BaylorBusiness
Hankamer School of Business

Working Paper Series

"Within-child Associations between Changes in Family Income and Changes in Externalizing and Internalizing Problems"

Eric Dearing
University of Wyoming

Kathleen McCartney
Harvard University

Beck A. Taylor
Economics Department
Baylor University
Beck_Taylor@baylor.edu

2005-061-ECO

BAYLOR
UNIVERSITY

Within-child Associations between Changes in Family Income and Changes in Externalizing and Internalizing Problems

Eric Dearing
University of Wyoming

Kathleen McCartney
Harvard University

Beck A. Taylor
Baylor University

January 2005

Abstract

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 (n = 1,132). Variations in income effects were estimated as a function of whether families were poor, whether mothers were partnered or not, and the number of hours mothers and their partners were employed. For all study children, increases in family income were associated with decreases in externalizing problems, although the estimated benefits of gains in income were greatest for children who were chronically poor. For both externalizing and internalizing problems, income gains were most strongly associated with problem decreases when chronically poor children's mothers were partnered and employed.

Within-child Associations between Changes in Family Income and Changes in Externalizing and Internalizing Problems

Children living in poverty are significantly more likely to develop social-emotional problems compared with 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 et al., 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). Researchers, however, most often compare family income and child problem levels *between* children, despite the fact that pioneering works on this topic focused on changes in income and problem levels *within* children (e.g., Elder, Van Nguyen, & Caspi, 1985). Within-child estimates of the responsiveness of social-emotional development to gains and losses in family income could add to both developmental science and social policy discussions about family economics and children's life chances.

The Development of Externalizing and Internalizing Problems within a Family Economic Context

Social-emotional problems during childhood have often been divided into two broad bands of disorder: (1) externalizing problems that are interpersonal in nature such as aggression, destructive behavior, and hyperactivity; and (2) 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 developing externalizing problems (Cichetti & 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 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, 2001). 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), over-crowding, inadequate lighting conditions, and neighborhoods characterized by poor municipal services and few merchants or retail stores (Evans, 2004).

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 risk of emotion regulation problems for children (Conger, Wallace, Sun, Simons, McLoyd, & Brody, 2002; Elder, Nguyen, & Caspi, 1985). Exposure to multiple environmental stressors in the context of poverty may lead to chronically heightened child neuronendocrine activity, thereby increasing 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 are relatively more likely to have externalizing and internalizing problems than children in families with more money. On the other hand, there is much less work examining whether children's social-emotional functioning is responsive to changes in family income. Within-child analyses of changes in family income and changes in 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, 1985; Duncan, 1988; Corcoran & Chaudry, 1997). Recent research highlights the importance of modeling these income variations (e.g., Dearing, McCartney, & Taylor, 2001; Yeung, Linver, & Brooks-Gunn, 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 change are policy relevant. Although it is useful to know that "poverty is bad," policy makers must also know whether children can recover from economic deprivation. Comparing children who are poor and 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; for empirical examples, see Conger et al., 2002; Linver, Brooks-Gunn, & Kohen, 2002; Yeung et al., 2002).

A third advantage of within-child estimates of the association between changes in income and changes in externalizing or internalizing problems is an increased ability relative to between-child analyses to control for potential endogeneity bias. The potential endogeneity of income limits causal inferences in studies using non-experimental data (Blau, 1999; Duncan, Yeung, Brooks-Gunn, & Smith, 1998; Mayer, 1997). In short, the question is whether poverty leads to more social-emotional problems or whether an unobserved variable (e.g., genetics) causes both. Although between-child and within-child analyses of non-experimental 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). Importantly, these unobserved characteristics that are fixed within children, their parents, and their environments cannot bias within-child estimates such as 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 changes in income and changes in child social-emotional functioning have produced null results in some studies, however (e.g., Ackerman, Brown, & Izard, 2004; Blau, 1999). One reason for this may be that potential moderators of within-child associations are rarely examined. Changes in income may be more meaningful for some children than others as a function of the developmental contexts in which those changes occur.

Variations in Income Effects across Families

Children living in families who 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 via its cumulative effects (Evans, 2003). Thus, income effects may vary by whether or not 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 non-linear such that income is unrelated to the social-emotional well-being of children who are not poor, but significantly and positively associated with the social-emotional well-being of poor children (Taylor, Dearing, & McCartney, 2004). Further, there appears to be significantly greater risk associated with persistent poverty compared with intermittent poverty for children's social-emotional well-being (e.g., Duncan, Brooks-Gunn, & Klebanov, 1995).

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.

Consistent with this hypothesis, mothers who are chronically poor are more likely to experience declines in depressive symptoms when they gain income than 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 suffer from income loses. Given the role of parent psychological well-being in transmitting income effects to children, life circumstances that influence parent mental health may be particularly likely to moderate the effects of income gains and 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 leading to families entering and exiting poverty for families with young children (Bane & Ellwood, 1986).

Partner status. Stress associated with time management and caregiving demands is often 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/separated families display more social-emotional problems than children in two-parent families, the size of these developmental differences are greatly reduced when controlling for family income differences (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 change 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, Merrigan, & Dufresne, 1997), although these positive effects may be due, at least in part, to accompanying income gains rather than employment, per se (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, which in turn are associated with increased parent 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 changes 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 employment

for these families. Consistent with this hypothesis, 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

Within-child estimates of associations between family income and child externalizing and internalizing problems were examined in the present study. To extend existing work linking family income changes and child social-emotional development, the goal of the present study was to estimate potential variations in income effects across family poverty, partner status, and employment circumstances. Specifically, secondary analyses of data from Phases I and II of the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (NICHD SECCYD) were used to estimate within-child associations between changes in family income, partner status, maternal employment, partner employment, and child externalizing and internalizing problems from the time that children were two years of age through the first grade.

We hypothesized that changes in income would, on average, significantly predict changes in children's externalizing and internalizing problems such that income increases would be associated with problem decreases, and we expected the size of these associations to be largest for chronically poor children. We also hypothesized that the estimated positive effects of income gains would be greatest when mothers were single compared with 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 change, 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 SECCYD. 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 U.S. 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 non-missing data (i.e., at least one observation for all variables included in the models) for analysis in the present study. Table 1 displays descriptive statistics for these 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/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 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, and number of hours that children were in non-maternal 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 versus 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 were either 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; for associations with child gender, see Keiley et al., 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 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 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 (e.g., U.S. Census, 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. Approximately 11% of the within-family variation and approximately 20% of the overall variation (i.e., within- and between-family variation) in income in the SECCYD was explained by changes in partner status, maternal employment, partner employment, and time (variance estimates were computed in an individual fixed-effects model for income, see Table A1).

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 mo.) and teachers (at kindergarten and at first grade) reported on children's problems using the Teacher Report Form, a slightly modified version of the CBCL designed to

assess classroom behaviors (TRF; Achenbach, 1991). 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 and Youth Development, 2004a; 2004b). 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 included a dummy code in our analyses that indicated whether assessments were completed using the CBCL or 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 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 using both individual fixed-effects models and multilevel models with time-varying predictors centered within-person. The individual fixed-effects models were estimated using Stata 8.2 (StataCorp, 2004) and the multilevel models were estimated using HLM 5.04 (Raudenbush, Bryk, & Congdon, 2001).

The individual fixed-effects (FE) estimator is appropriate when unobserved heterogeneity across children is assumed to be constant *within*-child, over time. The FE estimator then takes advantage of this assumption of within-child, time-invariant heterogeneity to, in effect, absorb such variation into the intercept term of a regression model as a means to allow explicitly for the individual heterogeneity contained in the temporal cross-sectional data (Hsaio, 2003).

Under such assumptions, the empirical model can be written as

$$y_{it} = \alpha_i + \beta' x_{it} + u_{it},$$
$$i = 1, \ldots, N,$$
$$t = 1, \ldots, T,$$

where β' is a 1×*K* vector of parameters attached to the *K* explanatory variables in the model, and α_i is a 1×1 scalar constant representing the effects of those stable variables peculiar to the *i*th individual. The error term, u_{it}, represents the effects of omitted variables that are peculiar to both the individual units (e.g., individual children in our analyses) and time periods. As long as u_{it} is well-behaved, OLS estimates of the α_i and β_k in the variable-intercept model above will be best linear unbiased estimators (Hsaio, 2003).

The empirical model above is estimated most easily by including in the matrix of explanatory variables a dummy variable for each child in the data. However, the computational procedure for estimating the slope parameters β_k does not require that dummy variables for each child be included. It can be shown that one need only find the means of time-series observations separately for each child, transform the observed variables by subtracting out the appropriate time-series means, and then apply the least-squares method to the transformed data.

Hence, the model can be written equivalently as $y_{it} - \overline{y_i} = \beta'\left(x_{it} - \overline{x_i}\right) + u_{it}$. The estimates of the β_k should be interpreted as the average *within*-child associations between the explanatory variables and the outcome variable. For example, in the present study, estimates should be interpreted as the average within-child associations between family income and other predictors and child social-emotional problems. It should be noted that the main effects of observed variables that are time-invariant (e.g., child ethnicity) drop out of the fixed-effects equation and cannot be estimated.

Importantly, the meaning of "fixed effects" as discussed thus far, is distinct from the meaning of this terminology in the context of multilevel models. Fixed-effects in multilevel models with two levels are the estimated level-2 coefficients; that is, the estimated averages for parameters specified at level-1 of the model (Raudenbush & Bryk, 2002; Singer & Willett, 2003). The term "fixed effects" is also used in multilevel models to denote a level-1 estimate for which the variance across level-2 units has been constrained to be 0. Despite this difference in terminology, within-child associations can also be estimated in multilevel models of longitudinal data by centering the time-varying predictor on each child's mean for that predictor. This method has been referred to alternatively as within-person (e.g., Singer & Willett, 2003) and group-mean (e.g., Raudenbush & Bryk, 2002) centering.

In the following level-1 model, $y_{it} = \beta_{00} + \beta_{10}\left(x_{it} - \overline{x_i}\right) + u_{it}$, β_{10} should be interpreted as the average *within*-child 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 child *i*. The main effects of time-varying predictors, interactions between time-varying predictors, and interactions between time-varying and time-invariant predictors may be estimated in both individual fixed-effects models and multilevel models. Further, the main effects of time-invariant predictors may be included in multilevel models, but as mentioned above, these main effects drop out of individual fixed-effects models because they are constant within-child. In a multilevel model, for example, the within-child association between changes in family income and changes in child externalizing problems could be estimated while controlling for between-child differences in externalizing problems that were a function of whether or not families were chronically poor. This estimation would not be possible using individual-level fixed effects.

Regardless of these differences, note that both individual fixed-effects models and multilevel models with estimates centered within-child help control for omitted variables associated within the child, the child's family, and the child's environment that are constant over time. This is an important advantage over between-child analyses of non-experimental data such as those often estimated using ordinary least-squares regression, primarily because between-child estimates of non-experimental data are susceptible to omitted variable bias due to unobserved characteristics of children (e.g., genetics) that are time-invariant and time-varying.

As is the case with between-child analyses, however, time-varying omitted variables may bias within-child estimates and there may be reciprocal causation such that the outcome variable influences predictors of interest (Duncan et al., 2004; Singer & Willett, 2003). In addition, biased estimates due to measurement error problems are more likely to occur when using differenced regressors compared with using regressors of cross-sectional data, although such compounded measurement error problems are less likely to occur when there is inter-individual variation in rate of change for the explanatory variables (Hsaio, 2003; Rogosa, 1995).[3] Despite these limitations, within-child estimates of the relation between family income and child social-emotional functioning provide useful information, given potential endogeneity biases in between-child estimates of income and the ramifications of these potential biases for both developmental science and policy interpretations.

Individual fixed-effects models. For both child externalizing and internalizing problems, five individual fixed-effects models were estimated. First (Model 1), the main effect of income was estimated, while controlling for household size, maternal partner status, maternal and partner hours of employment, hours in child care, and checklist version as well as linear, quadratic, and cubic time trends. Second (Model 2), the main effects of income, maternal partner status, and both maternal and partner hours of employment were interacted with chronic and

transient poverty dummy variables. In the next three models, three-way interactions were estimated between: (Model 3) income, partner status, and the poverty status dummies; (Model 4) income, maternal employment, and the poverty status dummies; and (Model 5) income, partner employment, and the poverty status dummies. Equations for these five models follow.

Model 1:

$$y_{it} - \overline{y_i} = \beta_{01}\left(Inc_{it} - \overline{Inc_i}\right) + \beta_{02}\left(House_{it} - \overline{House_i}\right) + \beta_{03}\left(Partner_{it} - \overline{Partner_i}\right)$$
$$+ \beta_{04}\left(MomEmp_{it} - \overline{MomEmp_i}\right) + \beta_{05}\left(PartEmp_{it} - \overline{PartEmp_i}\right) + \beta_{06}\left(CCare_{it} - \overline{CCare_i}\right)$$
$$+ \beta_{07}\left(CBCL?_{it} - \overline{CBCL?_i}\right) + \beta_{08}\left(Time_{it} - \overline{Time_i}\right) + \beta_{09}\left(Time_{it}^2 - \overline{Time_i^2}\right) + \beta_{10}\left(Time_{it}^3 - \overline{Time_i^3}\right) + u_{it}$$

Model 2:

$$y_{it} - \overline{y_i} = \beta_{01}(\cdot) + \ldots + \beta_{10}(\cdot) + \beta_{11}Chronic_i \times \left(Inc_{it} - \overline{Inc_i}\right) + \beta_{12}Transient_i \times \left(Inc_{it} - \overline{Inc_i}\right)$$
$$+ \beta_{13}Chronic_i \times \left(Partner_{it} - \overline{Partner_i}\right) + \beta_{14}Transient_i \times \left(Partner_{it} - \overline{Partner_i}\right)$$
$$+ \beta_{15}Chronic_i \times \left(MomEmp_{it} - \overline{MomEmp_i}\right) + \beta_{16}Transient_i \times \left(MomEmp_{it} - \overline{MomEmp_i}\right)$$
$$+ \beta_{17}Chronic_i \times \left(PartEmp_{it} - \overline{PartEmp_i}\right) + \beta_{18}Transient_i \times \left(PartEmp_{it} - \overline{PartEmp_i}\right) + u_{it}$$

Model 3:

$$y_{it} - \overline{y_i} = \beta_{01}(\cdot) + \ldots + \beta_{18}(\cdot) + \beta_{19}Chronic_i \times \left(Inc_{it} - \overline{Inc_i}\right) \times \left(Partner_{it} - \overline{Partner_i}\right)$$
$$+ \beta_{20}Transient_i \times \left(Inc_{it} - \overline{Inc_i}\right) \times \left(Partner_{it} - \overline{Partner_i}\right) + u_{it}$$

Model 4:

$$y_{it} - \overline{y_i} = \beta_{01}(\cdot) + \ldots + \beta_{18}(\cdot) + \beta_{19}Chronic_i \times \left(Inc_{it} - \overline{Inc_i}\right) \times \left(MomEmp_{it} - \overline{MomEmp_i}\right)$$
$$+ \beta_{20}Transient_i \times \left(Inc_{it} - \overline{Inc_i}\right) \times \left(MomEmp_{it} - \overline{MomEmp_i}\right) + u_{it}$$

Model 5:

$$y_{it} - \overline{y_i} = \beta_{01}(\cdot) + \ldots + \beta_{18}(\cdot) + \beta_{19}Chronic_i \times \left(Inc_{it} - \overline{Inc_i}\right) \times \left(PartEmp_{it} - \overline{PartEmp_i}\right)$$
$$+ \beta_{20}Transient_i \times \left(Inc_{it} - \overline{Inc_i}\right) \times \left(PartEmp_{it} - \overline{PartEmp_i}\right) + u_{it}$$

Note that all main effect predictors specified for Model 1 were also specified for Model 2 (as indicated by the expression $\beta_{01}(\cdot) + \ldots + \beta_{10}(\cdot)$); in addition, all main effects specified for

Model 1 and all two-way interactions specified for Model 2 were also specified for Models 3-5 (as indicated by the expression $\beta_{01}(\cdot)+...+\beta_{18}(\cdot)$).

Multilevel models. The five individual fixed-effects models were re-estimated using multilevel modeling with level-1 time-varying predictors centered within-child. One important difference between the individual fixed-effects models and the multilevel models was that we controlled for between-child differences in average level of externalizing and internalizing problems that were associated with chronic and transient poverty status as well as differences associated with child gender, maternal education, and child ethnicity in the multilevel models. In other words, in addition to the time-varying main effects and interactions specified for the fixed-effects models, we included seven level-2 time-invariant predictors of the level-1 intercept in the multilevel models: chronic poverty, transient poverty, child gender, maternal education, African-American ethnicity, European American ethnicity, and Latino American ethnicity.[4] Consider, for example, Model 2 re-written as the multilevel model we estimated to examine two-way interactions between income and poverty status.

Model 2:

$$
\begin{aligned}
y_{it} = [&\beta_{00} + \beta_{01}Chronic_i + \beta_{02}Transient_i + \beta_{03}Gender_i + \beta_{04}MomEdu_i + \beta_{05}AfrAmer_i + \beta_{06}EuroAmer_i \\
&+ \beta_{07}LatAmer_i + \beta_{10}\left(Inc_{it} - \overline{Inc_i}\right) + \beta_{11}Chronic_i \times \left(Inc_{it} - \overline{Inc_i}\right) + \beta_{12}Transient_i \times \left(Inc_{it} - \overline{Inc_i}\right) \\
&\beta_{20}\left(Partner_{it} - \overline{Partner_i}\right) + \beta_{21}Chronic_i \times \left(Partner_{it} - \overline{Partner_i}\right) + \beta_{22}Transient_i \times \left(Partner_{it} - \overline{Partner_i}\right) \\
&+ \beta_{30}\left(MomEmp_{it} - \overline{MomEmp_i}\right) + \beta_{31}Chronic_i \times \left(MomEmp_{it} - \overline{MomEmp_i}\right) \\
&+ \beta_{32}Transient_i \times \left(MomEmp_{it} - \overline{MomEmp_i}\right) + \beta_{40}\left(PartEmp_{it} - \overline{PartEmp_i}\right) \\
&+ \beta_{41}Chronic_i\left(PartEmp_{it} - \overline{PartEmp_i}\right) + \beta_{41}Transient_i \times \left(PartEmp_{it} - \overline{PartEmp_i}\right) \\
&+ \beta_{50}(\cdot)+...+\beta_{100}(\cdot)] + [\zeta_{00} + \zeta_{80}\left(Time_{it} - \overline{Time_i}\right)] + u_{it}
\end{aligned}
$$

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 allowing these parameters to vary at level-2. This was true for Models 1-5, for both externalizing and internalizing problems. Nonetheless, all multilevel and individual fixed-effects models included time trends as covariates. Thus, the estimated associations reported hereafter were evident above and beyond the naturally occurring linear and non-linear developmental changes in externalizing and internalizing problems.

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%). Although there was sufficient within-child variation for all time-varying predictors such that none were dropped from our individual fixed-effects models, the coefficients in the individual fixed-effects and multilevel models were estimated on the basis of those families who experienced changes in these variables. If a family was stable for a particular variable (e.g., a family whose income was constant or a mother who was always partnered), then this stability was captured in the individual-level fixed effect. Once time-varying predictors were interacted (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. Missing data are tabled according to children's highest problem scores during the study so that missing values for children who scored in the borderline clinical region or above can be compared to other children. On average, children who scored in the borderline clinical region or above were less likely to have missing outcome data compared with other children. For externalizing problems, for example, children who had at least one observation of 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 estimates are within-person such as those estimated in the present study (Raudenbush & Bryk, 2002; Hsaio, 2003). Nonetheless, we conducted several diagnostic analyses according to Foster's and Bickman's (1996) recommendations for detecting attrition problems. For example, in both our individual fixed-effects and multilevel models 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 addition, because we were particularly interested in associations between income and child outcomes, we interacted each of these indicators 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 effects of changes in income were estimated for child externalizing and internalizing problems in both individual fixed-effects models and multilevel models. As discussed above, in the multilevel models, 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 the appendix (i.e., Tables A2), including both time-varying (i.e., household size, child care hours,

CBCL version, time, time^2, and time^3) and time-invariant (i.e., child gender, child ethnicity, and maternal education) covariates in the model.

In general, estimates from the individual fixed-effects and multilevel models were very similar, although coefficients for income were smaller and more precisely estimated (i.e., smaller standard errors) in the multilevel models. Changes in family income were, on average, significantly associated with changes in child externalizing problems in both the fixed-effects and multilevel models such that income gains were correlated with problem decreases. In addition, children who were chronically poor were rated as having more externalizing problems, on average, compared with 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 changes in income and changes in externalizing problems was small when averaged across children. In the individual fixed-effects model, for example, a $10,000 change in income was associated with only a .14-point change 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 changes in income and changes in internalizing problems was small (-.05) and was not statistically distinguishable from zero. Thus, when within-child estimates were averaged across children, associations between changes in income and changes in social-emotional problems appeared to be of little importance.

Model 2: Interactions by Family Poverty Experiences

In our second set of individual fixed-effects and multilevel models, change in family income was interacted with families' poverty experiences so that the estimated within-child

association between changes in family income and changes in social-emotional problems could be compared across children with varying poverty experiences. Interactions were also estimated between the poverty variables and changes in 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 Table A3.

For child externalizing problems, the association between changes in family income and changes in problems significantly varied by chronic poverty status in both the fixed-effects and multilevel models. Specifically, this association was significantly larger for children living in chronically poor families compared with their peers living in families that had never been poor such that income gains were associated with larger problem decreases for children who were chronically poor. For those children who had never been poor, a $10,000 change in income was associated with only a .11-point change in externalizing problems in the fixed-effects model, for example. For those children who were chronically poor, however, a $10,000 change in income was significantly ($p < .05$) associated with a 1.63-point change in externalizing problems or about 16% of the between-child standard deviation.[5]

The association between changes in maternal employment and changes in externalizing problems also varied by poverty status. For children who were never poor, changes in maternal employment were unrelated to changes in externalizing problems (e.g., .00, in the fixed-effects model). For children who were chronically poor, however, a one-hour increase in maternal employment was positively and significantly ($p = .01$) associated with a .08-point increase in externalizing problems, based on a linear combination of the main effect and interaction coefficients from the fixed-effects model.

For child internalizing problems, the association between changes in income and changes in problems was somewhat larger for chronically poor children compared with never poor children, although not significantly so in either the fixed-effects or multilevel model. Two other time-varying predictors, however, did significantly differ by poverty status: partner status and partner employment. Gaining a partner in the home was associated with decreases in internalizing problems for children who were never poor (fixed-effects estimate = -2.56, $p < .05$), but was not associated with the internalizing problems of children who were chronically poor (i.e., fixed-effects estimate from linear combination of main effect and interaction = 3.12, $p > .20$). On the other hand, increased partner employment was significantly more likely to be associated with decreased internalizing problems for children who were chronically poor compared with children who were never poor (i.e., interaction coefficient = -.12 in both the fixed-effects and multilevel models).

Models 3, 4, and 5: Interactions by 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 interacted with partner status and the poverty indicators; in Model 4, income was interacted with maternal employment and the poverty indicators; and in Model 5, income was interacted with partner employment and the poverty indicators. These models were used to determine whether associations between change in income and change in child outcomes varied as a function of change in 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 Table A4.

Our estimates from the individual fixed-effects and multilevel models were similar. The three-way interactions were, in general, smaller and more precisely estimated in the multilevel models, however. As a result of the improved precision in the multilevel models, these estimates were more likely to be statistically significant than those in the individual fixed-effects models. Regardless, the overall interaction patterns were nearly identical using these two estimation strategies.

For child externalizing and internalizing problems, the three-way interaction between changes in family income, changes in partner status, and chronic poverty status was significant in both the individual fixed-effects and multilevel models (Table 5). For both outcomes, the three-way interaction of changes in family income, changes in maternal employment, and chronic poverty status was also significant, although only in the multilevel model for externalizing problems (Table 6). In addition, the three-way interaction of changes in family income, changes in partner employment, and chronic poverty status was significant for child internalizing problems when estimated in the multilevel model (Table 7; this interaction was also marginally significant in the fixed-effects model for internalizing problems and the multilevel model for externalizing problems).

To help interpret these interactions, linear combinations of the main effect and interaction coefficients were computed to estimate the association between changes in income and changes in child social-emotional problems for both never poor and chronically poor children under six conditions: (1) when mothers were partnered, (2) when mothers were single, (3) when mothers' hours of employment was 1 standard deviation above the mean (i.e., 45.20 hrs.), (4) when mothers' hours of employment was 1 standard deviation below the mean (i.e., 9.34 hrs.), (5) when partners' hours of employment was 1 standard deviation above the mean (i.e., 59.18 hrs.),

and (6) when partners' hours of employment was 1 standard deviation below the mean (i.e., 14.80 hrs.). These linear combinations are displayed in Table 8.

When mothers were single, changes in family income and changes in child problems were not significantly related to one another. However, when they were partnered, a $10,000 increase in income was association with a 3.66-point decline in externalizing problems and a 2.68-point decline in internalizing problems. Given that family income and partner status estimates were both within-child, this interaction may also be interpreted as evidence that associations between income and the child outcomes became larger (and more negative) when mothers partner status changed from single to partnered. In other words, these interaction effects were in the opposite direction predicted in the present study.[6]

On the other hand, the interaction between income and maternal employment was in the expected direction. More specifically, the association between changes in family income and changes in externalizing and internalizing problems became increasingly larger and more negative as mothers increased their hours of employment. For every one-hour increase in maternal employment, a $10,000 gain in income was associated with .05 more points in decreased externalizing problems and .09 more points in decreased internalizing problems. As noted in Table 8, for example, the estimated associations between changes in income and changes in social-emotional problems were not distinguishable from zero when mothers' hours of employment was 1 standard deviation below the mean, but a $10,000 gain in income when mothers' hours of employment was 1 standard deviation above the mean was associated with a 2.42-point decrease in externalizing problems and a 2.12-point decrease in internalizing problems. Given that the interaction of changes in family income and changes in partner employment was only significant for internalizing problems using the multilevel modeling approach we spend less time interpreting this interaction except to note that, as expected, it was

similar in direction to the interaction of changes in family income and change in maternal employment.

As a final step in estimating these interactions, we specified models in which the three-way interactions corresponding to partner status, maternal employment, and partner employment were simultaneously estimated (i.e., Models 3, 4, and 5 combined). Although statistical power was reduced and the potential for multicollinearity problems was likely increased (thereby decreasing estimate precision) in these combined models compared with Models 3-5, we were interested in determining which of these interactions would remain significant when all three were forced to compete for variance. In both the individual fixed-effects and multilevel models, the interaction of partner status by income by chronic poverty remained significant for child externalizing problems and the interaction of maternal employment by income by chronic poverty remained significant for child internalizing problems. The other three-way interactions were no longer significant in the combined models.

For the two three-way interactions that remained significant in these combined models, we computed the estimated effects of changes in partner status and maternal employment on changes in chronically poor children's social-emotional problems assuming varying levels of income change. We asked, for example, what was the estimated effect of a change from single to partnered status on the externalizing problems of children who were chronically poor when there were no changes in family income and when there were gains in family income because partners were working full-time (i.e., 40hrs/wk) and earning either the federal minimum wage (i.e., $5.15/hr) or 200% of the minimum wage (i.e., increases in annual income of $10,712 and $21,424, respectively)? Similarly, we asked what was the estimated effect of a change in maternal employment from unemployed to full-time employment on the internalizing problems of children who were chronically poor when earning the federal minimum wage and when

earning 200% of the federal minimum wage? We used linear combinations of the fixed-effects estimates from the combined models to answer these questions.

If families experienced a shift from single to partner status, the estimated change in externalizing problems for chronically poor children was an increase of 1.45 points if there were no accompanying increases in family income, an increase of 1.06 points if partners were employed full-time and earning minimum wage, and a decrease of -3.66 points if partners were employed full-time and earning 200% of the minimum wage. If families experienced increases in maternal employment from unemployed to full-time employed, the estimated change in internalizing problems for chronically poor children was an increase of 2.04 points if mothers were earning the minimum wage, and a decrease of -1.20 points if mothers were earning 200% of the minimum wage. In summary, it was evident that with workers in the home earning minimum wages or less, gaining a partner in the home or increasing maternal employment had negative consequences for chronically poor children's social-emotional functioning. Only when workers were earning above the minimum wage were these transitions positive for children.

Replication Strategies for Validating Problem Measures

To help determine the robustness of our results, we re-estimated the individual fixed-effects and multilevel models using five 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 across test versions, these five replication strategies were used to further validate our results.

First, we added a time-varying interaction term allowing the estimated effect of income to vary by instrument version (i.e., CBCL versus TRF). This interaction was insignificant in all models indicating that the association between income and child problems did not vary by CBCL

versus TRF. For our second strategy, we estimated time-varying interactions between our time parameters and income. Although previous research has indicated that the effects of income on some child outcomes varies by child age (such that effect sizes are largest in early childhood), examining variations across time in our analyses could also help detect artifacts due to variations in outcome measurement over time. Regardless, none of these interactions were statistically significant.

Third, we compared each observation of child externalizing or internalizing problems to the other four observations using four dummy variables (e.g., 24-month observation versus 36-month observation, 24-month observation versus 54-month observation, 24-month observation versus kindergarten observation, and 24-month observation versus first-grade observation). These dummies should have helped detect any within-child variation associated with each observation, including any variation associated with assessor (e.g., kindergarten teacher) or instrument (e.g., TRF). None of the dummy variables were statistically significant in any of our models. In addition, our results for income replicated using these first three strategies.

As a fourth strategy, we reduced variation in the number and type of reporters by re-estimating our models using only the data collected from child care providers. In other words, we limited our analyses to the first three observations points (i.e., 24, 36, and 54 months). Despite reduced power associated with fewer children (i.e., n = 1,050) and fewer observations, most results related to study hypotheses were replicated in these analyses. In the individual fixed-effects models, for example, four of the six significant or marginally significant main effects and interaction estimates for income were replicated.

Finally, for our fifth replication strategy, we used children's average raw scores on each item rather than T-scores for the CBCL and TRF. Each item on these measures is reported on a 3-point scale (0= not true of child, 1 = somewhat or sometimes true of child, and 2 = very true or

often true of child). Thus, if a child care provider or teacher endorsed every item as being very true of the child, then the average raw score would be 2 for that child. When these average raw scores were used to indicate level of externalizing and internalizing problems, most of our results related to study hypotheses were replicated. In the individual fixed-effects models, for example, five of the six significant or marginally significant main effect and interaction estimates for income were replicated.

In summary, although variations over time in test version and reporters likely led to some variability in children's problem scores due to factors other than actual changes in children's social-emotional functioning, there was little evidence that our results were biased by this. Our results were, in general, replicated in a variety of model specifications attempting to control for bias introduced by variations in how children's problems were assessed.

Discussion

Within-child associations between family income and child externalizing and internalizing problems were estimated in the present study. This study extends recent research focused on within-family changes in income by examining moderators of income effects, namely poverty experiences as well as within-family changes in maternal partner status, maternal employment, and partner employment. In so doing, we address 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. Changes in family structure and employment are particularly important in this regard because of the unique developmental

effects associated with these processes and their causal role in changing the economic conditions of poor families.

On average, gains in family income were significantly associated with decreases in 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 compared with other children. In fact, the average decrease in externalizing problems associated with a $10,000 gain in family income was more than 10 times larger for chronically-poor children compared with 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 changes in family structure and employment.

Our results for externalizing problems were consistent with a recent natural experiment of income change. Specifically, Costello, Comptom, Keeler and Angold (2003) found that American-Indian 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. Importantly, 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, changes in family income were more strongly associated with changes in problems for children who were chronically poor when their mothers were partnered than when

their mothers were single. When these children's mothers were partnered a $10,000 gain 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, a $10,000 gain for these children was associated with decreases in internalizing problems that were more than one-quarter of the normed between-child standard deviation. When considering these findings, it is also important to note that changes from single to partnered status increased rather than decreased risk factor for children who were chronically poor, unless these changes were accompanied by relatively substantial gains in family income. In other words, income was of greater value in partnered families because it appeared to mitigate existing risk associated with this context.

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/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 due to increased parent conflict. Opportunities for conflict may be maximized when both mothers and their partners live in the home together. If so, income gains and losses may be particularly likely to influence conflict frequency in these chronically poor households.

Second, mothers may be relatively unaffected by income changes, at least when compared with their partners. There is, in fact, evidence that father-child relationships compared with mother-child relationships are more likely to worsen in response to income losses (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 the possibility, however, that when mothers are single they receive higher levels of social support from family and friends to help cope with economic stress compared with when they are partnered. Regardless, future studies of changes in family income and child functioning that also examine changes in life stress, parent conflict, mother-child relationships, partner-child relationships, and social support could help disentangle these unexpected findings.

Variations by Employment

Our results for maternal employment were consistent with study predictions. Specifically, increases in family income were most strongly associated with decreases in child externalizing and internalizing problems when mothers were employed, especially for 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, 2003; Jackson, 2003). Indeed, the developmental effects of changes in 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, Taylor, & McCartney, 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, characterized by psychological well-being for children. Consistent with the results from welfare experiments (Genneitian & Miller; 2003), 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; Costello et al., 2003; Conger et al., 2002), our results indicated that income changes were less consistently and less strongly associated with children's internalizing compared 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 compared with other childhood disorders (Plomin, DeFries, McCleorn, Rutter, 1997). As such, externalizing problems may be more malleable in response to family environmental changes than 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 this; these types of problems may simply be resistant to change.

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

There are at least three important strengths of modeling within-family changes in family income the way that we have. First, modeling change in income provides an ecologically valid assessment because income is often in flux. Second, change estimates are policy relevant because they move beyond discussions of "poverty is bad" and address whether poor children will be responsive to economic improvements. Third, by examining within-family 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 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 changes in 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 changes as 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 upon which our results relied. 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 variations in reporters and CBCL versions across time points. Even though our results were robust across a variety of model specifications, several of which were used to specifically address this issue, within-child analyses of child self-reports and parent reports would also be useful to more fully understand associations between income changes and child social-emotional functioning.

Conclusion

Public costs associated with chronic social-emotional problems are tremendous (Cohen, 1998; Foster, Dodge, & Jones, 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 changes

in family economic context, although for some children more so than others. Child sensitivity to economic change appears to be context specific such that chronically poor children are most responsive to income gains and losses, 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.

References

Achenbach, T. M. (1991). *Manual for the Teacher Report Form and Profile.* Burlington, VT: University of Vermont Department of Psychiatry.

Achenbach, T.M. (1992). *Manual for the Child Behavior Checklist / 2-3 and 1992 Profile*. Burlington, VT: University of Vermont Department of Psychiatry.

Achenbach, T. M. & Edelbrock, C. S. (1984). Psychopathology of childhood. *Annual Review of Psychology, 35*, 227-256.

Ackerman, B. P., Brown, E. D., Izard, C. E. (2004). The relations between contextual risk, earned income, and the school adjustment of children from economically disadvantaged families. *Developmental Psychology, 40*, 204-216.

Amato, P. R. (1995). Single-parent households as settings for children's development, well-being, and attainment: A social network/resources perspective. *Sociological Studies of Children, 7*, 19-47.

Angrist, J. & Krueger, A. (1999). Empirical strategies in labor economics. In O. Ashenfelter & D. Card (Eds.), *Handbook of labor economics, Vol. 3*. Amsterdam: Elsevier Science.

Bane, M. J. & Ellwood, D. (1986). Slipping into and out of poverty: The dynamics of spells. *Journal of Human Resources, 21*, 1-23.

Blau, D. (1999). The effect of income on child development. *Review of Economics and Statistics, 81*, 261-276.

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology, 53*, 371-399.

Bradley, R. H., Corwyn, R. F., McAdoo, H. P., & Coll, C. G. (2001). The home environments of children in the United States part I: Variations by age, ethnicity, and poverty status. *Child Development, 72*, 1844-1886.

Brooks-Gunn, J., & Duncan, G. J. (1997). The effects of poverty on children. *The Future of Children: Children and Poverty*, *7*, 55-71.

Chorpita, B. F. & Barlow, D. H. (1998). The development of anxiety: The role of control in the early environment. *Psychological Bulletin, 124*, 3-21.

Cicchetti, D. & Toth, S. L. (1995). Developmental psychopathology and disorders of affect. In D. Cicchetti & D. J. Cohen (Eds.), *Developmental psychopathology, Vol. 2: Risk, disorder, and adaptation.* (pp. 369-420). Oxford: John Wiley.

Clarke-Stewart, K. A., Vandell, D. L., McCartney, K., Owen, M. T., Booth, C. (2000). Effects of parental separation and divorce on very young children. *Journal of Family Psychology, 14*, 304-326.

Cohen, M. A. (1998). The monetary value of saving a high-risk youth. *Journal of Quantitative Criminology, 14*, 5-33

Conger, R. D., Ge, X., Elder, G. H. (1994). Economic stress, coercive family process, and developmental problems of adolescents. *Child Development, 65*, 541-561.

Conger, R. D., Wallace, L. E., Sun, Y., Simons, R. L., McLoyd, & Brody, G. H. (2002). Economic pressure in African American families: A replication and extension of the family stress model. *Developmental Psychology, 38*, 179-193.

Corcoran, M. E. & Chaudry, A. (1997). The dynamics of childhood poverty. *Future of Children, 7*, 40-54.

Costello, E. J., Compton, S. N., Keeler, G., Angold, A. (2003). Relationships between poverty and psychopathology: A natural experiment. *JAMA, 290*, 2023-2029.

Crouter, A. C. & Booth, A. (Eds.) (2004). *Work-family challenges for low-income parents and their children.* Mahwah, NJ: Lawrence Erlbaum.

Danziger, S. K., Carlson, M. J., & Henly, J. R. (2001). Post-welfare employment and

psychological well-being. *Women and Health, 32*, 47-78.

Dearing, E., Berry, D., Mazlow, M. (in press). Poverty and early child development. K. McCartney & D. Phillips (Eds.), *The handbook of early childhood development*. Oxford, UK: Blackwell Publishing.

Dearing, E., McCartney, K., & Taylor, B. A. (2001). Change in family income-to-needs matters more for children with less. *Child Development, 72*, 1779-1793.

Dearing, E., Taylor, B. A., & McCartney, K. (2004). The implications of family income dynamics for women's depressive symptoms during the first three years following childbirth. *American Journal of Public Health*, *94*, 1372-1377.

Dodge, K. A. & Pettit, G. S. (2004). A biopsychosocial model of the development of chronic conduct problems in adolescence. *Developmental Psychology, 39*, 349-371.

Duncan, G. J. (1988). The volatility of family income over the life course. In P. Baltes, D. Featherman, & R. M. Lerner (Eds.), *Life-span development and behavior* (pp. 317-388). Hillside, NJ: Erlbaum.

Duncan, G. J. & Brooks-Gunn, J. (2000). Family poverty, welfare reform, and child development. *Child Development, 71*, 188-196.

Duncan, G. J., & Brooks-Gunn, J. (1997). Income effects across the life span: integration and interpretation. In Duncan, G. J., & Brooks-Gunn, J. (Eds.), *Consequences of growing up poor*. New York: Russell Sage Foundation.

Duncan, G. J., Brooks-Gunn, J., & Klebanov, P. K. (1994). Economic deprivation and early childhood development. *Child Development, 65*, 296-318.

Duncan, G. J., Magnuson, K. A., & Ludwig, J. (2004). The endogeneity problem in developmental studies. *Research in Human Development, 1*, 59-80.

Duncan, G. J., Yeung, W. J., Brooks-Gunn, J. & Smith, J. R. (1998). How much does childhood

poverty affect the life chances of children? *American Sociological Review, 63*, 406-423.

Dunifon, R., Kalil, A., Danziger, S. K. (2003). Maternal work behavior under welfare reform: How does the transition from welfare to work affect child development? *Children and Youth Services Review, 25*, 55-82.

Elder, G., Van Nguyen, T., Caspi, A. (1985). Linking family hardship to children's lives. *Child Development, 56*, 361-375.

Emery, R. E., & Laumann-Billings, L. (1998). An overview of the nature, causes, and consequences of abusive family relationships. *American Psychologist, 53*, 121–135.

Evans, G. W. (2004). The environment of childhood poverty. *American Psychologist, 59(2)*, 77-92.

Evans, G. W. (2003). A multimethodological analysis of cumulative risk and allostatic load among rural children. *Developmental Psychology, 39*, 924-933.

Evans, G. W. & English, K. (2002). The environment of poverty: Multiple stressor exposure, psychophysiological stress, and socioemotional adjustment. *Child Development, 73*, 1238-1248.

Foster, E. M. & Bickman, L. (1996). An evaluator's guide to detecting attrition problems. *Evaluation Review, 20*, 695-723.

Foster, E. M., Dodge, K. A., & Jones, D. (2003). Issues in the economic evaluation of prevention programs. *Applied Developmental Science, 7*, 76-86.

Genneitian, L. A. & Miller, C. (2003). Children and welfare reform: A view from an experimental welfare program in Minnesota. *Child Development, 73*, 601-620.

Gerard, J. M. & Buehler, C. (2004). Cumulative environmental risk and youth problem behavior. *Journal of Marriage and the Family, 66*, 702-720.

Hamilton, V. H., Merrigan, P., & Dufresne, E. (1997). Down and out: Estimating the relationship

between mental health and unemployment. *Health Economics, 6*, 397-407.

Hetherington, E. M., Bridges, M., & Insabella, G. M. (1998). What matters? What does not? Five perspectives on the association between marital transitions and children's adjustment. *American Psychologist, 53*, 167-184.

Hinshaw, S. P. (2002). Process, mechanism, and explanation related to externalizing behavior in developmental psychopathology. *Journal of Abnormal Child Psychology, 30*, 431-446.

Hsaio, C. (2003). *Analysis of panel data.* New York: Cambridge University Press.

Huston, A. C. (2004). Childcare for low-income families: Problems and promises. In A. C. Crouter & A. Booth (Eds.), *Work-family challenges for low-income parents and their children.* (pp. 139-164). Mahwah, NJ: Lawrence Erlbaum

Jackson, A. P. (2003). Mothers' employment and poor and near-poor African-American children's development: A longitudinal study. *Social Services Review, 77*, 93-109.

Kazdin, A. E. (1997). Conduct disorder across the life-span. In S. Luthar, J. A. Burack, D. Cicchetti, & J. R. Weisz (Eds.), *Developmental psychopathology: Perspectives on adjustment, risk, and disorder.* (pp. 248-272). New York: Cambridge University Press.

Keiley, M. K., Lofthouse, N., Bates, J. E., Dodge, K. A., & Pettit, G. S. (2003). Differential risks of covarying and pure components in mother and teacher reports of externalizing and internalizing behavior across ages 5 to 14. *Journal of Abnormal Child Psychology, 31*, 267-283.

Korbin, J. E., Coulton, C. J., Chard, S., Houston-Platt, C., & Su, M. (1998). Impoverishment and child maltreatment in African American and European American neighborhoods. *Development and Psychopathology, 10*, 215-233.

Leventhal, T., & Brooks-Gunn, J. (2000). The neighborhoods they live in: The effects of

neighborhood residence on child and adolescent outcomes. *Psychological Bulletin, 126,* 309–337.

Linver, M. R., Brooks-Gunn, J., Kohen, D. E. (2002). Family processes as pathways from income to young children's development. *Developmental Psychology, 38*, 719-734.

Llena-Nozal, A., Lindeboom, M., & Portrait, F. (2004). The effect of work on mental health: Does occupation matter? *Health Economics, 13*, 1045-1062.

Macmillan, R., McMorris, B. J., Kruttschnitt, C. (2004). Linked lives: Stability and change in maternal circumstances and trajectories of antisocial behavior in children. *Child Development, 75*, 205-220.

Mayer, S. E. (1997). *What money can't buy: Family income and children's life chances.* Cambridge, MA: Harvard University Press.

McLeod, J. D., & Shanahan, M. J. (1996). Trajectories of poverty and children's mental health. *Journal of Health and Social Behavior, 37,* 207-220.

McLoyd, V. C. (1998). Socioeconomic disadvantages and child development. *American Psychologist, 53,* 185-204.

NICHD Early Child Care Research Network (2001). Nonmaternal Care and Family Factors in Early Development: An Overview of the NICHD Study of Early Child Care. *Applied Developmental Psychology, 22*, 457-492.

NICHD Early Child Care Research Network (2003). Does amount of time spent in child care predict socioemotional adjustment during the transition to kindergarten? *Child Development, 74*, 976-1005.

NICHD Early Child Care Research Network & Duncan, G. J. (2003). Modeling the impacts of child care quality on children's preschool cognitive development. *Child Development, 74*, 1454-1475.

NICHD Study of Early Child Care and Youth Development (2004a). Phase I Instrument Documentation. Retrieved January 15, 2004 from http://secc.rti.org.

NICHD Study of Early Child Care and Youth Development (2004b). Phase II Instrument Documentation. Retrieved January 15, 2004 from http://secc.rti.org.

Nock, M. K. & Kazdin, A. E. (2002). Examination of affective, cognitive, and behavioral factors and suicide-related outcomes in children and young adolescents. *Journal of Clinical Child and Adolescent Psychology, 31,* 48-58.

O'Connor, T. G., Dunn, J., Jenkins, J. M., Pickering, K., & Rasbash, J. (2001). Family settings and children's adjustment: Differential adjustment within and across families. *British Journal of Psychiatry, 179,* 110-115.

Plomin, R., DeFries, J. C., McCleorn, G. E., Rutter, M. (1997). *Behavioral genetics: A primer.* (3rd Edition). New York: Freeman.

Raudenbush, S. W. & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods. Advanced quantitative techniques in the social sciences: Vol. 1* (2nd edition). Newbury Park, CA: Sage Publications.

Raudenbush, S. W., Bryk, A. S., & Congdon, R. T. (2001). *HLM 5.04*. Lincolnwood, IL: Scientific Software International.

Raver, C. C. (2003). Does work pay psychologically as well as economically? The role of employment in predicting depressive symptoms and parenting among low-income families. *Child Development, 74,* 1720-1736.

Rogosa, D. (1995). Myths and methods: "Myths about longitudinal research" plus supplemental questions. In J. M. Gottman (Ed.), *The analysis of change* (pp. 3-66). Mahwah, NJ: Erlbaum.

Roza, S. J., Hofstra, M. B., van der Ende, J., & Verhulst, F. C. (2003). Stable prediction of mood and anxiety disorders based on behavioral and emotional problems in childhood: A 14-year follow-up during childhood, adolescence, and young adulthood. *American Journal of Psychiatry, 160,* 2116-2121.

Schmitz, S., Fulker, D. W., Plomin, R., Zahn-Waxler, C., Emde, R. N., & DeFries, J. C. (1999). Temperament and problem behavior during early childhood. *International Journal of Behavioral Development, 23,* 333-355.

Singer, J. D. & Willett, J. T. (2003). *Applied longitudinal data analysis: Modeling change and event occurrence.* New York: Oxford University Press.

StataCorp (2004). *Stata/SE 8.2*. College Station, TX: Stata Corporation.

Taylor, B. A., Dearing, E., & McCartney, K. (2004). Incomes and outcomes in early childhood. *Journal of Human Resources,* 39, 980-1007.

Theodossiou, I. (1998). The effects of low-pay and unemployment on psychological well-being: A logistic regression approach. *Journal of Health Economics, 17,* 85-104.

U.S. Census Bureau. (2002). *Poverty in the United States: 2002*. Retrieved February 20, 2003 from http://www.census.gov/hhes/www/poverty.html.

Walter, M. (2002). Working their way out of poverty? Sole motherhood, work, welfare and material well-being. *Journal of Sociology, 38,* 361-380.

Yeung, W. J., Linver, M. R., Brooks-Gunn, J. (2002). How money matters for young children's development: Parental investment and family processes. *Child Development, 73,* 1861-1879.

Author Note

Eric Dearing, Department of Psychology, University of Wyoming; Kathleen McCartney, Graduate School of Education, Harvard University; Beck A. Taylor, Department of Economics, Baylor University. The contributions of the latter two authors were equally substantive and, as such, their order of authorship was assigned alphabetically.

This research was supported by a fellowship awarded to the first author from the National Academy of Education/Spencer Foundation and by a grant to the third author from the National Institute on Child Health and Human Development (HD 25451).

Correspondence concerning this article should be addressed to Eric Dearing, Department of Psychology, Biological Sciences, University of Wyoming, Laramie, WY 82071. E-mail: deariner@uwyo.edu

Footnotes

[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, 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 it confounds changes in care with the transition to school when hours in child care dropped to zero for all children. Nonetheless, we have kept this covariate in our models for three reasons: (1) it captured many children's real-life experiences in that the start of formal schooling often signaled the end to early child care experiences, (2) it was statistically significant in several models (as such, excluding this covariate may have led to biased income estimates) and (3) time-invariant controls (e.g., average hours in child care) could not be included in the individual fixed-effects models. It is important to note, however, that our results replicated across a variety of alternative specifications attempting 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 non-maternal care, the number of epochs children were in non-maternal 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 re-computed the time-varying child care covariate to include hours in school and 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/after-school care. Across these specifications, results for family income (main effects and interactions) were replicated.

[3] 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 divorces *and* remarries between observations so that partner status appears constant. This potential measurement error may have biased our coefficients towards 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).

[4] To help determine the robustness of our results to model re-specification, we also estimated the following alternative specifications: (1) 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; (2) 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 (3) 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.

[5] Throughout our analyses, we computed linear combinations in Stata 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, the following linear combination was computed:

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

[6] 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 versus those that were always single using individual fixed-effects models. Consistent with our other results, changes in income were negatively and significantly associated with changes in problems for children whose mothers were always partnered (for

externalizing = -3.46, *SE* = 1.60, $p < .05$; for internalizing = -3.64, 1.85, $p = .05$), but changes in income were not associated with changes in problems for children whose mothers were always single (for externalizing = .39, 1.38, $p = .78$; for internalizing = 1.43, 1.58, $p = .37$).

Table 1

NICHD SECCYD Sample Demographic Statistics

Variable	*M* (*SD*) / % (N = 1132)
Child Indicators	
Male	51%
African American	11%
European American	78%
Latino American	6%
Other Ethnicity	5%
Child Care Hours	17.46 (9.83)
Maternal Indicators	
Years of Education	14.43 (2.45)
Hrs of Employment	27.26 (17.93)
Always Partnered	54%
Sometimes Partnered	29%
Never Partnered	17%
Partner Hrs of Employment	36.99 (22.19)
Household Size	4.19 (1.15)
Family Income	$61,417 (48,561)
Transiently Poor	13%
Chronically Poor	10%

Note. Child gender and ethnicity, maternal education, and poverty status were estimated as time-invariant in our analyses. Family income, household size, partner status, maternal employment, partner employment, and child care hours were estimated as time-varying in our analyses.

Table 2

Percent Missing Data by Highest Externalizing and Internalizing Problem Level

	Number of Missing Observations					
	0	1	2	3	4	*M*
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

Table 3

Summary of Model 1: Main Effects

	Externalizing		Internalizing	
Predictor	Fixed-Effects	Multilevel	Fixed-Effects	Multilevel
Intercept	53.11*** (1.54)	54.85*** (1.41)	55.07*** (1.88)	53.24*** (1.39)
Chronic Poverty		2.67** (.87)		1.67* (.82)
Transient Poverty		.32 (.73)		-.42 (.69)
Income	-.14* (.06)	-.13* (.05)	-.05 (.08)	-.05 (.07)
Partner Status	.59 (.83)	.56 (.83)	-1.61 (1.02)	-1.72 (1.12)
Maternal Employment	.01 (.01)	.00 (.01)	.01 (.01)	.00 (.02)
Partner Employment	-.01 (.01)	-.01 (.01)	.01 (.02)	.01 (.02)

Note. In Table A1, coefficients are displayed for the following covariates: child gender and ethnicity, maternal education, household size, child care hours, CBCL version, Time, Time^2, and Time^3. ***$p < .001$ *$p < .05$

Table 4

Summary of Model 2: Interactions by Family Poverty Experiences

	Externalizing		Internalizing	
Predictor	Fixed-Effects	Multilevel	Fixed-Effects	Multilevel
Income	-.11^{+}	-.10*	-.05	-.05
	(.07)	(.05)	(.08)	(.08)
Income × Chronic	-1.52*	-1.38*	-.62	-.54
	(.73)	(.69)	(.89)	(.88)
Income × Transient	-.18	-.18	.17	.19
	(.29)	(.19)	(.35)	(.29)
Partner Status	.56	.32	-2.56*	-2.69^{+}
	(1.05)	(.98)	(1.29)	(1.43)
Partner × Chronic	-1.21	-1.01	5.77*	5.53*
	(2.32)	(2.35)	(2.84)	(2.69)
Partner × Transient	1.85	2.34	1.45	1.72
	(2.07)	(2.17)	(2.54)	(2.52)
Maternal Employment	.00	-.01	.01	.00
	(.02)	(.01)	(.02)	(.02)
Mat Emp × Chronic	.08*	.09*	.05	.05
	(.03)	(.04)	(.04)	(.04)
Mat Emp × Transient	-.01	-.01	-.08^{+}	-.07^{+}
	(.04)	(.03)	(.04)	(.04)
Partner Employment	.00	.00	.03^{+}	.03
	(.01)	(.01)	(.02)	(.02)
Part Emp × Chronic	.06	.06	-.12*	-.12*
	(.04)	(.04)	(.05)	(.05)
Part Emp × Transient	-.06^{+}	-.06^{+}	-.05	-.06
	(.04)	(.03)	(.04)	(.04)

Note. In Table A2, coefficients are displayed for model intercepts, poverty predictors of intercepts, and the following covariates: child gender and ethnicity, maternal education, household size, child care hours, CBCL version, Time, Time^2, and Time^3. *$p < .05$ $^{+}p < .10$

Table 5

Summary of Model 3: Interactions by Partner Status and Family Poverty Experiences

	Externalizing		Internalizing	
Predictor	Fixed-Effects	Multilevel	Fixed-Effects	Multilevel
Income	-.15 (.27)	-.12 (.17)	-.15 (.32)	-.13 (.40)
Income × Chronic	.26 (1.04)	.40 (1.02)	1.15 (1.28)	1.19 (1.18)
Income × Transient	-.41 (.93)	-.42 (.65)	.48 (1.14)	.44 (.91)
Partner Status	.42 (1.52)	.27 (1.30)	-3.00 (1.87)	-3.04 (2.16)
Partner × Chronic	4.28 (3.36)	4.36 (3.29)	11.35** (4.11)	10.88** (3.74)
Partner × Transient	1.45 (2.96)	1.85 (2.60)	2.33 (3.62)	2.41 (3.38)
Partner Status × Income	.04 (.27)	.01 (.17)	.11 (.32)	.09 (.40)
Partner × Income × Chronic	-3.77* (1.54)	-3.76** (1.45)	-3.69* (1.88)	-3.59* (1.75)
Partner × Income × Transient	.25 (.97)	.26 (.67)	-.34 (1.18)	-.26 (.96)

Note. In Tables A3 and A4, coefficients for all covariates are displayed. $^{**}p < .01$ $^{*}p < .05$ $^{+}p < .10$

Table 6

Summary of Model 4: Interactions by Maternal Employment and Family Poverty Experiences

	Externalizing		Internalizing	
Predictor	Fixed-Effects	Multilevel	Fixed-Effects	Multilevel
Income	-.09 (.08)	-.10^{+} (.05)	-.08 (.10)	-.08 (.08)
Income × Chronic	.02 (1.20)	.03 (.89)	1.96 (1.46)	2.02^{+} (1.18)
Income × Transient	-.07 (.59)	-.06 (.36)	.60 (.73)	.68 (.59)
Maternal Employment	.01 (.02)	-.01 (.02)	-.01 (.03)	-.01 (.03)
Mat Emp × Chronic	.13* (.05)	.14* (.06)	.17* (.07)	.17** (.06)
Mat Emp × Transient	-.01 (.06)	.00 (.05)	-.03 (.07)	-.02 (.06)
Maternal Emp × Income	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)
Mat Emp × Income × Chronic	-.05 (.03)	-.05* (.02)	-.09* (.04)	-.09** (.03)
Mat Emp × Income × Transient	.00 (.02)	.00 (.05)	-.01 (.02)	-.01 (.02)

Note. In Tables A3 and A4, coefficients for all covariates are displayed. $^{**}p < .01$ $^{*}p < .05$ $^{+}p < .10$

Table 7

Summary of Model 5: Interactions by Partner Employment and Family Poverty Experiences

	Externalizing		Internalizing	
Predictor	Fixed-Effects	Multilevel	Fixed-Effects	Multilevel
Income	-.07 (.14)	-.06 (.11)	-.09 (.17)	-.09 (.19)
Income × Chronic	-1.00 (.89)	-.75 (.90)	.41 (1.08)	.52 (.99)
Income × Transient	.00 (.54)	-.08 (.35)	-.17 (.66)	-.16 (.47)
Partner Employment	.00 (.02)	.00 (.01)	.05^{+} (.03)	.05 (.03)
Part Emp × Chronic	.13 (.08)	.14* (.06)	.02 (.10)	.02 (.09)
Part Emp × Transient	-.04 (.05)	-.06 (.04)	-.08 (.06)	-.09 (.06)
Partner Emp × Income	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)
Part Emp × Income × Chronic	-.04 (.04)	-.05^{+} (.03)	-.08^{+} (.04)	-.08* (.04)
Part Emp × Income × Transient	-.01 (.01)	.00 (.01)	.01 (.02)	.00 (.01)

Note. In Tables A3 and A4, coefficients for all covariates are displayed. *$p < .05$ $^{+}p < .10$

Table 8

Individual Fixed-Effects Coefficients for Family Income: Variations by Poverty Status, Partner Status, and Employment

Poverty Status	Partnered	Single	Maternal Emp > *M* [a]	Maternal Emp < *M* [b]	Partner Emp > *M* [c]	Partner Emp < *M* [d]
			Externalizing			
Chronic Poverty	-3.66**	.11	-2.42*	-.56	-3.39*	-1.65*
	(1.12)	(1.01)	(1.09)	(.97)	(1.76)	(.73)
Never Poor	-.11^{+}	-.15	-.15	-.10	-.13^{+}	-.08
	(.07)	(.26)	(.10)	(.07)	(.08)	(.11)
			Internalizing			
Chronic Poverty	-2.68*	1.01	-2.12*	1.05	-4.32*	-.70
	(1.37)	(1.24)	(1.09)	(1.18)	(2.15)	(.89)
Never Poor	-.04	-.15	.01	-.06	-.09	.05
	(.08)	(.32)	(.12)	(.08)	(.09)	(.13)

Note. Income coefficients, standard errors, and significance tests were calculated using linear combinations in Stata (e.g., the estimated income coefficient for chronically poor children's externalizing problems when their mothers were partnered was equal to $\beta_{01}\left(Inc_{it} - \overline{Inc_i}\right) + \beta_{11} Chronic \times \left(Inc_{it} - \overline{Inc_i}\right) + \beta_{19} Chronic_i \times \left(Inc_{it} - \overline{Inc_i}\right) \times \left(Partner_{it} - \overline{Partner_i}\right)$). [a] Hours of maternal employment one *SD* above the *M* (i.e., 45.20 hrs). [b] Hours of maternal employment one *SD* below the *M* (i.e., 9.34 hrs). [c] Hours of partner employment one *SD* above the *M* (i.e., 59.18 hrs). [d] Hours of partner employment one *SD* below the *M* (i.e., 14.80 hrs). $^{**}p < .01$ $^{*}p < .05$

Table A1

Individual Fixed-effects Model Predicting Changes in Income

Predictor	All Children	Never Poor	Chronic Poverty	Transient Poverty
Partner Status		1.62*** (.23)	.23 (.31)	1.38*** (.29)
Maternal Employment		.023*** (.003)	.014* (.006)	.020** (.006)
Partner Employment	.014*** (.003)			
Time		.037*** (.010)	.011 (.011)	.022^{+} (.011)
Time^{2}	-.0015*** (.0004)			
Tme^{3}	.00002*** (.000005)			

Note. For predictors that significantly varied by poverty status (e.g., maternal employment), coefficients are displayed for never poor, chronically poor, and transiently poor children separately. ***$p < .001$ **$p < .01$ *$p < .05$

Table A2

Model 1 Covariates

	Externalizing		Internalizing	
Covariate	Fixed-Effects	Multilevel	Fixed-Effects	Multilevel
For Intercept				
Child Gender		.55 (.40)		.26 (.37)
African American		2.17** (.62)		.51 (.59)
European American		-.85* (.41)		-.45 (.41)
Latino American		-.07 (.69)		.43 (.68)
Maternal Education		-.41*** (.09)		-.30** (.09)
Time-varying Covariates				
Household Size	.06 (.26)	.01 (.32)	.23 (.32)	.14 (.34)
Child Care Hours	.02* (.01)	.03 (.02)	.01 (.01)	.04 (.02)
CBCL Version	-6.20*** (.87)	5.24*** (1.27)	-6.55*** (1.07)	5.38*** (1.21)
Time	-.15** (.05)	-.19** (.07)	.26*** (.07)	.20** (.07)
$Time^2$	.00 (.00)	.01 (.00)	-.02*** (.00)	-.02*** (.00)
$Time^3$	-.00 (.00)	-.00 (.00)	.0003*** (.0000)	.0002*** (.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 if these non-linear time parameters were not included in models. ***$p < .001$ **$p < .01$ *$p < .05$

Table A3

Model 2 Covariates

	Externalizing		Internalizing	
Covariate	Fixed-Effects	Multilevel	Fixed-Effects	Multilevel
For Intercept				
Chronic Poverty		2.67** (.87)		1.65* (.82)
Transient Poverty		.31 (.73)		-.41 (.69)
Child Gender		.55 (.40)		.26 (.37)
African American		2.17** (.62)		.51 (.59)
European American		-.85* (.41)		-.45 (.41)
Latino American		-.07 (.69)		.43 (.68)
Maternal Education		-.41*** (.09)		-.30** (.09)
Time-varying Covariates				
Household Size	.02 (.26)	-.01 (.30)	.21 (.32)	.10 (.34)
Child Care Hours	.02* (.01)	.03 (.02)	.01 (.01)	.04* (.02)
CBCL Version	-6.16*** (.87)	5.09*** (.99)	-6.39*** (1.07)	5.20*** (1.21)
Time	-.16** (.05)	-.20** (.06)	.25*** (.07)	.19** (.07)
$Time^2$	.00 (.00)	.01 (.00)	-.02*** (.00)	-.02*** (.00)
$Time^3$	.00 (.00)	-.00 (.00)	.0003*** (.0000)	.0002*** (.0000)

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

Table A4

Model 3, 4, and 5 Covariates

	Externalizing		Internalizing	
Covariate	Fixed-Effects	Multilevel	Fixed-Effects	Multilevel
Model 3				
Maternal Employment	.00 (.02)	-.01 (.01)	.01 (.02)	.00 (.02)
Chronic Poverty	.07* (.03)	.08* (.04)	.04 (.04)	.05 (.04)
Transient Poverty	-.01 (.04)	-.01 (.04)	-.08^{+} (.04)	-.07^{+} (.04)
Partner Employment	.00 (.01)	.00 (.01)	.03^{+} (.02)	.03 (.02)
Chronic Poverty	.08^{+} (.05)	.08^{+} (.04)	-.10^{+} (.06)	-.11* (.05)
Transient Poverty	-.06^{+} (.04)	-.06^{+} (.03)	-.05 (.04)	-.06 (.04)
Model 4				
Partner Status	.59 (1.06)	.33 (.99)	-2.64* (1.29)	2.78^{+} (1.43)
Chronic Poverty	-1.47 (2.33)	-1.26 (2.33)	5.47^{+} (2.84)	5.21^{+} (2.72)
Transient Poverty	1.85 (2.08)	2.35 (2.16)	1.61 (2.55)	1.90 (2.53)
Partner Employment	.00 (.01)	.00 (.01)	.03^{+} (.02)	.03 (.02)
Chronic Poverty	.05 (.04)	.06 (.04)	-.14* (.05)	-.14** (.05)
Transient Poverty	-.06^{+} (.04)	-.07* (.03)	-.05 (.04)	-.06 (.05)

***$p < .001$ **$p < .01$ *$p < .05$ $^{+}p < .10$

Table A4 Continued

Model 3, 4, and 5 Covariates

	Externalizing		Internalizing	
Covariate	Fixed-Effects	Multilevel	Fixed-Effects	Multilevel
Model 5				
Partner Status	.49 (1.08)	.26 (1.00)	-2.79* (1.32)	-2.92* (1.47)
Chronic Poverty	-1.26 (2.33)	-1.09 (2.29)	5.76* (2.85)	5.49* (2.68)
Transient Poverty	1.78 (2.11)	2.34 (2.17)	1.84 (2.58)	2.12 (2.57)
Maternal Employment	.00 (.02)	-.01 (.01)	.01 (.02)	.00 (.02)
Chronic Poverty	.07* (.03)	.08* (.04)	.04 (.04)	.05 (.04)
Transient Poverty	-.02 (.04)	-.01 (.03)	-.08+ (.05)	-.07+ (.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. ***$p < .001$ **$p < .01$ *$p < .05$ $^{+}p < .10$