardship often access different types of food assistance program simultaneously (Mosely and Tiehen, 2004). Respondents received a "1" for this measure if help from any of these sources was received between Waves 1 and 2. We include separate controls for participation in the federal Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in the previous year (self-report), employment status as of the Wave 1 interview (derived from administrative data), and for the proportion of months receiving food stamps between Wave 1 and Wave 2 of the IFS (derived from administrative data). These additional measures were included because they may capture effects above and beyond overall income level that may be associated with food hardships and behavior problems. A measure for TANF participation was not included because of its collinearity with food stamp receipt. Food stamp receipt was prioritized over TANF receipt because some respondents received food stamps in the absence of cash TANF benefits, and because of its clearer association with food consumption. A 3-item measure assessing the perceived availability of social support was adapted from Orthner and Neenan (1996), which tapped both material and emotional support (e.g., help with small favors, someone to listen to problems, someone to loan money in an emergency). A control for perceived economic hardship was developed using items from the Minnesota Family Investment Program Survey, which include "My financial situation is better than it's been in a long time," "I worry about not having enough money in the future," "These days I can generally afford to buy the things we need," and "There never seems to be enough money to buy something or go somewhere just for fun." Items 1 and 3 were reverse coded and the 4 items were then summed (Cronbach's alpha = .56 and .65 for the younger and older children's families, respectively). Higher scores refer to greater levels of perceived hardship. Taken together, these measures tap several aspects of economic hardship and poverty that could potentially confound the relationship between food hardships and child behavior problems.

Parental Characteristics. Two aspects of parenting, parenting stress and parental warmth, were examined in this study. Parenting stress was assessed using a modified version of the Parenting Stress Index (Abidin, 1983), which was created for the Women's Employment Study (Danziger et al., 2000). Respondents were asked to rate feelings they had in their role as a parent or primary caregiver for the children in their care in the past 12 months. Items include respondents' feelings about their responsibilities as parents or caregivers, their children's demands on them, and their feelings of being tired, worn out, or exhausted from raising a family. The sum of 8 items comprises the parenting stress score, for which higher scores indicate greater degrees of stress (Cronbach's alpha = .75 for both age groups). Parental warmth was assessed using a 5-item scale developed for the same study, which is based on items from the New Chance Study and Block's Child Rearing Practices Report (Block, 1965; Quint, Bos, and Polit, 1997). The scale includes items such as the degree to which mothers praised their children, did something special with them, and played games, hobbies, or sports with them during the previous 12 months (Cronbach's alpha = .75 and .78 for the younger and older children's families, respectively).

In the IFS, the 12-item Center for Epidemiological Studies Depression Scale (CES-D) is used to assess maternal (parental) depressive symptoms (Ross, Mirowsky, and Huber, 1983). Response options for each item range from 0 (less than 1 day) to 3 (5–7 days), indicating how often in the previous week the respondent experienced various symptomatic events. Items in the CES-D cover several major components of depressive symptomatology, including depressed mood, feelings of guilt and worthlessness, loss of appetite, and sleep disturbance. Each negative item was coded from 0 to 3, based on the respondent's answer, and the positive items were reverse coded. The summary score was used as a continuous variable in the analysis instead of using a cut-off point to categorize the respondents as depressed and not depressed. This shortened version of the CES-D demonstrated high internal consistency in the IFS (Cronbach's alpha = .93 for both age groups).

Child Participation in Other Systems We include information on school and child care participation in our multivariate models. A dichotomous variable was constructed representing whether

the child receives formal or informal child care versus no child care (i.e., cared for by the respondent or another parent). For the younger age group, children were classified as having child care if they participated in a preschool or kindergarten program. Since a small number of older children were not yet enrolled in school or were missing information on child care, two additional dichotomous variables representing each of these situations were also included in the analyses for older children. Because children who are in school or child care might be eligible for federal nutritional programs such as the National School Lunch Program, which may buffer the effect of food hardship at home, it is important to include participation in these systems as control variables in assessing the relationship between food insecurity and child behavioral outcomes.

Demographics and Other Control Variables Demographic control variables include information on child's age, gender, caregiver's race, and family size and structure. Information on the child's race was not available, so the primary caregiver's race was included as a control variable. With exception of the child's age, the remaining demographic variables were coded dichotomously, where having an African American caregiver or being male received a "1," and having a white or "other race" caregiver or being female were coded as "0." Two types of family structure were measured using dichotomous variables. Marital status was coded as "1" for "being married to a partner" and cohabiting was coded as "1" for "living with an unmarried partner." All other family structures were coded as "0." The number of household members as of the Wave 1 interview was also included as a control variable, as was the number of months between the Wave 1 and Wave 2 interviews. In addition, a dummy variable was assigned a "1" if the caregiver reported any physical, cognitive, or emotional conditions that limited the child's activities.

Timing of Key Measures. We take advantage of the prospective study design to ensure that predictor variables in the analysis are derived from time periods that precede the assessment of the outcome variables (behavior problems). The behavior problem measure is derived at Wave 2, and assesses child behaviors within the last 3 months. The food hardship, parenting stress, and parental

warmth measures are derived from Wave 2 of the survey, since they are retrospective assessments of the past 12 months. Since depression was assessed over the past week, we averaged the Wave 1 and Wave 2 depression scores, although multivariate results did not differ substantially when using only the Wave 1 depression measure. Several other control variables were assessed at Wave 2, because they related to the 12-month or calendar year period preceding the Wave 2 interview (i.e., income, WIC receipt, food stamp receipt, number of months between survey interviews). Child's age was also assessed at Wave 2. All other controls were assessed at Wave 1.

Sample Characteristics

Table 2 provides the descriptive characteristics of the two subsamples. For children between 3 to 5 years of age (mean age=4), 51 percent were male, 80 percent had a primary caregiver who was African American, and 11 percent had a physical, emotional or cognitive condition that limited their daily activities (7 percent had missing information on the presence of such a condition). In this subsample, families had a mean annual income range of $7,500–9,999. Fifty-three percent of the subsample had a parent who worked during the quarter of the Wave 1 interview, 36 percent of their families received WIC benefits in the year prior to the Wave 2 interview, 57 percent received other informal sources of help, and on average, their families received food stamps 57 percent of the time between the Wave 1 and Wave 2 interviews. Sixty-two percent of the subsample received some form of child care (5 percent had missing information on their child care situations).

For children ages 6 to 12 (mean age= 9), 49 percent were male, 77 percent had a primary caregiver who was African American, and 13 percent had a condition limiting their activities (1 percent were missing information on conditions that limit activities). This subsample also had caregivers with a mean annual income range of $7,500–9,999. Approximately 52 percent of the sample had a parent who was working during the quarter of the Wave 1 interview, and 21 percent were from families receiving WIC assistance. Over half (54 percent) of the older children received some form of child care (other than school), and 5 percent had not yet enrolled in school.

TABLE 2
Descriptive Statistics

Variables	Ages 3 to 5 (N=458)				Ages 6 to 12 (N=747)			
	M	SD	Range	α	M	SD	Range	α
Child Behavior Problems								
Externalizing	8.59	2.68	6–18	.79	8.49	2.68	6–18	.80
Internalizing	4.59	1.08	4–11	.50	7.25	1.79	6–17	.62
Food Hardship Scale	4.65	1.19	4–12	.73	4.82	1.47	4–12	.79
Economic Circumstances								
Income range	5.02	2.86	1–14		5.05	2.82	1–15	
Working in Wave 1 interview quarter	.53	.50	0–1		.52	.50	0–1	
Perceived hardship	11.19	2.63	4–16	.56	11.21	2.88	4–16	.65
Received WIC in previous calendar year	0.36	0.48	0–1		0.21	0.41	0–1	
Proportion of months received food stamps between Wave 1 and Wave 2	0.57	0.34	0–1		0.56	0.35	0–1	
Other sources of help	0.57	0.81	0–3		0.63	0.88	0–3	
Social support	10.33	2.00	4–12	.85	10.11	2.15	4–12	.85
Parental Characteristics								
Parenting stress	15.47	4.66	8–32	.75	15.63	4.63	8–31	.75
Parental warmth	17.92	2.12	7–20	.75	17.65	2.30	9–20	.78
Depression[a]	4.96	7.42	0–36	.94	4.76	6.98	0–36	.93
Demographics and other controls								
Child age	4.02	0.82	3–5		8.83	1.95	6–12	
Child gender: male	0.51	0.50	0–1		0.53	0.50	0–1	
African American caregiver	0.80	0.40	0–1		0.78	0.42	0–1	
Caregiver currently married	0.07	0.25	0–1		0.09	0.28	0–1	
Caregiver cohabiting	0.06	0.24	0–1		0.06	0.23	0–1	
Number of household members	4.10	1.70	2–10		4.18	1.58	2–10	
Child has condition that limits activity	0.11	0.31	0–1		0.13	0.34	0–1	
Missing child health condition information	0.07	0.25	0–1		0.01	0.10	0–1	
Participates in child care	0.62	0.48	0–1		0.54	0.50	0–1	
Missing child care information	0.05	0.23	0–1		0.01	0.11	0–1	
Child currently enrolled in school	Not Applicable				0.96	0.22	0–1	
Months between Wave 1 and Wave2	14.01	3.13	6–21		14.27			

[a]The descriptive statistics for the depression scale are derived from the Wave 2 survey. The Wave 1 average depression score was 5.90 (standard deviation= 8.38) for 3- to 5-year-olds, and 6.10 (standard deviation = 8.45) for 6- to 12-year- olds , and the internal reliability of the scale at Wave 1 was .93 for both age groups.

The means, standard deviations, and ranges (for scale variables) are provided in Table 2.

RESULTS

Tables 3 and 4 show the results of correlational analyses for the behavior problem, food hardship, economic circumstances, and parental characteristic variables for the younger and older children, respectively. For both age groups, internalizing and externalizing behavior problems are statistically correlated with food hardships and with parenting stress and depression. For the older children, parental warmth is also correlated with both sets of behavior problems in the expected direction. Food hardships are associated with overall economic hardship, as assessed by the respondent, and with social support and other sources of help.

The results of OLS regression analyses predicting children's Wave 2 behavioral outcomes for 3- to 5-year- olds are presented in Table 5. Three major groups of Wave1 predictors were entered in step-wise fashion: (1) food hardship, basic demographic characteristics, and child's participation in other systems (e.g., child care, school); (2) economic resources (e.g., income level, parental work status, etc.); and (3) our hypothesized mediators: parental stress, warmth, and depression. Table 5 shows only steps 2 and 3 for externalizing and internalizing behavior problems, respectively. The effect of food hardships in step 1 (not shown) was positive and statistically significant for both externalizing and internalizing behavior problems (.45 and .15, respectively; p < .01).

As depicted in Models 1 and 3 of Table 5, food hardship retains its positive effect on children's behavior problems when controlling for the economic resource variables at step 2, suggesting that the observed relationships are not an artifact of other aspects of poverty in general, but rather a result of the experience of food hardships per se. Model 1 further illustrates that young children participating in school or child care are significantly less likely to exhibit externalizing behavior problems. Model 3 shows that young children with mothers in cohabiting relationships have higher levels of internalizing behavior problems, and those in larger households and with caregivers who report higher levels of perceived social support exhibit fewer internalizing behavior problems.

TABLE 3
Correlations for Outcomes and Key Predictors: Children Ages 3 to 5

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Externalizing behavior problems	-												
2. Internalizing behavior problems	0.53***	-											
3. Food hardship	0.21***	0.16***	-										
4. Other sources of help	0.10*	0.07	0.29***	-									
5. Social support	-0.12*	-0.14**	-0.24***	-0.20***	-								
6. Perceived hardship	0.06	0.03	0.21***	0.33***	-0.30***	-							
7. Working in Wave1 interview quarter	0.00	-0.05	0.01	-0.03	-0.04	-0.11*	-						
8. Income range	-0.04	-0.03	-0.07	-0.16***	0.01	-0.22***	0.24***	-					
9. Received WIC in previous calendar year	0.07	0.04	-0.07	0.02	0.07	0.02	-0.13**	-0.14**	-				
10. Proportion of months on food stamps	-0.01	0.01	-0.05	0.12**	-0.03	0.15**	-0.16**	-0.33***	0.22***	-			
11. Parenting stress	0.33***	0.23***	0.37***	0.20***	-0.19***	0.24***	0.01	-0.06	0.11*	0.03	-		
12. Parental warmth	-0.02	-0.09	-0.19***	-0.14**	0.06	-0.11*	0.03	0.11*	-0.12**	-0.09	-0.35***	-	
13. Depression	0.33***	0.21***	0.44***	0.34***	-0.33***	0.35***	0.00	-0.02	0.05	0.09	0.50***	-0.16***	-

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

TABLE 4
Correlations for Outcomes and Key Predictors: Children Ages 6 to 12

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Externalizing behavior problems	-												
2. Internalizing behavior problems	0.47***	-											
3. Food hardship	0.09*	0.16***	-										
4. Other sources of help	0.17***	0.16***	0.27***	-									
5. Social support	-0.10**	-0.14***	-0.20***	-0.21***	-								
6. Perceived hardship	0.21***	0.10**	0.20***	0.35***	-0.28***	-							
7. Working in Wave1 interview quarter	-0.03	0.05	-0.06	0.01	0.01	-0.09*	-						
8. Income range	0.00	-0.07	-0.05	-0.09*	0.13***	-0.19***	0.13**	-					
9. Received WIC in previous calendar year	0.09*	0.06	-0.06	-0.06	0.02	0.02	-0.07	-0.10**	-				
10. Proportion of months on food stamps	0.05	0.06	-0.05	0.05	-0.16***	0.11**	-0.11**	-0.23***	0.16***	-			
11. Parenting stress	0.35***	0.32***	0.24***	0.16***	-0.14***	0.19***	-0.02	-0.06	0.12**	0.06	-		
12. Parental warmth	-0.10**	-0.12**	-0.07*	-0.10**	-0.05	-0.10**	0.01	0.04	0.01	-0.02	-0.27***	-	
13. Depression	0.32***	0.32***	0.31***	0.27***	-0.32***	0.31***	0.01	-0.07*	0.06	0.19***	0.42***	-0.11**	-

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

TABLE 5
Hierarchical Regression Analyses for the Effects of Food Hardship on Children's Behavior Problems (Ages 3 to 5: N=448)[a]

Variables	Externalizing Behavior Problems						Internalizing Behavior Problems					
	Model 1			Model 2			Model 3			Model 4		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Food Hardship Scale	0.40	0.11	0.18**	0.12	0.12	0.05	0.13	0.05	0.14**	0.06	0.05	0.07
Economic Circumstances												
Income ranges	0.00	0.05	0.00	-0.03	0.05	-0.03	0.01	0.02	0.02	0.00	0.02	0.01
Worked in Wave1 interview quarter	0.24	0.28	0.04	0.15	0.26	0.03	-0.15	0.11	-0.07	-0.18	0.11	-0.08
Perceived hardship	-0.03	0.05	-0.03	-0.11	0.05	-0.10*	-0.02	0.02	-0.06	-0.04	0.02	-0.09
Received WIC previous calendar year	0.50	0.27	0.09	0.26	0.26	0.05	0.12	0.11	0.05	0.05	0.11	0.02
Proportion of months on food stamps between Wave 1 and Wave 2	-0.39	0.41	-0.05	-0.41	0.39	-0.05	0.02	0.17	0.01	0.00	0.16	0.00
Other sources of help	0.14	0.17	0.04	0.00	0.16	0.00	0.07	0.07	0.05	0.04	0.07	0.03
Social support	-0.10	0.07	-0.07	-0.01	0.07	-0.01	-0.08	0.03	-0.14**	-0.06	0.03	-0.12*
Demographics and Other Controls												
Child age	-0.03	0.16	-0.01	-0.11	0.15	-0.03	-0.10	0.06	-0.07	-0.10	0.06	-0.08
Child gender: male	-0.18	0.25	-0.03	-0.25	0.24	-0.05	-0.17	0.10	-0.08	-0.17	0.10	-0.08
African American caregiver	-0.13	0.33	-0.02	-0.21	0.31	-0.03	0.03	0.13	0.01	0.02	0.13	0.01
Caregiver currently married	-0.88	0.55	-0.08	-0.88	0.52	-0.08	-0.12	0.22	-0.03	-0.08	0.22	-0.02
Caregiver cohabiting	0.77	0.55	0.07	0.39	0.52	0.04	0.63	0.22	0.14**	0.54	0.22	0.12*
Number of household members	-0.04	0.08	-0.03	-0.03	0.08	-0.02	-0.09	0.03	-0.14**	-0.10	0.03	-0.16**
Child has condition that limits activity	0.64	0.41	0.07	0.30	0.39	0.04	0.26	0.16	0.08	0.21	0.16	0.06
Missing child health condition	0.25	1.02	0.02	-0.02	0.96	0.00	0.38	0.41	0.09	0.38	0.41	0.09
Participates in child care	-0.94	0.29	-0.17**	-0.94	0.27	-0.17**	-0.04	0.12	-0.02	-0.03	0.12	-0.01
Missing child care information	-1.74	1.13	-0.15	-1.04	1.08	-0.09	-0.36	0.46	-0.08	-0.35	0.46	-0.07
Months between Wave 1 and Wave 2	0.00	0.04	0.00	0.01	0.04	0.01	0.00	0.02	0.00	0.00	0.02	0.01

(table continues)

Variables	Externalizing Behavior Problems						Internalizing Behavior Problems					
	Model 1			Model 2			Model 3			Model 4		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Parental Characteristics												
Parenting stress				0.14	0.03	0.24**				0.03	0.01	0.14*
Parental warmth				0.16	0.06	0.13**				-0.01	0.03	-0.03
Depression				0.10	0.02	0.23**				0.02	0.01	0.09
Adjusted R^2		0.06			0.17			0.06			0.08	
F for change in R^2		2.62**			18.74**			2.45**			5.05**	

*p < .05, **p < .01.
[a]Ten cases were omitted from the analysis owing to missing values on one or more variables.

We adhere to Baron and Kenney's (1986) approach for testing mediation in our models. Correlational analyses depicted in Tables 3 and 4 show that food hardships are positively associated with externalizing and internalizing behavior problems and with parenting stress and depression. In turn, parenting stress and depression are positively associated with externalizing and internalizing behavior problems. The inclusion of the parental characteristics in Model 2 results in statistically significant effects for parenting stress, warmth, and depression, and the disappearance of the food hardship effects observed in Model 1. This suggests that these parental characteristics mediate the relationship between food hardship and externalizing behavior problems, although the effect of parental warmth is not in the expected direction (i.e., higher levels of parental warmth are associated with higher levels of externalizing behavior problems). In Model 4, the inclusion of the parental controls results in a statistically significant effect for parenting stress and the disappearance of the food hardship effect, suggesting that parenting stress mediates the relationship between food hardship and internalizing behavior problems for young children. Other significant effects from Models 1 and 3 are retained. In addition, a statistically significant effect for perceived financial hardship on externalizing behavior problems emerges in Model 2, but it is in the unexpected direction (i.e., the greater the level of perceived financial hardship the lower the level of externalizing behavior problems).

Table 6 shows the result of OLS regression analyses for the 6- to 12-year-old children's Wave 2 externalizing and internalizing behavioral problems. The predictor variables were added to the models using the same step-wise procedures used for the younger child sample. The baseline models that control for demographic characteristics (not shown) indicate significant positive effects of food hardship on both externalizing and internalizing problems for this age group (.16, $p<.05$; .20, $p<.01$, respectively). When controlling for economic resources in step 2 (Model 1 in Table 6), the effect of food hardship on externalizing behavior problems becomes insignificant. The inclusion of step 2 variables yields positive effects for perceived hardship, WIC benefits, other sources of help, and children with a limiting health condition, while male children and children with married parents are associated with lower reported levels

TABLE 6
Hierarchical Regression Analysis for the Effects of Food Hardship on Children's Behavior Problems (Ages 6–12; N=701)[a]

Variables	Externalizing Behavior Problems						Internalizing Behavior Problems					
	Model 5			Model 6			Model 7			Model 8		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Food Hardship Scale	0.07	0.07	0.04	-0.09	0.07	-0.05	0.16	0.05	0.13**	0.05	0.05	0.04
Economic Circumstances												
Income range	0.07	0.04	0.07	0.06	0.04	0.07	-0.01	0.02	-0.01	-0.01	0.02	-0.02
Worked in Wave1 interview quarter	0.01	0.20	0.00	-0.04	0.19	-0.01	0.23	0.13	0.06	0.18	0.13	0.05
Perceived hardship	0.15	0.04	0.17**	0.11	0.04	0.12**	0.03	0.03	0.04	0.00	0.02	0.00
Received WIC previous calendar year	0.74	0.25	0.11**	0.48	0.24	0.07*	0.35	0.16	0.08*	0.18	0.16	0.04
Proportion of months on food stamps between Wave 1 and Wave 2	-0.13	0.31	-0.02	-0.35	0.30	-0.05	0.16	0.21	0.03	0.00	0.20	0.00
Other sources of help	0.33	0.12	0.11**	0.20	0.12	0.07	0.21	0.08	0.10*	0.12	0.08	0.06
Social support	-0.03	0.05	-0.02	0.02	0.05	0.01	-0.07	0.03	-0.09*	-0.04	0.03	-0.05
Demographics and Other Controls												
Child age	0.05	0.05	0.04	0.06	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.04
Child gender: male	-0.41	0.20	-0.08*	-0.33	0.19	-0.06	-0.26	0.13	-0.07	-0.20	0.13	-0.06
Child has condition that limits activity	0.85	0.29	0.11**	0.62	0.28	0.08*	0.12	0.20	0.02	-0.06	0.19	-0.01
African American caregiver	-0.17	0.25	-0.03	-0.07	0.24	-0.01	0.17	0.17	0.04	0.22	0.16	0.05
Caregiver currently married	-1.38	0.36	-0.14**	-1.21	0.35	-0.13**	-0.32	0.24	-0.05	-0.21	0.23	-0.03
Caregiver cohabiting	-0.08	0.42	-0.01	-0.08	0.40	-0.01	0.71	0.28	0.09*	0.70	0.27	0.09**
Number of household members	0.07	0.07	0.04	0.02	0.06	0.01	-0.12	0.04	-0.11**	-0.16	0.04	-0.14**
Child has condition that limits activity	0.85	0.29	0.11**	0.62	0.28	0.08*	0.12	0.20	0.02	-0.06	0.19	-0.01
Child participates in child care	-0.02	0.21	0.00	-0.04	0.20	-0.01	0.06	0.14	0.02	0.08	0.14	0.02
Missing child care information	-0.87	0.99	-0.03	-0.42	0.94	-0.02	-0.29	0.66	-0.02	0.04	0.63	0.00
Child not yet enrolled in school	0.54	0.45	0.04	0.41	0.43	0.03	1.25	0.30	0.15**	1.16	0.29	0.14**
Months between Wave 1 and Wave2	0.02	0.03	0.03	0.02	0.03	0.03	0.00	0.02	-0.01	-0.01	0.02	-0.01

(table continues)

Variables	Externalizing Behavior Problems						Internalizing Behavior Problems					
	Model 5			Model 6			Model 7			Model 8		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Parental Characteristics												
Parenting stress				0.14	0.02	0.25**				0.08	0.02	0.22**
Parental warmth				0.02	0.04	0.02				-0.02	0.03	-0.02
Depression				0.07	0.02	0.17**				0.05	0.01	0.20**
Adjusted R^2		0.13			0.22			0.10			0.21	
F for change in R^2		5.27**			26.58**			4.93**			26.89**	

*p < .05, **p < .01.
[a]Forty-six cases were omitted from the analysis owing to missing values on one or more variables.

of externalizing problems. When step 3 controls for parental characteristics are added (Model 2 in Table 6), the previous effects are retained with the exception of sources of additional help, which becomes statistically insignificant. In addition, parenting stress and depression are positively associated with externalizing behavior problems.

With respect to internalizing behavior problems, food hardship has a statistically significant effect in Model 3 in Table 6, controlling for economic resource variables. In addition, receipt of WIC benefits and other sources of help, cohabiting parents, and children not yet enrolled in school are all associated with higher levels of behavior problems. A higher perception of social support availability and living in a larger household are associated with lower reported levels of internalizing problems. In Model 4, the effects of food hardship and other economic resource variables disappear when parental characteristics are added. Other effects are retained, and parenting stress and depression are both positively associated with internalizing behavior problems.

In sum, it appears that food hardships are positively associated with externalizing behavior problems for younger children, and with internalizing behavior problems for both age groups of children, but that all of these relationships are mediated by parental characteristics. We did not find an effect for food hardship on older children's externalizing behavior problems. Given that a primary limitation of our analyses is the use of nonexperimental data, we conducted one additional analysis to improve our ability to make causal inferences about the effect of food hardship on children's behavior problems. Table 7 depicts the results from a change score analysis, where we predicted the effect of changes in food hardship on the change in older children's externalizing behavior problems between Wave 1 and Wave 2, controlling for the initial score on externalizing behavior problems, change in parental characteristics (i.e., parenting stress, warmth, and depression), and all other control variables from the initial OLS analysis. Various researchers have demonstrated the benefits of using change scores as a means of reducing potential bias from time-invariant family characteristics that may cause both food hardship and behavior problems (Allison, 1990; Duncan and the NICHD Early Child Care Research Network, 2003; Dunifon

TABLE 7
Hierarchical Regression and Change Score Analyses for the Effects of Food Hardship on 6- to 12-Years-Old Children's Externalizing Behavior Problems (N =701)[a]

Variables	Externalizing Behavior Problems						Change analysis					
	Model 5			Model 6			Model 9			Model 10		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Externalizing Behavior Problems at Wave1							-0.48	0.03	-0.49**	-0.50	0.03	-0.51**
Food Hardship Scale[b]	0.07	0.07	0.04	-0.09	0.07	-0.05	0.26	0.07	0.14**	0.15	0.07	0.08*
Economic circumstances												
Income range	0.07	0.04	0.07	0.06	0.04	0.07	-0.05	0.03	-0.05	-0.05	0.03	-0.05
Worked in Wave1 interview quarter	0.01	0.20	0.00	-0.04	0.19	-0.01	0.22	0.19	0.04	0.21	0.18	0.04
Perceived hardship	0.15	0.04	0.17**	0.11	0.04	0.12**	0.14	0.04	0.15**	0.12	0.03	0.12**
Received WIC in previous calendar year	0.74	0.25	0.11**	0.48	0.24	0.07*	0.07	0.23	0.01	-0.09	0.22	-0.01
Proportion of months on food stamps between Wave 1 and Wave 2	-0.13	0.31	-0.02	-0.35	0.30	-0.05	-0.18	0.29	-0.02	-0.31	0.28	-0.04
Other sources of help	0.33	0.12	0.11**	0.20	0.12	0.07	-0.29	0.12	-0.09*	-0.36	0.11	-0.11**
Social support	-0.03	0.05	-0.02	0.02	0.05	0.01	0.12	0.05	0.09**	0.15	0.05	0.11**
Demographics and Other Controls												
Child age	0.05	0.05	0.04	0.06	0.05	0.04	0.07	0.05	0.05	0.07	0.05	0.05
Child gender: male	-0.41	0.20	-0.08*	-0.33	0.19	-0.06	-0.54	0.18	-0.10**	-0.48	0.18	-0.09**
African American caregiver	-0.17	0.25	-0.03	-0.07	0.24	-0.01	-0.25	0.23	-0.04	-0.18	0.22	-0.03
Caregiver currently married	-1.38	0.36	-0.14**	-1.21	0.35	-0.13**	-1.03	0.34	-0.10**	-0.90	0.33	-0.09**
Caregiver cohabiting	-0.08	0.42	-0.01	-0.08	0.40	-0.01	-0.37	0.39	-0.03	-0.38	0.38	-0.03
Number of household members	0.07	0.07	0.04	0.02	0.06	0.01	-0.02	0.06	-0.01	-0.07	0.06	-0.04
Child has condition that limits activity	0.85	0.29	0.11**	0.62	0.28	0.08*	0.18	0.27	0.02	0.08	0.27	0.01
Child participates in child care	-0.02	0.21	0.00	-0.04	0.20	-0.01	-0.04	0.20	-0.01	-0.06	0.19	-0.01
Missing child care information	-0.87	0.99	-0.03	-0.42	0.94	-0.02	-1.68	1.05	-0.05	-1.19	1.02	-0.04
Child not yet enrolled in school	0.54	0.45	0.04	0.41	0.43	0.03	0.57	0.43	0.04	0.50	0.42	0.04
Months between Wave 1 and Wave 2	0.02	0.03	0.03	0.02	0.03	0.03	0.04	0.03	0.04	0.04	0.03	0.04

(table continues)

TABLE 7, continued

Variables	Externalizing Behavior Problems						Change analysis					
	Model 5			Model 6			Model 9			Model 10		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Parental Characteristics[a]												
Parenting stress				0.14	0.02	0.25**				0.12	0.02	0.20**
Parental warmth				0.02	0.04	0.02				0.01	0.04	0.01
Depression				0.07	0.02	0.17**				0.03	0.02	0.07
Adjusted R^2		**0.13**			**0.22**			**0.29**			**0.33**	
F for change in R^2		**5.27****			**26.58****			**15.17****			**15.32****	

*p < .05, **p < .01.
[a]Forty-six cases were omitted from the analysis owing to missing values on one or more variables.
[b]Wave 1 scores were subtracted from Wave 2 scores for these variables in the change analyses.

and Kowaleski-Jones, 2004; Rogosa and Willett, 1983). Models 1 and 2 from Table 6 are included in Table 7 to serve as a reference for the change score analysis (Models 3 and 4 in Table 7). Changes in food hardship have a statistically significant effect on externalizing behavior problems for children 6–12 years old, and the effect is not mediated by changes in parental characteristics. This result differs from the earlier analyses of the relationship between food hardship and older children's externalizing behavior problems (shown in Models 1 and 2), where food hardship was not associated with externalizing behavior problems. The effect for the initial level of externalizing behavior problems is statistically significant; the higher the initial level of behavior problems, the less the increase in behavior problems between survey waves. Additionally, the unexpected positive effect of family WIC participation observed in the initial OLS analyses disappears in the change score analysis.

It is important to note that the sample size is smaller for the change analysis, because 53 children were not yet 6 years of age as of the Wave 1 survey, and thus lacked the identical measure of externalizing behavior problems across both survey waves. A change analysis could not be conducted for younger children, since a much larger number of children were not yet 3 years of age as of Wave 1, resulting in a sample size reduced by nearly one-third. A change score analysis could not be conducted for internalizing behavior problems for either age group because the internalizing behavior subscale of the SSRS was not administered in Wave 1.

DISCUSSION

Results of multivariate analyses show that, in general, food hardships are associated with behavior problems in children, controlling for other indicators of poverty. These findings lend support to Hypothesis 1, and suggest that the associations between food hardship and behavior problems are not simply an artifact of the more general experience of poverty. Once controls for parental characteristics (i.e., parental stress, warmth, and depression) are added to the analysis, the effect of food hardship disappears, further suggesting an indirect association between food hardship and behavior problems, in support of Hypothesis 2. The effect of food hardship on behavior problems does not appear to be the

result of more physiological mechanisms that directly affect children's behaviors. The exception to this general finding is the effect of food hardship on externalizing behavior problems among older children (6–12 years of age), which persists when parental characteristics are controlled. This effect emerged in the change analysis, but not in the initial analyses using time-lagged predictors of behavior problem levels. One possible explanation for the discrepancy between these two methodological approaches is that unmeasured factors may suppress the effect of food hardship on behavior problems. When the change score method is employed, this bias is reduced, leading to a more accurate assessment of the relationship between food hardship and behavior problems. Thus, for the older children only, the relationship between food hardship and externalizing behavior problems may be more physiological in nature, or the result of an indirect mechanism that is unmeasured in the present analysis.

To address Hypothesis 3, we make comparisons between younger and older children with respect to the relationship between food hardships and internalizing behavior problems. The magnitude of this relationship for the two age groups appears to be relatively similar in size (correlation coefficients and standardized betas are nearly identical). With respect to externalizing behavior problems, the age group comparison is less straightforward. Correlational analyses depict a stronger association between food hardship and externalizing behavior problems for younger children compared to older children. Furthermore, multivariate analyses using time-lagged predictors of behavior problem levels suggest that food hardship is more strongly associated with externalizing problems in younger children than older children. However, given that the change score method could be used only in the analyses predicting older children's externalizing behaviors, we are unable to directly compare younger and older children on this outcome. Taken together, the analyses offer mixed support for Hypothesis 3.

Other key findings that emerged in our analyses are that the marital status of the primary caregiver is negatively associated with externalizing behavior problems in older children, and children with cohabiting caregivers have higher levels of internalizing behavior problems. In this analysis, we do not address the relationship of the caregiver's partner to the child, which may contribute to these

differential effects. In addition, larger family sizes predicted lower rates of older children's internalizing behavior problems. One possibility is that children from larger families may be more likely to assert themselves socially, and therefore be less likely to be withdrawn, shy, or to have internally oriented emotional coping mechanisms. The finding that younger children who participate in child care or preschool have lower levels of externalizing problems may relate to advantages of some extra-familial settings over the quality of care provided at home (a finding that has been shown for low-income children in other studies; see Barnett, 1995). This finding may also relate to the respite that child care and school offer to some parents, or to compensatory behavior toward or assessments of children by working parents who feel guilty about the time they are apart from their young children. Higher levels of social support are associated with lower levels of internalizing behavior problems in younger children, suggesting that caregivers who have more help from family and friends may feel less burdened and therefore interact more positively with their children, or that children with supported caregivers are socialized differently than children whose caregivers have little social support. Finally, older children who are reported as having an activity-limiting condition are more likely to be reported by their caregivers as having externalizing behavior problems, but we are unable to identify whether this finding stems from the condition itself or from some other mechanism.

Several limitations to the study may bear on our findings. First, we have incomplete information on alternative food sources. We tried to control for alternative sources of food and nutrition (e.g., using participation in various systems of care and the receipt of various formal and informal benefits as proxies), although we did not have information on the availability of free school meal programs, the frequency at which children receive meals in the homes of other relatives or their friends, or the nature of the nutritional content of the food consumed by children in our sample. Still, the fact that we found that grade school children are at risk of externalizing problems as a function of food hardship suggests that this age group remains vulnerable to the effects of inadequate food intake. Second, it is possible that older children are more aware than younger children of the implications of food hardship (e.g., the realization

that their family is struggling to make ends meet). If so, the link between food hardship and externalizing behavior problems observed for older children may be partially explained by their intellectual understanding of the hardship, which in turn may be linked to feelings of anger or frustration that manifest as externalizing behavior problems. Third, although the change score analysis findings for older children may represent a direct physiological manifestation of the effect of food hardship on behaviors, the nature of the food consumed by younger and older children may differ, producing differential mechanisms affecting behaviors for these two age groups. Lacking detailed information on alternative food sources, children's cognitive understanding of their families' economic hardships, or the nutritional intake of the children in our sample, we are unable to test these hypotheses.

Other factors that we were unable to control in the present analyses may bias the observed results. We did not have an available measure of parental discipline for the time period of this analysis. Past research has shown that the effects of poverty status on children's behavior problems is mediated by frequent use of physical punishment (McLeod and Shanahan, 1993). A similar mechanism may exist with respect to food hardship and behavior problems. We also did not control for Wave 1 behavior problems in most of our analyses, despite the fact that past research has shown a link between behavior problems and parenting characteristics (Orthner and Neenan, 1996). We were, however, able to control for Wave 1 behaviors only in the analysis predicting changes in older children's externalizing behavior problems. It is significant that food hardship emerges as a statistically significant predictor for older children in the change score analysis.

Another limitation of our research is that the generalizability of our findings is unclear. This study is based in one state, with a TANF program that has been characterized as "middle-of-the-road" in terms of its balance of "carrots" and "sticks" (Center on Hunger and Poverty, 1998). The composition of the welfare recipient sample drawn for this study in 1998 may not be representative of similar populations from other states, particularly states with TANF programs that are viewed as more punitive or more generous in nature. Furthermore, while our study was limited to a population of families making the

transition from welfare to work, other families may also struggle with food hardship, due either to limited resources or parental neglect.

We also rely heavily on self-report measures to explore relationships between food hardships and behavior problems, although self-report measures of food insecurity have been shown to be associated with inadequacies in nutritional intake and lesser amounts of available food (Matheson, Varady, Varady, and Killen, 2002; Kendall et al., 1996). We are not able to rule out the possibility that caregivers who report higher levels of food hardship may be more likely to perceive their children as having behavior problems, regardless of whether behavior problems exist. Furthermore, although our rationale for using only the child-specific items of food insecurity from the USDA scale is based on our desire to assess more direct effects of food insecurity on children's outcomes, these USDA items are not linked to individual children, but rather to household children as a group. With respect to our outcome measures, the internal reliability of our measure for internalizing behavior problems was moderate, at best. The relationships observed in our models predicting this outcome may be biased, as a result. However, it is likelier that such a bias would lessen the chance of observing statistical effects.

Finally, it is important to keep in mind that our analyses focused on the effects of mild and moderate food hardship on behavior problems. The relationships we observe may, therefore, be conservative in nature, and families experiencing more severe forms of food insecurity need to be included in future studies addressing these relationships.

CONCLUSION AND IMPLICATIONS FOR PRACTICE

Several further questions are in need of exploration. Future work on this topic should attempt to assess the duration, stability, and timing of food hardship in relation to behavioral outcomes for children from different age groups. This information could provide needed insight about the optimal timing of interventions to preempt adverse consequences stemming from food hardship. To better estimate the direct effects of food hardship on children's behaviors, information on the health of children should be included in statistical models, including physical growth and development, minor illnesses, and other

medical conditions that may mediate the link between food difficulties and behavior problems. This is particularly needed with populations affected by welfare reforms, where food hardships have likely fluctuated in relation to parental work and family welfare dynamics.

Although we did not find evidence of an association between food stamp receipt and behavior problems, we cannot make an assessment of the impact of food assistance programs, given the nonexperimental design of our study. However, some children in our sample remain vulnerable to food hardships regardless of their families' food stamp status, and past research has shown that many families who stop receiving food stamps remain eligible for this benefit (Mills, Dorai-Raj, Peterson and Alwang, 2001). A more detailed understanding of the roles of work, welfare receipt and food stamps, as well as other programs and supports (e.g., WIC, free school meal programs, informal supports) and their impacts on children's health and behaviors is needed.

Based on our analyses, we recommend several strategies for improving practice with children who may be affected by food hardships. First, more effective assessment strategies are needed for identifying families who require food assistance. Assessments should include information on other economic characteristics and resources of the household, eligibility status for cash and in-kind assistance programs, parental characteristics, and information on the quality, quantity, and regularity of food intake. Grade school children appear to remain vulnerable to the effects of food hardships, despite the availability of programs such as the NSLP. Not all eligible children participate in the NSLP (Dunifon and Kowaleski-Jones, 2004), however, and our study was not able to control for NSLP participation.

Second, practitioners in child care and school settings should be aware that behavior problems may be linked to problems with food consumption, since interventions linked to food difficulties would necessarily differ from interventions linked to parenting issues or other correlates of problematic behaviors. Due to the dearth of research on the link between food hardships and behavior problems, it is not likely that current practice strategies with children presenting adverse behaviors involve assessments of food intake. Additionally, with the relatively widespread availability of federal lunch programs, food

stamps, and the WIC program, practitioners may currently be inclined to either rule out food insecurity as a possible contributing factor to behavior problems, or simply refer families experiencing food insecurity to these services. Since our analysis found that controlling for most of these resources (one notable exception being the NSLP), several relationships between food hardship and behavior problems persisted, a more in-depth assessment of the food intake problems a family is experiencing may be needed. Since food hardships among younger children (ages 3–5) were linked to behavior problems vis-à-vis parental characteristics, even after controlling for program participation and other key predictors of behavioral outcomes, practitioner training on these topics should not be limited to school personnel, but should be extended to health practitioners, and child care workers as well.

Third, by expanding outreach efforts and increasing community resources for providing emergency food assistance services for low-income working families, some of the stigma associated with seeking help from such resources may be reduced. The Food Stamp and WIC programs should also consider allowing parents to choose their own food items, rather than prescribing the items that should be purchased. Caregivers may feel less reluctant to seek and use these resources earlier, before crisis points emerge, if the services are provided in a nonstigmatizing manner, and participants are offered more flexible parameters for using them. Such efforts may ultimately benefit children's social and emotional development.

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