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Within-Child Associations Between Family Income and Externalizing and Internalizing Problems

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Within-child associations between family income and child externalizing and internalizing problems were examined using longitudinal data from the NICHD Study of Early Child Care and Youth Development (2004a, 2004b; $N = 1{,}132$). Variations in income effects were estimated as a function of whether families were poor, whether mothers were partnered, and the number of hours mothers and their partners were employed. On average, children had fewer externalizing problems during times when their families' incomes were relatively high than during times when their families' incomes were relatively low; the estimated benefits of increased income were greatest for children who were chronically poor. For both externalizing and internalizing problems, income was most strongly associated with problems when chronically poor children's mothers were partnered and employed.

Keywords: externalizing problems, internalizing problems, poverty, family structure, maternal employment

Children living in poverty are significantly more likely to develop social–emotional problems than are their peers who are not poor, and the magnitude of this risk may increase with longer exposure to impoverished conditions (e.g., Brooks-Gunn & Duncan, 1997; Duncan & Brooks-Gunn, 1997; Evans, 2004; Linver, Brooks-Gunn, & Kohen, 2002; McLeod & Shanahan, 1996; McLoyd, 1998; Taylor, Dearing, & McCartney, 2004; Yeung, Linver, & Brooks-Gunn, 2002). In turn, developmental consequences associated with persistently high social–emotional problems during childhood may extend into adulthood, increasing the likelihood of educational failure, unemployment, psychiatric disorder, suicide attempts, and criminality problems (e.g., Cohen, 1998; Kazdin, 1997; Nock & Kazdin, 2002; Roza, Hofstra, van der Ende, & Verhulst, 2003). As such, public costs associated with chronic social–emotional problems are tremendous (Cohen, 1998; Foster, Dodge, & Jones, 2003).

Social–emotional problems during childhood have often been divided into two broad bands of disorder: (a) externalizing problems that are interpersonal in nature, such as aggression, destructive behavior, and hyperactivity, and (b) internalizing problems that are intrapersonal in nature, such as anxiety, depression, and fearfulness (e.g., Achenbach & Edelbrock, 1984; Schmitz et al., 1999). Developmental contexts that impede children's self-regulatory efforts, that negatively bias children's social-information processing, and/or that include role models of antisocial behavior may increase the likelihood of children's developing externalizing problems (Cicchetti & Toth, 1995; Dodge & Pettit, 2004; Evans, 2004; Hinshaw, 2002). Developmental contexts that undermine children's sense of control over life may increase the likelihood of children's developing internalizing problems (Chorpita & Barlow, 1998). Low family income is, in fact, associated with a multitude of environmental risk factors inside and outside the family that may influence self-regulation, social-information processing, modeling, and perceptions of control (for a review, see Evans, 2004).

Consider, for example, that parents living in poverty are more likely to use punitive and coercive parenting strategies and are less likely to demonstrate consistency and high levels of responsiveness with their children (e.g., Bradley, Corwyn, McAdoo, & Coll, 2001; Conger, Ge, & Elder, 1994). In addition, risk of exposure to violence within the family and neighborhood is related to family income such that the poorest children are most likely to both witness and personally experience violent acts (e.g., Emery & Laumann-Billings, 1998; Korbin, Coulton, Chard, Platt-Houston, & Su, 1998; Leventhal & Brooks-Gunn, 2000). Further, children in poverty are exposed to a variety of stressors associated with the low quality of housing their families can afford, including high levels of air and water pollutants (e.g., sulfur oxides), overcrowding, inadequate lighting conditions, and neighborhoods characterized by poor municipal services and few merchants or retail stores (Evans, 2004).

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Family stress that arises from exposure to these stressors and the accumulation of multiple risk factors within impoverished environments may be particularly harmful to children's social–emotional functioning. Specifically, high levels of family stress are associated with emotional problems for parents (e.g., depressive symptoms and feelings of uncertainty, ambiguity, and loss of control) and, in turn, the use of rejecting parenting strategies, thereby increasing the risk of emotion-regulation problems for children (Conger et al., 2002; Elder, Nguyen, & Caspi, 1985). Exposure to multiple environmental stressors in the context of poverty may lead to chronically heightened child neuroendocrine activity, thereby increasing the risk of developing depression, anxiety, and self-regulation problems, including diminished attention and hyperarousal (Evans, 2003, 2004; Evans & English, 2002).

The Developmental Science and Policy Relevance of Within-Child Analyses

To date, empirical work estimating the association between family economic risk and child social–emotional development has been based largely on between-child comparisons. In other words, it is clear that children in families with less money, compared with children in families with more money, are relatively more likely to have social–emotional problems, and these problems are more likely to persist over time (e.g., Aber, Brown, & Jones, 2003; NICHD Early Child Care Research Network, 2004). On the other hand, there is much less work examining within-child associations between family income and social–emotional functioning. Given longitudinal data on both family economics and child social–emotional functioning, it is possible to estimate within-child associations to determine whether variations in family economic level over time are associated with variations in child social–emotional problem levels over time. By doing so, it is possible to examine whether children's problem levels are lower at times when their family income levels are relatively higher than at times when their family income levels are relatively lower. Such within-child analyses of family income and child social–emotional functioning could add to the existing literature in at least three ways.

First, there is considerable evidence that family income is often in flux, particularly for families living in or near poverty (Ackerman, Brown, & Izard, 2004; Bane & Ellwood, 1986; Corcoran & Chaudry, 1997; Duncan, 1988). Recent research highlights the importance of modeling these income variations for developmental outcomes (e.g., Dearing, McCartney, & Taylor, 2001; Yeung et al., 2002). Above and beyond the effects of income *levels*, for example, income *changes* are related to children's externalizing problems such that income losses are associated with more problems (Yeung et al., 2002). Further, income gains that move families out of poverty are associated with problem decreases (Macmillan, McMorris, & Kruttschnitt, 2004).

Second, within-child analyses of income are policy relevant. Although it is useful to know that "poverty is bad," policymakers must also know whether children can recover from economic deprivation. Comparing children who are poor and children who are not poor on developmental outcomes cannot provide an answer to this question. It is important to note, however, that between-child comparisons focused on the mechanisms linking income and child social–emotional problems can guide policy and intervention by highlighting the developmental processes that transfer risk to children in poverty (for a discussion of this advantage, see Bradley & Corwyn, 2002; Conger et al., 2002; Linver et al., 2002; Yeung et al., 2002).

A third advantage of within-child estimates of the association between income and externalizing or internalizing problems is an increased ability relative to between-child analyses to control for potential endogeneity bias (i.e., potential omitted variable bias). The potential endogeneity of income limits causal inferences in studies using nonexperimental data (Blau, 1999; Duncan, Yeung, Brooks-Gunn, & Smith, 1998; Mayer, 1997). In short, the question is whether economic deprivation leads to more social–emotional problems or whether an unobserved variable (e.g., genetics) causes both. In other words, because families have not been randomly assigned to economic conditions in nonexperimental designs, there is the potential that observed correlations between economic context and child outcomes are, in fact, due to a third omitted variable. Although between-child and within-child analyses of nonexperimental data are both susceptible to bias associated with omitted variables that are time-varying as well as to reciprocal causation (Singer & Willett, 2003), between-child analyses can also be biased by unobserved characteristics of children, their parents, and their environments that are constant over time (i.e., fixed). It is important to note that these unobserved characteristics that are fixed within children, their parents, and their environments cannot bias within-child estimates of the association between changes in a child's family income and changes in that child's social–emotional functioning (Angrist & Krueger, 1999; Duncan, Magnuson, & Ludwig, 2004; Hsaio, 2003).

Within-child estimates of the association between income and child social–emotional functioning have produced null results in some studies, however (e.g., Ackerman et al., 2004; Blau, 1999). One reason for this may be that potential moderators of within-child associations are rarely examined. Income may be more meaningful for some children than others as a function of the developmental contexts in which children live.

Variations in Income Effects Across Families

Children living in families that are chronically poor may be at greatest risk to experience harm from economic deprivation, because neuroendocrine activity and related psychological functioning are likely to be affected by stress that is chronic through its cumulative effects (Evans, 2003). Thus, income effects may vary by whether families are poor and the length of time families spend in poverty. Consistent with this hypothesis, associations between income and child social–emotional outcomes appear to be nonlinear in that income is unrelated to the social–emotional well-being of children who are not poor but is significantly and positively associated with the social–emotional well-being of poor children (Taylor et al., 2004). Further, there appears to be significantly greater risk associated with persistent poverty than with intermittent poverty for children's social–emotional well-being (e.g., Duncan, Brooks-Gunn, & Klebanov, 1994).

If exposure to environmental stress associated with economic deprivation is most likely to harm children when that exposure is chronic, then the benefits of reduced environmental stress via income gains may also be most evident for children who have experienced chronic poverty. In other words, compared with children who are chronically poor, children who are transiently or never poor may have less to gain from an equivalent increase in

family income, because these children may be less likely to experience the consequences of stress exposure in the first place. A finding consistent with this hypothesis is that mothers who are chronically poor are more likely to experience declines in depressive symptoms when they gain income than are mothers who are transiently or never poor (Dearing, Taylor, & McCartney, 2004).

Even among chronically poor families, however, there may be developmental contexts in which children are particularly likely to benefit from income gains and to suffer from income losses. Although few potential moderators of income other than poverty status have been explored (Bradley & Corwyn, 2002), we argue here that family structure, maternal employment, and partner employment are excellent candidates for investigation because of their relevancy to parents' mental health and because changes in partner status and employment are the most common causes of income changes that lead families with young children to enter and exit poverty (Bane & Ellwood, 1986).

Partner Status

Stress associated with time management and caregiving demands can be higher for single parents than partnered parents, and children living in single-parent homes may be at heightened risk for developing social–emotional problems (e.g., Amato, 1995; Hetherington, Bridges, & Insabella, 1998). Yet negative developmental outcomes associated with single parenthood may be due, at least in part, to low family income. Consider, for example, that although children living in single-parent and divorced or separated families display more social–emotional problems than children in two-parent families, the size of these developmental differences is greatly reduced when family income differences are controlled (Clarke-Stewart, Vandell, McCartney, Owen, & Booth, 2000; Macmillan et al., 2004; O'Connor, Dunn, Jenkins, Pickering, & Rasbash, 2001). If the negative developmental effects of single parenthood are partly due to low income, then children in these households may be particularly responsive to income gains and losses. Further, the importance of income in single-parent homes may be especially true in the context of chronic poverty, primarily because the cumulative effects of single parenthood combined with chronic poverty may place children at exceptional risk for developing social–emotional problems (Evans, 2003).

Maternal and Partner Employment

There is substantial evidence that employment is positively associated with mental health outcomes for women and men (e.g., Hamilton, Merrigan, & Dufresne, 1997; Llena-Nozal, Lindeboom, & Portrait, 2004; Theodossiou, 1998). Gaining employment is associated with improvements in mental health (e.g., decreased depressive symptoms; Hamilton et al., 1997), although these positive effects may be due, at least in part, to accompanying income gains rather than employment per se (see, e.g., Dearing et al., 2004). The mental health implications of employment among poor families, however, appear more complicated.

On the one hand, steady employment is associated with better psychological well-being for women and men in poverty (Danziger, Carlson, & Henly, 2001). On the other hand, poverty increases the probability of being underemployed (e.g., involuntary part-time employment) and the probability of holding a job that is low in prestige and task complexity, qualities that in turn are associated with increased parental stress and more coercive parenting (Crouter & Booth, 2004; Dunifon, Kalil, & Danziger, 2003; Raver, 2003; Walter, 2002). In addition, poor families may experience more barriers than other families when trying to find adequate child care, which may undermine the otherwise positive mental health benefits of employment for parents (Huston, 2004).

For chronically poor children, therefore, income may be most likely to influence social–emotional functioning when parents are employed. That is, income losses may compound stress associated with employment, and income gains may alleviate stress associated with employment, for these families. Consistent with this hypothesis are reports that transitions from welfare to work are most likely to be associated with improved parent mental health and child social–emotional functioning when these transitions are accompanied by economic gains (Gennetian & Miller, 2002; Raver, 2003).

The Present Study

In the present study, we examined within-child estimates of associations between family income and child externalizing and internalizing problems. Our goal was to extend existing work on this topic by estimating potential variations in income effects across family poverty, partner status, and employment circumstances. Specifically, we used data from Phases I and II of the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care and Youth Development (SECCYD) to estimate within-child associations among family income, partner status, maternal employment, partner employment, and child externalizing and internalizing problems from the time that children were 2 years of age through the first grade.

We hypothesized that income would, on average, significantly predict children's externalizing and internalizing problems such that higher levels of income would be associated with lower levels of problems. In other words, given that we examined within-child associations, we expected individual children would have fewer problems when their family incomes were relatively high than when their family incomes were relatively low. In addition, we expected the size of these within-child associations to be largest for chronically poor children. We also hypothesized that the estimated positive effects of income would be greater when mothers were single than when they were partnered, would be increasingly positive the more hours mothers were employed, and would be increasingly positive the more hours partners were employed. As with the main effect of income, these interactions were also expected to be most evident in the context of chronic poverty.

Method

Sample

Data used in this investigation were from the first and second phases of the NICHD Study of Early Child Care and Youth Development (2004a, 2004b). Shortly after giving birth in 1991, 1,364 women and their recently born children living in or near 10 urban and suburban sites in the United States were recruited to participate in this study using a conditional random sampling method (for extensive recruitment and sampling details, see NICHD Early Child Care Research Network, 2001; NICHD Early Child Care Research Network & Duncan, 2003). Of this sample, 83% (1,132) had sufficient nonmissing data (i.e., at least one observation for all variables

Table 1
Demographic Statistics for Children in the NICHD SECCYD With Child-Care Provider and/or Teacher Reports of Social–Emotional Functioning

Variable	1 month (N = 1132)[a]	24 months (n = 573)[b]	36 months (n = 632)[b]	54 months (n = 768)[b]	Kindergarten (n = 1004)[b]	First grade (n = 1008)[b]
Time-invariant						
Child is male (%)	51.4					
African American (%)	5.7					
European American (%)	78.7					
Latino American (%)	10.6					
Other ethnicity (%)	5.6					
Maternal education (years)						
M	14.43					
SD	2.45					
Time-varying						
Mother was partnered (%)		84.5	83.1	83.5	81.0	78.8
Maternal employment hours						
M		31.79	30.35	25.28	24.24	26.65
SD		15.28	16.16	18.96	18.03	18.93
Partner employment hours						
M		34.56	36.04	39.62	35.71	37.15
SD		20.78	21.36	23.39	21.57	23.43
Household size						
M		3.88	4.02	4.22	4.30	4.34
SD		1.19	1.14	1.09	1.14	1.14
Family income ($)						
M		59,090	59,992	60,744	57,599	67,255
SD		43,332	48,287	53,096	44,214	51,295

Note. NICHD = National Institute of Child Health and Human Development; SECCYD = Study of Early Child Care and Youth Development.
[a] The total number of children included in our multilevel models. [b] Sample sizes at each assessment time indicate the number of children with nonmissing outcome data at that assessment. At each assessment time, descriptive statistics for time-varying variables are reported only for those children with nonmissing outcome data.

included in the models) for analysis in the present study. Table 1 displays descriptive statistics for time-invariant and time-varying characteristics of families.

Originally designed to study the developmental implications of early child care, the first and second phases of the SECCYD include longitudinal data (collected from birth through first grade) on both family economics and child social–emotional functioning. Although the sample is not statistically representative of any population defined a priori, it is economically and geographically diverse. In addition, the use of parent reports of family income and child-care provider or teacher reports of child problems in the SECCYD data avoids problems of shared method variance, a problem for studies that rely on parent reports for both family context and child outcomes.

Measures

Demographics. When the study children were 1 month old, mothers reported their years of education as well as child gender and ethnicity.[1] At 24, 36, and 54 months as well as at kindergarten and at first grade (i.e., five observations), mothers reported their household size, partner status, hours of employment, partner's hours of employment (coded as 0 if no partner was in the home), and number of hours that children were in nonmaternal child care.[2] Partner status was coded as 1 if mothers reported being married or having a partner. Ethnicity was effect coded (i.e., African American, European American, and Latino American vs. the grand mean, which included children of ethnicities other than the three coded here, e.g., Asian American); child gender and partner status were dummy coded.

These covariates were chosen because they either were central to study hypotheses (e.g., maternal employment), had demonstrated associations with child social–emotional functioning in previous research (e.g., for associations with child care, see NICHD Early Child Care Research Network, 2003, and Keiley, Lofthouse, Bates, Dodge, & Pettit, 2003; for associations with child ethnicity, see Gerard & Buehler, 2004), potentially modified the meaningfulness of income level (i.e., household size), or helped control for the potential endogeneity of income (e.g., maternal

[1] Although maternal education may vary over time, the NICHD SECCYD included only one assessment of years of maternal education during the first two phases, and as such, this indicator was treated as time-invariant in our analyses.

[2] For the analyses presented, number of hours in child care was treated as a time-varying covariate. The coefficients for this covariate, however, should not be interpreted as the unique effects of child-care experiences, because the covariate confounds changes in care with the transition to school, when hours in child care dropped to zero for all children. Nonetheless, we kept this covariate in our models for two reasons: (a) It captured many children's real-life experiences in that the start of formal schooling often signaled the end to early child-care experiences, and (b) it was statistically significant in several models (as such, excluding this covariate may have led to biased income estimates). It is important to note, however, that our results were replicated across a variety of alternative specifications that attempted to control for children's child-care experiences, including using time-invariant controls in our multilevel models (e.g., the average number of hours children were in nonmaternal care, the number of epochs children were in nonmaternal care, and the average number of hours children were in care multiplied by the number of epochs that they were in care). In addition, we recomputed the time-varying child-care covariate to include hours in school and in out-of-school care at kindergarten and at first grade. We then estimated this time-varying covariate along with its interaction with a dummy variable indicating whether children were in child care or school/afterschool care. Across these specifications, results for family income (main effects and interactions) were replicated.

education may influence both income and children's social–emotional outcomes).

For partner status, maternal employment, and partner employment (the time-varying covariates for which moderator effects were examined), there was within-child variation, particularly among chronically and transiently poor families. For example, 23% of families who were never poor, 48% of families who were chronically poor, and 53% of families who were transiently poor experienced at least one change in partner status. The average within-child standard deviations for maternal and partner hours of employment, respectively, were 7.94 and 9.42 for families who were never poor, 15.04 and 11.82 for families who were chronically poor, and 12.33 and 15.49 for families who were transiently poor.

Family income and poverty status. Mothers reported their total household income (annualized) at 24, 36, and 54 months as well as at kindergarten and at first grade (i.e., five observations). Total household income was divided by 10,000 so that estimated income coefficients represented the estimated change in externalizing and internalizing problems associated with a $10,000 change in income. In addition, the ratio of family income to family needs was computed by dividing total family income by the poverty threshold for the appropriate family size (U.S. Census Bureau, 2002). Families with income-to-needs ratios less than 1.0 at three or more assessments were coded as chronically poor. Families with income-to-needs ratios less than 1.0 at only one or two assessments were coded as transiently poor. Other families were coded as never poor.

The mean annual income was $67,310 for families who were never poor, $25,362 for families who were transiently poor, and $12,641 for families who were chronically poor. For all three groups, there was considerable variation in income *within* families during the study period. The average within-family standard deviation in income across the five assessments was $15,806 for families who were never poor, $12,256 for families who were transiently poor, and $6,481 for families who were chronically poor.

Child social–emotional functioning. Two versions of the Child Behavior Checklist (CBCL) were used to assess child externalizing and internalizing problems. At 24 and 36 months, child-care providers reported on children's problems using the CBCL for ages 2–3 years (CBCL/2–3; Achenbach, 1992). At 54 months, at kindergarten, and at first grade, child-care providers (at 54 months) and teachers (at kindergarten and at first grade) reported on children's problems using the Teacher Report Form (TRF; Achenbach, 1991), a slightly modified version of the CBCL designed to assess classroom behaviors. As the most widely used assessments of child social–emotional problems, both measures have demonstrated excellent psychometrics in standardization samples, as well as in the NICHD sample (Achenbach, 1991, 1992; NICHD Study of Early Child Care & Youth Development, 2004a, 2004b). Averaged across the five assessments, child-care provider and teacher reports of externalizing and internalizing problems were moderately correlated ($r = .46$, $p < .001$).

Raw scores for externalizing and internalizing problems were converted to *T* scores (based on age norms) so that scores on the CBCL and TRF were comparable. We also included a dummy code in our analyses that indicated whether assessments were completed using the CBCL or the TRF. This indicator, which was labeled "CBCL version," was included to control for any potential changes in problem scores that were artifacts of variations in instruments (and/or evaluators) used to assess problems. In addition, several replication strategies (reported in the Results section) were used to help validate the use of these measures.

Statistical Analyses

In the present study, within-child associations between family income and child externalizing and internalizing problems were estimated in multilevel models using HLM 5.04 (Raudenbush, Bryk, & Congdon, 2001). Within-child estimates were obtained by centering time-varying predictors such as income on each child's mean for these predictors. This method has been referred to alternatively as within-person (e.g., Singer & Willett, 2003) and group-mean (e.g., Raudenbush & Bryk, 2002) centering.

Consider the following Level 1 model, $y_{it} = \beta_{00} + \beta_{10}(x_{it} - \overline{x_{i\cdot}}) + u_{it}$, for which the predictor, x, has been within-person centered. In this model, x_{it} is the value of predictor x for child i at time t, and $\overline{x_{i\cdot}}$ is the average value of predictor x for child i across all time points. As such, β_{10} should be interpreted as the average within-person association between explanatory variable x and outcome y (e.g., the average within-child association between family income and child externalizing problems), and β_{00} should be interpreted as the unadjusted average of outcome y for person i. The main effects of time-varying predictors and interactions between multiple time-varying predictors that are centered within person may be estimated in a Level 1 model such as this. Further, the main effects of time-invariant predictors as well as interactions between time-varying and time-invariant predictors may be estimated by adding the time-invariant predictors at Level 2 of the model. For example, the within-child association between family income and child externalizing problems, as well as variations in this association as a function of whether or not families were chronically poor, could be estimated while controlling for average between-child differences in externalizing problems associated with whether or not families were chronically poor.

Note that multilevel models with estimates centered within child help control for unobserved characteristics of the child and the child's family that are constant over time. This is an important advantage over between-child analyses of nonexperimental data such as those often estimated using ordinary least-squares regression, primarily because between-child estimates of nonexperimental data are susceptible to omitted variable bias owing to unobserved characteristics of children (e.g., genetics) that are time invariant and time varying. As is the general case with multilevel models of longitudinal data, within-child estimates in multilevel models inherently account for the fact that observations are nested over time within children, thereby controlling for problems that would otherwise arise from repeated measures (e.g., correlated errors within child).

As a point of comparison, however, it is important to note that not all multilevel model specifications provide within-child estimates, even when predictors are specified as time varying. If, for example, time-varying predictors in multilevel models of longitudinal data on children have been left uncentered or have been centered on the grand mean (i.e., $y_{it} = \beta_{00} + \beta_{10}(x_{it} - \overline{x..}) + u_{it}$, *for which* $\overline{x..}$ *is the average value of predictor* x across all children and all time points), these predictors estimate a mix of within-child and between-child effects. Because they include between-child effects in this mix, estimates based on predictors that are uncentered or grand-mean centered are susceptible to bias caused by unobserved heterogeneity between children. Of these three centering choices for time-varying predictors (i.e., uncentered, within-child centered, and grand-mean centered), therefore, only within-child centering helps control for time-invariant omitted variable bias (Kreft & De Leeuw, 1998; Raudenbush & Bryk, 2002; Singer & Willett, 2003).[3]

Within-child estimates, however, can be biased by time-varying omitted variables or reciprocal causation (i.e., simultaneity) such that the outcome variable influences predictors of interest (Duncan et al., 2004; Singer & Willett, 2003). In addition, biased estimates that are due to measurement error are more likely when using differenced regressors than when using regressors of cross-sectional data, although such compounded measurement error problems are less likely to occur when there is interindividual variation in rate of change for explanatory variables (Hsaio, 2003; Rogosa,

[3] It should be noted that our within-child analyses could also have been estimated using individual fixed-effects models (for a description of these models, see Duncan et al., 2004; Hsaio, 2003). In fact, we estimated all of our models using this alternative method, and our results were nearly identical to those estimated in the multilevel models, as would be expected. Both the multilevel models using within-child centering and the individual fixed-effects models controlled for time-invariant potential omitted variables as well as autocorrelation that was due to repeated observations of children.

1995).[4] Nonetheless, within-child estimates are useful given that they provide greater control for potential endogeneity bias than do between-child estimates.

In the present study, five multilevel models were estimated for the two outcomes with Level 1 time-varying predictors centered within child. First (Model 1), the main effect of income was estimated while controlling for the following time-varying covariates: household size, maternal partner status, maternal and partner hours of employment, hours in child care, and CBCL version as well as linear, quadratic, and cubic time trends. We included the linear, quadratic, and cubic time trends in this and all subsequent models as controls because they were all statistically significant in unconditional growth models (i.e., models that included only time trends at Level 1). Second (Model 2), cross-level interactions were estimated by including dummy variables for chronic and transient poverty at Level 2 of the model for the main effects of income, maternal partner status, and both maternal and partner hours of employment.

In the next three models, the following three-way interactions were estimated: income (Inc), partner status (Partner), and the poverty status dummies (Model 3); income, maternal employment (MomEmp), and the poverty status dummies (Model 4); and income, partner employment (PartEmp), and the poverty status dummies (Model 5). To control for between-child differences in average level of externalizing and internalizing problems that were associated with family poverty status as well as differences associated with child gender, maternal education, and child ethnicity, we included seven Level 2 time-invariant predictors of the Level 1 intercept in all models: chronic poverty, transient poverty, child gender, maternal education (MomEdu), African American (AfrAmer) ethnicity, European American (EuroAmer) ethnicity, and Latino American (LatAmer) ethnicity.[5] The following equation for Model 3 is provided as an example of the three higher-order models (i.e., Models 3, 4, and 5):

$$
\begin{aligned}
y_{it} = [&\beta_{00} + \beta_{01}Chronic_i + \beta_{02}Transient_i + \beta_{03}Gender_i + \beta_{04}MomEdu_i \\
&+ \beta_{05}AfrAmer_i + \beta_{06}EuroAmer_i + \beta_{07}LatAmer_i + \beta_{10}(Inc_{it} - \overline{Inc_i}) \\
&+ \beta_{11}Chronic_i \times (Inc_{it} - \overline{Inc_i}) + \beta_{12}Transient_i \times (Inc_{it} \\
&- \overline{Inc_i})\beta_{20}(Partner_{it} - \overline{Partner_i}) + \beta_{21}Chronic_i \times (Partner_{it} \\
&- \overline{Partner_i}) + \beta_{22}Transient_i \times (Partner_{it} - \overline{Partner_i}) \\
&+ \beta_{30}(MomEmp_{it} - \overline{MomEmp_i}) + \beta_{31}Chronic_i \times (MomEmp_{it} \\
&- \overline{MomEmp_i}) + \beta_{32}Transient_i \times (MomEmp_{it} - \overline{MomEmp_i}) \\
&+ \beta_{40}(PartEmp_{it} - \overline{PartEmp_i}) + \beta_{41}Chronic_i \times (PartEmp_{it} \\
&- \overline{PartEmp_i}) + \beta_{42}Transient_i \times (PartEmp_{it} - \overline{PartEmp_i}) \\
&+ \beta_{50}(HSize_{it} - \overline{HSize_i}) + \beta_{60}(CCare_{it} - \overline{CCare_i}) + \beta_{70}(CBCL?_{it} \\
&- \overline{CBCL?_i}) + \beta_{80}(Time_{it} - \overline{Time_i}) + \beta_{90}(Time_{it}^2 - \overline{Time_i^2}) \\
&+ \beta_{100}(Time_{it}^3 - \overline{Time_i^3}) + \beta_{110}Chronic_i \times (Inc_{it} - \overline{Inc_i}) \times (Partner_{it} \\
&- \overline{Partner_i}) + \beta_{120}Transient_i \times (Inc_{it} - \overline{Inc_i}) \\
&\times (Partner_{it} - \overline{Partner_i})] + [\zeta_{00} + \zeta_{80}(Time_{it} - \overline{Time_i})] + u_{it}
\end{aligned}
$$

Note that the Level 1 intercept (i.e., average problems) and the Level 1 slope for linear time were allowed to vary across Level 2 units (i.e., children). All other Level 1 time-varying predictors were constrained to have zero variance across children because of low-reliability and model-convergence problems when these parameters were allowed to vary at Level 2. This was true for Models 1–5, for both externalizing and internalizing problems. Nonetheless, all multilevel models included linear, quadratic, and cubic time trends as covariates. Thus, the estimated associations reported hereafter were evident above and beyond the naturally occurring linear and nonlinear developmental changes in externalizing and internalizing problems.

Given the large number of predictors in our models, we also examined the main effects and interactions of interest in reduced-form models that did *not* include time trends, time-invariant covariates, or time-varying covariates other than partner status, maternal employment, and partner employment (which were central to our interaction hypotheses). All statistically significant results from the larger models for income and its interactions with partner status, maternal employment, and partner employment were also significant (and in the same direction) in these simplified models. Because the larger models likely provided more conservative estimates of variance in social–emotional functioning uniquely explained by income, we report results from these larger models rather than from the simplified models.

Not all families included in these models experienced changes over time on all of the time-varying predictors. Among chronically poor children, for example, 48% experienced a change in partner status, but the remaining children had mothers who were always partnered (18%) or never partnered (34%). Once time-varying predictors were included in interactions (e.g., income by partner status), the products varied as long as there was within-child variation in one of the two main effect predictors.

Missing data. For children's externalizing and internalizing problems, patterns of missing data in the NICHD SECCYD are displayed in Table 2. The percentages of children with missing data are tabled according to children's highest problem scores during the study so that missing-data patterns for children who scored in the borderline clinical region or above can be compared with the missing-data patterns for other children. On average, children who scored in the borderline clinical region or above were less likely to have missing outcome data than were other children. For externalizing problems, for example, children who had at least one observation above borderline clinical level were missing an average of 1.26 outcome assessments, compared with an average of 1.71 for other children.

Although missing data in longitudinal analyses can lead to biased estimates, this problem is minimized when within-person estimates, such as those in the present study, are used (Hsaio, 2003; Raudenbush & Bryk, 2002). Nonetheless, we conducted several diagnostic analyses according to Foster and Bickman's (1996) recommendations for detecting attrition problems. In our multilevel models, for example, we included an indicator of the number of waves completed by participants, a time-varying indicator of whether participants had complete data for the preceding wave, and a dummy variable indicator of whether participants had complete data. (In

[4] One potential source of measurement error in the present study was the time lag between observations. Consider, for example, a change in partner status that occurred at 37 months but was not captured until 54 months or a parent who divorced *and* remarried between observations so that partner status appeared constant. This potential measurement error may have biased our coefficients toward zero. Most important in this regard, absolute effect sizes for income in the present study may be underestimates, because of time lags and other potential sources of measurement error that are peculiar to family self-reports of family income (for a review, see Dearing, Berry, & Maslow, in press).

[5] To help determine the robustness of our results to model respecification, we also estimated the following alternative specifications: (a) models for which the Level 2 covariates (i.e., child gender, maternal education, and child ethnicity) were specified as predictors of the model intercept and time trends; (b) models for which the Level 2 covariates were specified as predictors of the model intercept, time trends, family income, and any time-varying interactions; and (c) models in which the Level 2 covariates (including chronic and transient poverty) were specified as predictors of all Level 1 parameters. Across these alternative specifications, results for family income (main effects and interactions) were replicated.

Table 2
Percentages of Children Missing Data by Highest Externalizing and Internalizing Problem Level

Problem level	Percentages of children with 0–4 missing observations					Mean no. of missing observations
	0	1	2	3	4	
Externalizing						
Borderline or above (n = 376)	34.3	26.3	22.6	13.0	3.7	1.26
Below borderline (n = 784)	24.4	18.6	27.2	21.0	8.8	1.71
Internalizing						
Borderline or above (n = 426)	34.7	23.7	26.3	13.1	2.1	1.24
Below borderline (n = 734)	23.4	19.6	25.3	21.5	10.1	1.75

addition, because we were particularly interested in associations between income and child outcomes, we included each of these indicators in interactions with our income parameters.) Using these strategies, we found no evidence that missing data were biasing our model estimates. Further, results reported hereafter were robust when missing data were imputed using predicted values from a variety of child and family characteristics.

Results

Model 1: The Average Effects of Income and Family Poverty Experiences

As a first step in our data analyses, the average within-child effects of income were estimated for child externalizing and internalizing problems. As discussed above, differences in the average level of problems between children who were never poor and those who were chronically or transiently poor were also estimated by including the poverty variables as predictors of the model intercepts. Coefficients and standard errors for family income and the poverty variables as well as partner status, maternal employment, and partner employment are displayed in Table 3. Coefficients and standard errors for Model 1 covariates are displayed in Appendix A; both time-varying (i.e., household size, child care hours, CBCL version, time, time squared, and time cubed) and time-invariant (i.e., child gender, child ethnicity, and maternal education) covariates are included.

Family income was, on average, significantly associated with child externalizing problems such that children had fewer problems when their level of family income was relatively high than at times when their level of family income was relatively low. In addition, children who were chronically poor were rated as having more externalizing problems, on average, than children who were never poor. Although this difference between chronically poor and never poor children was approximately 27% of the between-person standard deviation for the CBCL norm (i.e., the CBCL has been normed so that the between-child standard deviation is 10 points), the size of the within-child association between income and externalizing problems was small when averaged across children. An additional $10,000 in income was, for example, associated with only a 0.13-point decrease in externalizing problems, less than 2% of the between-person standard deviation for the CBCL norm.

Although chronically poor children had significantly more internalizing problems, on average, than never poor children, the within-child association between income and internalizing problems was small (−.05) and was not statistically distinguishable from zero. Thus, when within-child estimates were averaged across children, associations between income and social–emotional problems appeared to be of little importance.

Model 2: Interactions Involving Family Poverty Experiences

In our second set of multilevel models, the interaction of family income and families' poverty experiences was included so that the estimated within-child association between family income and social–emotional problems could be compared across children with varying poverty experiences. Interactions were also estimated between the poverty variables and partner status, maternal employment, and partner employment, the three time-varying predictors for which three-way interactions with income would also be examined. An overview of these results is displayed in Table 4. Coefficients and standard errors for Model 2 covariates, including all time-varying and time-invariant main effects that were estimated in Model 1, are displayed in Appendix B.

For child externalizing problems, the association with family income significantly varied by chronic poverty status. Specifically, the association between income and externalizing problems was significantly larger for children living in chronically poor families than for their peers living in families that had never been poor such

Table 3
Summary of Model 1: Main Effects

Predictor	Externalizing problems	Internalizing problems
Intercept	54.85***	53.24***
	(1.41)	(1.39)
Chronic poverty	2.67**	1.67*
	(0.87)	(0.82)
Transient poverty	0.32	−0.42
	(0.73)	(0.69)
Income	−0.13*	−0.05
	(0.05)	(0.07)
Partner status	0.56	−1.72
	(0.83)	(1.12)
Maternal employment	0.00	0.00
	(0.01)	(0.02)
Partner employment	−0.01	0.01
	(0.01)	(0.02)

Note. Coefficients are displayed in Appendix A for the following covariates: child gender and ethnicity, maternal education, household size, child-care hours, Child Behavior Checklist version, time, time^2, and time^3.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4
Summary of Model 2: Interactions Involving Family Poverty Experiences

Predictor	Externalizing problems	Internalizing problems
Income	−0.10*	−0.05
	(0.05)	(0.08)
Income × Chronic Poverty	−1.38*	−0.54
	(0.69)	(0.88)
Income × Transient Poverty	−0.18	0.19
	(0.19)	(0.29)
Partner status	0.32	−2.69†
	(0.98)	(1.43)
Partner × Chronic Poverty	−1.01	5.53*
	(2.35)	(2.69)
Partner × Transient Poverty	2.34	1.72
	(2.17)	(2.52)
Maternal employment (Mat Emp)	−0.01	0.00
	(0.01)	(0.02)
Mat Emp × Chronic Poverty	0.09*	0.05
	(0.04)	(0.04)
Mat Emp × Transient Poverty	−0.01	−0.07†
	(0.03)	(0.04)
Partner employment (Part Emp)	0.00	0.03
	(0.01)	(0.02)
Part Emp × Chronic Poverty	0.06	−0.12*
	(0.04)	(0.05)
Part Emp × Transient Poverty	−0.06†	−0.06
	(0.03)	(0.04)

Note. Coefficients are displayed in Appendix B for model intercepts, poverty predictors of intercepts, and the following covariates: child gender and ethnicity, maternal education, household size, child-care hours, Child Behavior Checklist version, time, time^2, and time^3.
† $p < .10$. * $p < .05$.

Table 5
Summary of Model 3: Interactions Involving Partner Status and Family Poverty Experiences

Predictor	Externalizing problems	Internalizing problems
Income	−0.12	−0.13
	(0.17)	(0.40)
Income × Chronic Poverty	0.40	1.19
	(1.02)	(1.18)
Income × Transient Poverty	−0.42	0.44
	(0.65)	(0.91)
Partner status	0.27	−3.04
	(1.30)	(2.16)
Partner × Chronic Poverty	4.36	10.88**
	(3.29)	(3.74)
Partner × Transient Poverty	1.85	2.41
	(2.60)	(3.38)
Partner Status × Income	0.01	0.09
	(0.17)	(0.40)
Partner × Income × Chronic Poverty	−3.76**	−3.59*
	(1.45)	(1.75)
Partner × Income × Transient Poverty	0.26	−0.26
	(0.67)	(0.96)

Note. Coefficients for all covariates are displayed in Appendix C.
* $p < .05$. ** $p < .01$.

that within-family variations in income levels were associated with larger within-child variations in problem levels for children who were chronically poor. For those children who had never been poor, an additional $10,000 of family income was associated with only a 0.10-point decrease in externalizing problems. For those children who were chronically poor, however, an additional $10,000 in family income was associated ($p < .05$) with a 1.48-point decrease in externalizing problem level, or about 15% of the between-child standard deviation, nearly 15 times larger than the income effect estimated for children who were never poor.[6]

The within-child association between maternal employment and externalizing problems also varied by poverty status. For children who were never poor, maternal employment was unrelated to externalizing problems. For children who were chronically poor, however, a 1-hr increase in maternal employment was positively and significantly ($p = .01$) associated with a 0.08-point increase in externalizing problems, based on a linear combination of the main effect and interaction coefficients.

For child internalizing problems, the association between income and problems did not significantly vary by poverty status. Two other time-varying predictors, however, did significantly differ by poverty status: partner status and partner employment. Although there was a not quite significant trend indicating that having a partner in the home was negatively associated with internalizing problems for children who were never poor (−2.69, $p < .10$), partner status was not associated with the internalizing problems of children who were chronically poor (i.e., 2.84, $p > .20$). On the other hand, more hours of partner employment were significantly associated with fewer internalizing problems for children who were chronically poor but not for children who were never poor.

Models 3, 4, and 5: Interactions Involving Partner Status, Maternal Employment, Partner Employment, and Family Poverty Experiences

In the next three models, three-way interactions were estimated: In Model 3, income was included in interactions with partner status and the poverty indicators; in Model 4, income was included in interactions with maternal employment and the poverty indicators; and in Model 5, income was included in interactions with partner employment and the poverty indicators. These models were used to determine whether within-child associations between income and child outcomes varied as a function of partner status or employment and whether these two-way interactions significantly differed as a function of poverty experiences. An overview of results from these models is displayed in Tables 5, 6, and 7. Coefficients and standard errors for covariates are displayed in Appendix C.

For child externalizing and internalizing problems, the three-way interaction among family income, partner status, and chronic poverty status was significant (see Table 5). For both outcomes, the three-way interaction of family income, maternal employment, and chronic poverty status was also significant (see Table 6). In

[6] Throughout our analyses, we computed linear combinations to obtain the estimated income coefficients, standard errors, and significance levels for chronically poor children. For example, to obtain the estimated effect of income for chronically poor children from Model 2, we computed the following linear combination:

$$\beta_{01}(Income_{it} - \overline{Income_i}) + \beta_{11}Chronic \times (Income_{it} - \overline{Income_i}).$$

addition, the three-way interaction of family income, partner employment, and chronic poverty status was significant for child internalizing problems (see Table 7; this interaction was close to significant, $p < .10$, for externalizing problems).

To help interpret these interactions, we computed linear combinations of the main effect and interaction coefficients to estimate the association between income and child social–emotional problems for both never poor and chronically poor children under six conditions: (a) when mothers were partnered, (b) when mothers were single, (c) when mothers' hours of employment were 1 standard deviation above the mean (i.e., 45.20 hr), (d) when mothers' hours of employment were 1 standard deviation below the mean (i.e., 9.34 hr), (e) when partners' hours of employment were 1 standard deviation above the mean (i.e., 59.18 hr), and (f) when partners' hours of employment were 1 standard deviation below the mean (i.e., 14.80 hr). These linear combinations are displayed in Figure 1.[7]

In families that were never poor, income effects were not statistically distinguishable from zero and were similar in size when mothers were partnered and when they were not partnered (see Figure 1A). Family income and child problems were also not significantly related to one another when chronically poor mothers were single. However, when these chronically poor mothers were partnered, an additional $10,000 in income was associated with a 3.46-point decline in externalizing problems and a 2.45-point decline in internalizing problems, although the latter association was not quite significant. Given that family income and partner status estimates were both within child, associations between income and the child outcomes in the context of chronic poverty were larger (and more negative) at times when mothers were partnered than at times when they were single. In other words, for children in chronic poverty, variations in income effects across family structures were in the direction opposite that predicted in the present study.[8]

Table 6
Summary of Model 4: Interactions Involving Maternal Employment and Family Poverty Experiences

Predictor	Externalizing problems	Internalizing problems
Income	−0.10†	−0.08
	(0.05)	(0.08)
Income × Chronic Poverty	0.03	2.02†
	(0.89)	(1.18)
Income × Transient Poverty	−0.06	0.68
	(0.36)	(0.59)
Maternal employment (Mat Emp)	−0.01	−0.01
	(0.02)	(0.03)
Mat Emp × Chronic Poverty	0.14*	0.17**
	(0.06)	(0.06)
Mat Emp × Transient Poverty	0.00	−0.02
	(0.05)	(0.06)
Maternal Employment × Income	0.00	0.00
	(0.00)	(0.00)
Mat Emp × Income × Chronic Poverty	−0.05*	−0.09**
	(0.02)	(0.03)
Mat Emp × Income × Transient Poverty	0.00	−0.01
	(0.05)	(0.02)

Note. Coefficients for all covariates are displayed in Appendix C.
† $p < .10$. * $p < .05$. ** $p < .01$.

Table 7
Summary of Model 5: Interactions Involving Partner Employment and Family Poverty Experiences

Predictor	Externalizing problems	Internalizing problems
Income	−0.06	−0.09
	(0.11)	(0.19)
Income × Chronic Poverty	−0.75	0.52
	(0.90)	(0.99)
Income × Transient Poverty	−0.08	−0.16
	(0.35)	(0.47)
Partner employment (Part Emp)	0.00	0.05
	(0.01)	(0.03)
Part Emp × Chronic Poverty	0.14*	0.02
	(0.06)	(0.09)
Part Emp × Transient Poverty	−0.06	−0.09
	(0.04)	(0.06)
Partner Employment × Income	0.00	0.00
	(0.00)	(0.00)
Part Emp × Income × Chronic Poverty	−0.05†	−0.08*
	(0.03)	(0.04)
Part Emp × Income × Transient Poverty	0.00	0.00
	(0.01)	(0.01)

Note. Coefficients for all covariates are displayed in Appendix C.
† $p < .10$. * $p < .05$.

On the other hand, the interaction between income and maternal employment was in the expected direction (see Figure 1B). More specifically, among chronically poor families, the association between family income and externalizing and internalizing problems was increasingly larger and more negative when mothers worked more hours than when they worked fewer hours, but this was not the case among never poor families, for whom income effects were not significant regardless of maternal employment circumstances. As displayed in Figure 1B, the estimated associations between income and social–emotional problems were not distinguishable from zero when mothers' hours of employment were 1 standard deviation below the mean, but an additional $10,000 in income when chronically poor mothers' hours of employment were 1 standard deviation above the mean was associated with a 2.28-point decrease in externalizing problems and a 1.98-point decrease in internalizing problems. Given that the interaction of family

[7] Income coefficients, standard errors, and significance tests for Figure 1 were calculated using linear combinations. For example, the estimated income coefficient for chronically poor children's externalizing problems when their mothers were partnered was equal to:

$$\beta_{01}(Inc_{it} - \overline{Inc_i}) + \beta_{11}Chronic \times (Inc_{it} - \overline{Inc_i}) + \beta_{19}Chronic_i \times (Inc_{it} - \overline{Inc_i}) \times (Partner_{it} - \overline{Partner_i}).$$

[8] Because some chronically poor families did not change their partner status during the study, we also compared the within-child effect of changes in income for chronically poor families that were always partnered with those that were always single. Consistent with our other results, income was negatively and significantly associated with problems for children whose mothers were always partnered (−3.46 for externalizing, $SE = 1.60$, $p < .05$; −3.64 for internalizing, $SE = 1.85$, $p = .05$), but income was not associated with problems for children whose mothers were always single (0.39 for externalizing, $SE = 1.38$, $p = .78$; 1.43 for internalizing, $SE = 1.58$, $p = .37$).

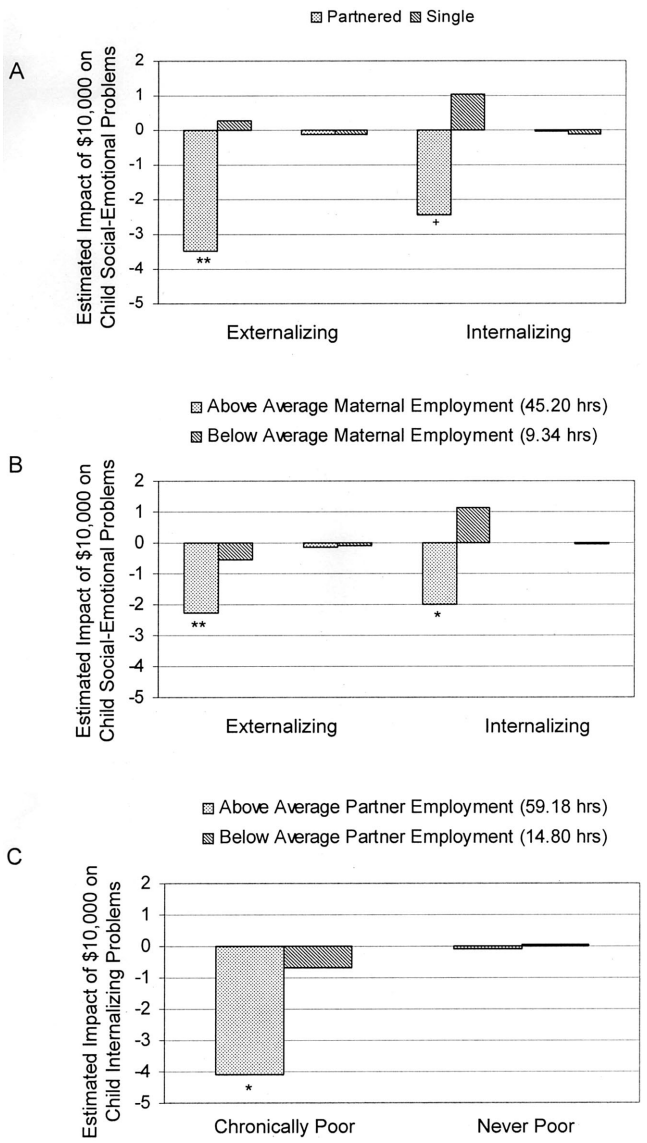

Figure 1. The estimated impact of an additional $10,000 in family income on child externalizing and internalizing problems for chronically poor and never poor children: (A) when their mothers were partnered and when their mothers were single; (B) when their mothers were working an above-average level of hours (i.e., one standard deviation above the mean, which was 45.20 hr) and when their mothers were working a below-average level of hours (i.e., one standard deviation below the mean, which was 9.34 hr); and (C) when their mothers' partners were working an above-average level of hours (i.e., one standard deviation above the mean, which was 59.18 hr) and when their mothers' partners were working a below-average level of hours (i.e., one standard deviation below the mean, which was 14.80 hr). $^{+}p < .10$. $*p < .05$. $**p < .01$.

income and partner employment was significant only for internalizing problems, we spend less time interpreting this interaction except to note that, as expected, it was similar in direction to the interaction of family income and maternal employment (see Figure 1C).

Effect size estimates for all three-way interactions were small in absolute size, with partial correlations ranging from .06 to .10. Nonetheless, effect size estimates for the three-way interactions were similar to the effect size estimates for other statistically significant predictors in the models. The average partial correlation for maternal education was .14 in the externalizing models and .10 in the internalizing models, for example.

Combined Model: Simultaneous Estimation for All Three-Way Interactions

As a final step in estimating these interactions, we specified models in which the three-way interactions involving partner status, maternal employment, and partner employment were simultaneously estimated (i.e., Models 3, 4, and 5 combined). Statistical power was reduced, and the potential for multicollinearity problems was likely increased (thereby decreasing estimate precision), in these combined models relative to Models 3–5. Yet, given within-family patterns of covariance among partner status, maternal employment, and partner employment (e.g., both partner status and partner employment changed when families gained an employed partner), we were interested in determining which of these interactions would remain significant when all three were forced to compete for variance. The interaction of partner status with income and chronic poverty remained significant for child externalizing problems, and the interaction of maternal employment with income and chronic poverty remained significant for child internalizing problems. The other three-way interactions were no longer significant in the combined models.

Replication Strategies for Validating Problem Measures

To help determine the robustness of our results, we reestimated the multilevel models using four replication strategies. In particular, we were interested in validating our use of *T* scores on the CBCL and TRF from child-care provider and teacher reports. Although all of our analyses reported to this point included a dummy variable controlling for differences in *T* scores from the CBCL to the TRF, we used these four replication strategies to further validate our results. The four strategies included (a) adding a time-varying interaction term that allowed the estimated effect of income to vary by instrument version (i.e., CBCL vs. TRF), (b) estimating time-varying interactions between our time parameters and income, (c) reducing the variation in the number and type of reporters by reestimating our models using only the data collected from child-care providers, and (d) using children's average raw scores on each item rather than *T* scores for the CBCL and TRF.

Using these four strategies, we found no evidence that the effect of income varied across instrument version or assessment time. In addition, across all of these strategies, the majority of our results related to the study hypotheses were replicated with similar main effects and interactions for income. Thus, although variations over time in test version and reporters likely led to some variability in children's problem scores because of factors other than actual changes in children's social–emotional functioning, there was little evidence that our results were biased by this variability.

Discussion

In this study, we extended recent research that used within-family estimates to examine links between income and child social–emotional problems by examining key hypothesized mod-

erators—namely, poverty experiences, maternal partner status, maternal employment, and partner employment. In so doing, we addressed variations in the importance of income for children's social–emotional development as a function of changing family contexts. Although previous studies have demonstrated that associations between family income and child social–emotional functioning are largest for poor children and that children who experience persistent poverty are at greatest risk (e.g., Duncan et al., 1994; Taylor et al., 2004), few other potential moderators of economic context have been examined. Family structure and employment are particularly important in this regard because of the unique developmental effects associated with these features of developmental context and their causal role in changing the economic conditions of poor families.

On average, family income was significantly and negatively associated with children's externalizing problems, although the size of this association was small when constrained to be equal across all children in the SECCYD sample. The effect of income on externalizing problems, however, was significantly larger for chronically poor children than for other children. In fact, the average estimated decrease in externalizing problems associated with an additional $10,000 in family income was nearly 15 times larger for chronically poor children than for children who were never poor. On the other hand, family income was not associated with children's internalizing problems, at least when income estimates were averaged across family structure and employment contexts.

Our results for externalizing problems were consistent with those from a recent natural experiment of income change. Specifically, Costello, Compton, Keeler, and Angold (2003) found that Native American children experienced decreases in symptoms associated with conduct and oppositional defiant disorders when their families moved out of poverty because of income supplements from a gambling casino. Our results add to these findings on the average effect of income gains for chronically poor families by demonstrating variations in income effects associated with family structure and employment. For both externalizing and internalizing problems, changes in partner status and employment were significant moderators in the present study such that income gains were most strongly associated with problem decreases when chronically poor children's mothers were partnered and employed.

Variations by Partner Status

Unexpectedly, family income was more strongly associated with problems for chronically poor children when their mothers were partnered than when their mothers were single. When children's mothers were partnered, an additional $10,000 in family income was associated with decreases in externalizing problems that were more than one third of the normed between-child standard deviation for this outcome. Similarly, an additional $10,000 in family income for these children was associated with decreases in internalizing problems that were more than one quarter of the normed between-child standard deviation.

We speculate about these unexpected findings by offering two possible explanations. First, these findings may have been a function of parental conflict in chronically poor homes when mothers were partnered. In cross-sectional models linking economic hardship and children's social–emotional problems, parental conflict is an important mediator of associations between parent depression and less nurturant or less involved parenting and, in turn, child social–emotional functioning (e.g., Conger et al., 2002). That is, one reason that poverty poses a risk to children may be because of increased parent conflict. Opportunities for conflict may be maximized when mothers and their partners live in the home together. If this is so, income may be particularly likely to influence conflict frequency in these chronically poor households, and as such, income may be more likely to influence children in these homes where conflict varies in response to income variations.

Second, mothers may be relatively unaffected by income levels, at least when compared with their partners. There is, in fact, evidence that father–child relationships are more likely to worsen in response to income losses than are mother–child relationships (Elder et al., 1985), although results from recent cross-sectional models of family stress indicate that both maternal and partner mental health mediate associations between financial stress and child social–emotional functioning (e.g., Conger et al., 2002). There is a possibility, however, that when mothers are single they receive higher levels of social support from family and friends to help cope with economic stress than when they are partnered. Regardless, future within-child studies of family income and child functioning that also examine life stress, parent mental health, parent conflict, mother–child relationships, partner–child relationships, and/or social support could help disentangle these unexpected findings.

Variations by Employment

Our results for maternal employment were consistent with study predictions. Specifically, family income was most strongly associated with child externalizing and internalizing problems when mothers were employed and was especially associated with the internalizing problems of chronically poor children. This finding builds on evidence that employment gains for families in poverty are associated with decreased problems and that employment is most likely to lead to child improvements when combined with income gains (Dunifon et al., 2003; Gennetian & Miller, 2002; Jackson, 2003). Indeed, the developmental effects of income and employment appear to be interdependent, each creating a context for the other.

Increased maternal employment in low-income families can lead to improvements in maternal mental health and reductions in negative parenting strategies (e.g., coercive discipline; Jackson, 2003; Raver, 2003). Yet, as is true for child outcomes, this relation may depend on whether employment gains lead to income gains (Dearing et al., 2004; Raver, 2003). In fact, the results of the present study indicate that increased maternal employment among chronically poor families posed a risk to children's social–emotional development without considerable income gains. Income was also moderated by partner employment in the present study such that income effects were largest when partners were employed, although these results were less robust than those for maternal employment.

In summary, it is increasingly apparent that financially rewarding employment creates a positive context for poor families, one characterized by psychological well-being for children. Consistent with the results from welfare experiments (Gennetian & Miller, 2002), the results from the present study suggest that policies designed to improve well-being among poor families are likely to be most successful if they attend to both employment and income

needs. In fact, our analyses indicated that neither gaining a partner nor gaining maternal employment in and of themselves would benefit children and that without income gains, these changes could increase risk for chronically poor children. Our analyses also indicated that income was most beneficial in the context of chronic poverty when mothers were partnered and employed. Thus, policies focused on creating incentives to increase the number of two-parent households or hours of employment among the chronically poor may be most likely to improve children's social–emotional well-being if they lead to economic gains for these families.

The Responsiveness of Externalizing Versus Internalizing Problems

As others have also reported (e.g., Ackerman et al., 2004; Conger et al., 2002; Costello et al., 2003), our results indicated that income was less consistently and less strongly associated with children's internalizing problems than with their externalizing problems, particularly with regard to the main effects of income. This difference for externalizing problems compared with internalizing problems is not surprising considering that genetic influences are relatively modest and family environmental influences are relatively large for disruptive behavior disorders relative to other childhood disorders (Plomin, DeFries, McClearn, & Rutter, 1997). As such, externalizing problems may be more malleable in response to family environmental changes than are internalizing problems. Nonetheless, there is substantial evidence that internalizing problems such as anxiety and depression are partly determined by developmental contexts that undermine perceptions of control, and our estimated between-child differences in internalizing problems for chronically poor versus never poor children were consistent with this evidence; these types of problems may simply be resistant to change. Indeed, another potential reason for the smaller estimated income effects for internalizing problems than for externalizing problems may be that outside reporters, including child-care providers and teachers, have a more difficult time identifying problems that are internalized than problems that are externalized.

Strengths and Limitations of Within-Child Estimates and the Present Study

There are at least three important strengths of modeling family income the way that we did. First, modeling income over time as a dynamic within-child phenomenon provides an ecologically valid assessment, because income is often in flux. Second, within-child estimates are policy relevant because they move beyond discussions of poverty as a risk factor to discussions of whether poor children will be responsive to economic improvements. Third, by examining within-child associations, our estimates of the relation between family income and children's social–emotional functioning were not susceptible to bias caused by unobserved heterogeneity that was fixed within children, their families, or their environments.

Despite these methodological strengths, there is the potential for time-varying omitted variables and reciprocal causation (i.e., simultaneity) in the present study. If time-varying processes that influence both family income and child problems were omitted from the present study, our estimates of income effects would be biased. Consider, for example, that parents may have found a personal mentor, entered therapy, or experienced some other type of personal intervention (e.g., religious conversion) during the study that simultaneously led to increased family income and decreased child problems.

Our confidence in the estimated income effects, however, is bolstered by the time-varying covariates that we did include, in particular, maternal employment, partner employment, and partner status. Collectively, these three variables represent the overwhelming majority of factors that are proximally linked with economic change for families with young children, especially poor families (e.g., Bane & Ellwood, 1986; Corcoran & Chaudry, 1997). As such, variance associated with factors more distally linked with economic change (e.g., changes in parent health) is likely captured by these variables. In addition, controlling for the natural time paths of child social–emotional problems further reduces the possibility that the estimated associations were spurious.

The inclusion of employment and partner status as time-varying covariates was also important given the possibility that children's social–emotional problems may influence family economics. Consider that any causal influence that social–emotional problems have on family income is likely mediated by employment or partner status changes. For example, if more disruptive child behavior contributed to a divorce or to a reduction in hours of employment, then our partner status and employment controls should have captured this reciprocal influence.

The present study also may have been limited by the social–emotional problem reports on which our results relied. The CBCL is designed to capture problem behavior, and as such, there were likely floor effects limiting our ability to detect associations between income and social–emotional functioning among children who displayed few problem behaviors. In addition, although using reporters other than children's parents helped us avoid problems of shared method variance, variation in child problem scores may have been biased to some greater or lesser degree by nonrandom patterns of missing data (e.g., children who were not in child care) as well as variations in reporters and CBCL versions across time points. With regard to child-care provider and teacher reports of social–emotional functioning, it is also worth noting that our failure to detect a significant main effect of income for internalizing problems may have been due to the relative difficulty that outside observers such as teachers have when assessing internalizing, as opposed to externalizing, problems (e.g., Stanger & Lewis, 1993).

Even though our results were robust across a variety of model specifications used to specifically address these issues, and even though we could not detect any bias associated with missing data, within-child analyses of longitudinal data that avoid these problems would be useful to further validate our results. In this regard, it is noteworthy that the NICHD Early Child Care Research Network (2004) found significant associations between average rate of change in family income and average rate of change in children's physical aggression as reported by mothers, such that children whose families gained more income over time were reported as having greater declines in physical aggression than children whose families gained less or lost income. Although based on between-child comparisons of average rates of change in family income, these results were consistent with our within-child analyses, at least with regard to the main effects of income.

Conclusion

Chronic social–emotional problems can have immense public costs (Cohen, 1998; Foster et al., 2003). Our results add to existing literature indicating that poverty may be one environmental context contributing to child externalizing and internalizing problems. Specifically, we have demonstrated that these problems appear malleable in response to variations in family economic context, although more so for some children than others. Child sensitivity to family economics appears to be context specific such that chronically poor children are most responsive to income, particularly when their mothers are partnered and employed. Indeed, when mothers of chronically poor children become partnered or gain employment, risk of social–emotional problems may increase if these changes are not accompanied by financial gains.

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Appendix A

Coefficients (and Standard Errors) for Model 1 Covariates

Covariate	Externalizing problems	Internalizing problems
For intercept		
Child gender	0.55	0.26
	(0.40)	(0.37)
African American	2.17**	0.51
	(0.62)	(0.59)
European American	−0.85*	−0.45
	(0.41)	(0.41)
Latino American	−0.07	0.43
	(0.69)	(0.68)
Maternal education	−0.41***	−0.30**
	(0.09)	(0.09)
Time-varying covariates		
Household size	0.04	0.14
	(0.30)	(0.34)
Child-care hours	0.03	0.04
	(0.02)	(0.02)
CBCL version	5.17***	5.38***
	(0.99)	(1.21)
Time	−0.20**	0.20**
	(0.06)	(0.07)
$Time^2$	0.01	−0.02***
	(0.00)	(0.00)
$Time^3$	−0.00	0.0002***
	(0.00)	(0.0000)

Note. Although $Time^2$ and $Time^3$ were not significant for the externalizing models displayed, these two time trends were significant before entering the other time-varying covariates and, for this reason, were retained in all subsequent models. All significant main effects, interactions, and covariates were, however, significant when these nonlinear time parameters were not included in models.

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

Appendix B

Coefficients (and Standard Errors) for Model 2 Covariates

Covariate	Externalizing problems	Internalizing problems
For intercept		
Chronic poverty	2.67**	1.65*
	(0.87)	(0.82)
Transient poverty	0.31	−0.41
	(0.73)	(0.69)
Child gender	0.55	0.26
	(0.40)	(0.37)
African American	2.17**	0.51
	(0.62)	(0.59)
European American	−0.85*	−0.45
	(0.41)	(0.41)
Latino American	−0.07	0.43
	(0.69)	(0.68)
Maternal education	−0.41***	−0.30**
	(0.09)	(0.09)
Time-varying covariates		
Household size	−0.01	0.10
	(0.30)	(0.34)
Child-care hours	0.03	0.04*
	(0.02)	(0.02)
CBCL version	5.09***	5.20***
	(0.99)	(1.21)
Time	−0.20**	0.19**
	(0.06)	(0.07)
$Time^2$	0.01	−0.02***
	(0.00)	(0.00)
$Time^3$	−0.00	0.0002***
	(0.00)	(0.0000)

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

(*Appendixes continue*)

Appendix C

Coefficients (and Standard Errors) for Models 3, 4, and 5 Covariates

Covariate	Externalizing problems	Internalizing problems
	Model 3	
Maternal employment	−0.01	0.00
	(0.01)	(0.02)
Chronic poverty	0.08*	0.05
	(0.04)	(0.04)
Transient poverty	−0.01	−0.07†
	(0.04)	(0.04)
Partner employment	0.00	0.03
	(0.01)	(0.02)
Chronic poverty	0.08†	−0.11*
	(0.04)	(0.05)
Transient poverty	−0.06†	−0.06
	(0.03)	(0.04)
	Model 4	
Partner status	0.33	2.78†
	(0.99)	(1.43)
Chronic poverty	−1.26	5.21†
	(2.33)	(2.72)
Transient poverty	2.35	1.90
	(2.16)	(2.53)
Partner employment	0.00	0.03
	(0.01)	(0.02)
Chronic poverty	0.06	−0.14**
	(0.04)	(0.05)
Transient poverty	−0.07*	−0.06
	(0.03)	(0.05)
	Model 5	
Partner status	0.26	−2.92*
	(1.00)	(1.47)
Chronic poverty	−1.09	5.49*
	(2.29)	(2.68)
Transient poverty	2.34	2.12
	(2.17)	(2.57)
Maternal employment	−0.01	0.00
	(0.01)	(0.02)
Chronic poverty	0.08*	0.05
	(0.04)	(0.04)
Transient poverty	−0.01	−0.07†
	(0.03)	(0.04)

Note. Coefficients and standard errors in Models 3, 4, and 5 for time-invariant predictors of intercept in the multilevel models as well as for household size, child-care hours, CBCL version, and the time parameters are not presented because they were largely redundant with those presented for Model 2; these estimates from Models 3, 4, and 5 are available from the authors upon request.
† $p < .10$. * $p < .05$. ** $p < .01$.

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