Many Kinds of Poverty: Three dimensions of economic hardship, their combinations, and children's behavior problems

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Abstract

Income poverty, material deprivation, and subjective financial stress are three distinct dimensions of economic hardship. The majority of the theoretical and empirical literature on the effects of economic hardship on children has treated material deprivation and subjective financial stress as only mediators of the effects of income poverty, not considering the independent effects of each dimension or the effects of their combinations. Using nationally representative, longitudinal data from the Millennium Cohort Study on over 18,000 families in the United Kingdom, we propose seven distinct experiences of economic hardship, based on the possible combinations of income poverty, material deprivation, and subjective financial stress, and identify whether these different economic hardship combinations are differentially associated with children's behavior problems between ages 3 and 7 using both mixed- and fixed-effects linear regression models. We find that all economic hardship combinations, including those without income poverty, were associated with higher levels of children's behavior problems. The combination of material deprivation and subjective financial stress and the combination of all three dimensions of economic hardship were associated with the highest levels of behavior problems. Based on these findings, we argue that income poverty is an important but insufficient measure of economic hardship for children and that theory and research on the effects of economic hardship on children should consider the multi-dimensional nature of economic stressors for families.

Economic hardship in childhood has long been a critical target for intervention and policy because of its devastating immediate and long-term impacts on children's well-being. Children who experience economic hardship consistently present higher levels of mental health problems, including both internalizing symptoms, such as depression and anxiety, and externalizing symptoms, such as hyperactivity or aggression (Conger et al. 1992; Costello et al. 2003; Dearing et al. 2006; Kaiser et al. 2017; McLeod and Shanahan 1993; Zilanawala and Pilkauskas 2012). These early effects of economic hardship on mental health endure into adulthood (Evans and Cassells 2013). Though most of these findings are based on children in the United States, the same patterns exist in other high-income countries, including those with far stronger welfare policies (Bradbury et al. 2015; Kaiser et al. 2017; Washbrook et al. 2012).

Increasingly, social scientists studying economic hardship are taking a more nuanced approach, recognizing that economic hardship is an underlying construct that groups together at least three related, but distinct dimensions: income poverty, material deprivation, and subjective financial stress (Bradshaw and Finch 2003; Gauthier and Furstenberg 2010; Marks 2007; Neckerman et al. 2016). *Income poverty* is the resource dimension of economic hardship and refers to a low input of financial resources available to a family. *Material deprivation* captures the lived conditions of economic hardship and refers to inadequate material conditions. *Subjective financial stress* is the psychological dimension and refers to the subjective evaluation of economic circumstances. These three dimensions may overlap and occur together, but they are distinct and can be experienced independently of each other (Bradshaw and Finch 2003). In other words, the underlying construct of economic hardship has heterogenous expressions. For example, a family may be income poor but neither financially stressed nor materially deprived (Boushey and Gundersen 2001; Bradshaw and Finch 2003; Gauthier and Furstenberg 2010). At

the same time, a family could be materially deprived or financially stressed but still have income above the poverty threshold.

Despite evidence that these three dimensions of economic hardship are distinct, no studies to our knowledge have yet investigated the different possible combinations of these dimensions of economic hardship, and the heterogeneous effects that these distinct experiences of economic hardship may have on children. Instead, the vast majority of studies on the effects of economic hardship on children have focused on income poverty alone, often making the implicit assumption that this single dimension can fully measure economic hardship. Fewer studies have examined the effects of material deprivation and only a small handful of studies have considered the effects of subjective financial stress. This lack of nuance in the conceptualization of economic hardship in children's lives is problematic because income poverty or any other single dimension does not capture all children who experience economic hardship (Bradshaw and Finch 2003; Marks 2007). By reframing economic hardship as a heterogeneous construct and carefully disentangling the diverse ways in which economic hardship can manifest in children's lives based on the multiple possible combinations of income poverty, material deprivation, and subjective financial stress, we may be able to better measure the effects of economic hardship on children, better understand the mechanisms that drive these effects, and better explain the differential outcomes for children living with economic hardship.

In this exploratory study, we extend existing theory and empirical research on economic hardship in childhood by unpacking the multiple possible economic hardship combinations and examining their associations with children's behavior problems as a proxy for their mental health. We ask three research questions: (1) How prevalent are the different possible combinations of income poverty, material deprivation, and subjective financial stress (i.e. manifest experiences of economic hardship) relative to each other during childhood? (2) To what degree is each

experience of economic hardship associated with children's behavior problems in early and middle childhood? (3) To what degree is moving into each experience of economic hardship associated with children's behavior problems in early and middle childhood? To answer these research questions, we use data from the Millennium Cohort Study (MCS), a nationally representative longitudinal cohort study of over 18,000 children born in the United Kingdom. To our knowledge, the MCS is one of the few large-scale, longitudinal study in the world that includes information on children's outcomes as well as information on all three dimensions of economic hardship.

Background and Conceptual Motivation

Distinct Dimensions of Economic Hardship

A growing sociological and economics literature shows that income poverty, material deprivation, and subjective financial stress are indicators of distinct dimensions of the underlying construct of economic hardship (Bradshaw and Finch 2003; Fusco et al. 2011; Gauthier and Furstenberg 2010; Marks 2007; Neckerman et al. 2016). Several studies have found statistically significant but weak correlations between income poverty, material deprivation, and subjective financial stress, suggesting that the three dimensions are largely distinct and that there are heterogeneous profiles of economic hardship (Boushey and Gundersen 2001; Gauthier and Furstenberg 2010; Iceland and Bauman 2007; Leininger and Kalil 2014; Marks 2007). While there is evidence that experiencing one dimensions of economic hardship increases the probability of also experiencing a second dimension, most families do not experience more than one dimension of economic hardship at a time (Bradshaw and Finch 2003).

There are many possible reasons for why families might experience only one dimension of economic hardship, but not other dimensions. For example, families with income well above the poverty threshold could experience material deprivation or subjective financial stress because

of regional differences in costs of living, transitions into and out of unemployment, unforeseen expenses, and the need to support dependent family members (Bradshaw and Finch 2003). High levels of debt and perceptions of low job security could explain why some families who are neither income poor nor materially deprived nevertheless feel financially stressed (Gaunt and Benjamin 2007; Tay et al. 2016), while high levels of assets can explain why some income poor families are not materially deprived (McKernan et al. 2009). Serious health problems could also lead families who are not income poor to experience either material deprivation, subjective financial stress, or both (Bona et al. 2016; Markman and Luce 2010; Sharp et al. 2013; Yabroff et al. 2016).

Theoretical Framework

The two theoretical frameworks most commonly used to explain how economic hardship affects children do not adequately account for this distinction between the three distinct dimensions of economic hardship. The Family Investment Model (FIM), which posits that economic hardship influences children by leading parents to invest fewer material, social, and time resources in children's development (Conger and Donnellan 2007), defines economic hardship by the income poverty dimension alone and does not account for the other two dimensions at all. The Family Stress Model (FSM), on the other hand, proposes that economic hardship influences children by undermining parents' capacity to parent in responsive ways (Conger and Donnellan 2007; Elder 1998). Though the FSM does explicitly account for material deprivation and subjective financial stress, together called economic strain, it treats these as mediators in the relationship between income poverty and children's outcomes. That is, the FSM assumes that material deprivation and subjective financial stress are caused by income poverty. As such, this framework does not allow for these dimensions to vary independently of income poverty. Thus, neither of these theoretical models reflects the growing evidence that the three

dimensions of economic hardship are distinct, nor that there may be many possible manifest experiences of economic hardship based on the possible combinations of these dimensions.

Prior Empirical Literature

Though there is a considerable body of literature showing the negative effects of economic hardship on children, this extant empirical literature also does not reflect the growing evidence that the three dimensions of economic hardship are distinct. Many of the studies that have found a significant association between income poverty and children's behavior problems did not account for either material deprivation or subjective financial stress (Costello et al. 2003; Dearing et al. 2006; Kaiser et al. 2017; Lansford et al. 2018; McLeod and Shanahan 1993). Those studies that specifically tested the FSM did account for material deprivation and subjective financial stress, but only as mediators, finding a significant association between income poverty and children's behavior problems mediated by economic strain (i.e., material deprivation and subjective financial stress) (Conger and Conger 2002; Conger et al. 1992; McLoyd 1990; Mistry et al. 2008).

Only a small number of studies has examined whether material deprivation and subjective financial stress influence children independently of income. Most of these studies consider only material deprivation and find that material deprivation is associated with worse children's behavior problems, social-emotional competence, and physical health, holding income constant (Gershoff et al. 2007; Lee and Lee 2016; Schenck-Fontaine et al., 2018; Zilanawala and Pilkauskas 2012). Material deprivation is also associated with several risk factors for children's mental health and behavior problems, including maternal mental health problems, higher levels of parental stress, and less sensitive parenting behavior, again holding income constant (Gershoff et al. 2007; Heflin and Iceland 2009; Lee and Lee 2016; Newland et al. 2013). Moreover, Gershoff et al. (2007) found that the effects of income poverty and material deprivation on child

outcomes may operate through different pathways. Their results suggest that the effects of income poverty on children operate through changes in parents' investments of resources in their children's development, the pathway proposed by the FIM, while the effects of material deprivation operate through changes in parental stress and parenting behaviors, the pathway proposed by the FSM. Their results also show that income poverty is primarily associated with children's cognitive development, while material deprivation is primarily associated with children's mental health (Gershoff et al. 2007).

To our knowledge, only two studies have investigated the effects of subjective financial stress on children independent of income. These studies found that, holding income constant, parents' subjective financial stress is associated with higher levels of children's internalizing and externalizing behavior problems (Leininger and Kalil 2014; Ponnet 2014). Both studies found a direct effect of parents' subjective financial stress on children's behavior problems (Leininger and Kalil 2014; Ponnet 2014), as well as, for children in middle- and high-income families, an effect mediated through parental depression, parents' stress, and parental conflict, the pathway proposed by the FSM (Ponnet 2014).

These studies provide initial evidence that the three dimensions of economic hardship – income poverty, material deprivation, and subjective financial stress – are not only distinct from each other but can also influence children independently and in unique ways. This study builds on this prior literature by examining several possible experiences of economic hardship in childhood and identifying whether these different experiences of economic hardship are differentially associated with children's mental health, as measured by children's behavior problems.

While the extant empirical literature provides some clues into what these differential effects might be, no studies have yet investigated the possible independent and combined effects

of all three dimensions of economic hardship on children. Therefore, this is a largely exploratory study. However, we do propose two hypotheses. First, because the different dimensions of economic hardship influence children through different pathways and influence different domains of children's well-being (Gershoff et al. 2007), it is possible that children who experience different combinations of these economic hardship dimensions are affected very differently. Specifically, since income poverty appears to be more strongly associated with children's cognitive development, and material deprivation with children's mental health (Gershoff et al. 2007), we expect that only economic hardship experiences with material deprivation are associated with worse behavior problems, while the behavior of children in families who experience income poverty without material deprivation is not affected. Second, because a larger accumulation of stressors is associated with more significant disruptions in children's development than the experience of a single stressor (Evans and Kim 2012, 2013), we expect that the experience of multiple dimensions of economic hardship would be associated with greater effects on children than the experience of a single dimension. These hypotheses, if confirmed, point to a need to expand the existing theoretical models to include the multi-dimensional nature of economic hardship.

The Current Study

We examine both between-family and within-family associations between economic hardship experiences and children's behavior problems. Our analysis focuses on children in early to middle childhood, when children are most vulnerable to the effects of economic hardship (Guo 1998; Wagmiller 2015). We focus specifically on children's behavior problems, because these are not only predictive of diagnosable mental health disorders in childhood (Goodman et al. 2000), but are also predictive of poor academic achievement (Sayal et al. 2015), as well as mental health problems and criminal activity in adulthood (Althoff et al. 2010; Babinski et al. 1999).

Data

Data and Analytic Sample

This study uses data from the Millennium Cohort Study (MCS), a longitudinal, nationally representative cohort study of children living in the UK. The sample was drawn from Child Benefit records, uptake of which is nearly universal (HM Revenue and Customs 2009). The sampling frame was children who were born between September 2000 and August 2001 in England and Wales and between November 2000 and January 2002 in Scotland and Northern Ireland (Plewis et al. 2007). Disadvantaged and minority families were over-sampled by stratifying by the Child Poverty Index and the proportion of ethnic minority population of each local electoral ward. Northern Ireland, Scotland, and Wales were also over-sampled relative to England. The initial sample of MCS included 18,818 focal children from 18,552 families. An additional 699 children from 692 families were added at wave two. The total sample size is therefore 19,517 children from 19,244 families.

This study uses data from the second, third, and fourth waves of the MCS when children were three, five, and seven years old respectively. We restricted the analytic sample to families with singleton focal children, as families with multiple births likely have unique economic hardship experiences. Because several of the measures are subjective, the analysis sample was further restricted to exclude families in which the main respondent changes throughout the study period in order to ensure that the subjective reporter is the same at all waves. Because of this restriction, all respondents in the analytic sample are mothers. Thus, the final analysis sample includes 17,541 focal children and their mothers.

Measures

Income Poverty

Using information on parents' net income, we constructed a dichotomous indicator for income poverty based on the standard UK relative poverty measure, defining income poverty as having income below 60% of the median. Net income, which is post-tax income including any benefits or transfers, was measured using 19 income bands at each wave. Bands of different sizes were used for two-parent and single-parent households and the bands were updated over time to reflect changes in the economy and parents' age. Imputation using interval regression was conducted by the MCS team to address item non-response (Hansen 2014). To compare income across families, each families' net income was set relative to that of a couple with no children using the modified OECD equivalence scale (Hansen 2014). We then used the Consumer Price Index (CPI) to adjust for inflation, setting all income equivalent to 2008 British pounds.

Material Deprivation

Material deprivation was measured using four items available at each wave. Mothers were asked whether they were *behind on their utility bill payments* (i.e. electricity, gas, other fuel, or water bills) and whether they were *unable to afford a warm, waterproof coat* for the focal child. Mothers were also asked to what degree *damp or condensation* on the walls of their home was a problem in rooms other than the kitchen and bathroom (1 = *no damp*; 2 = *not much of a problem*; 3 = *some problems*; 4 = *great problem*). We dichotomized this question, coding the responses *"some problems"* and *"great problem"* to indicate problems with damp. A final measure of material deprivation was *crowded housing*, a dichotomous indicator using the standard threshold of more than one person per room, excluding kitchens and bathrooms (Blake et al. 2007). Table 1 shows the distribution of the sample across these four items. Table 2 shows their correlations. Since the correlations between the individual items are significant but small, we chose to construct a material deprivation measure that uses a count of the number of deprivations, rather than to summarize them using a mean. Specifically, we constructed a dichotomous variable to

indicate whether a family reported at least one of these four deprivations. Such a counting approach is standard for calculating deprivation scores (Alkire and Foster, 2011).

Subjective Financial Stress

To capture mothers' subjective financial stress, mothers were asked to rate how well the household was managing financially (1 = *living comfortably*; 2 = *doing alright*; 3 = *just about getting by;* 4 = *finding it quite difficult*; 5 = *finding it very difficult).* Table 1 shows the distribution of the sample across this item. This question is comparable to questions used in other studies that have measured financial stress in the UK, the EU, and the US (Gauthier and Furstenberg 2010; Leininger and Kalil 2014; Shaw et al. 2014). Using this information, we created a dichotomous indicator, defining subjective financial stress as *"just about getting by," "finding it quite difficult,"* and *"finding it very difficult."*

Economic Hardship Combinations

Using information about income poverty, material deprivation, and subjective financial stress, we constructed eight mutually exclusive dichotomous indicator variables to reflect the possible combinations of these three dimensions: (0) no economic hardship; (1) income poverty only; (2) material deprivation only; (3) subjective financial stress only; (4) income poverty and material deprivation; (5) income poverty and subjective financial stress; (6) material deprivation and subjective financial stress; and (7) all three dimensions of economic hardship.

Child Behavior Problems

Children's behavior problems at each wave were measured using the Strengths and Difficulties Questionnaire (SDQ), a standard measure used in large-scale surveys (Goodman 1997). For low-risk, population-based samples it is recommended that the SDQ be operationalized using two validated subscales based on broad classifications of how children react to stressors (Goodman, Lamping, & Ploubidis, 2010). *Internalizing behavior problems*

describe behaviors that are primarily internalized or occur within the person, such as anxiety or depression. To compute a score for internalizing behavior problems, we summed mothers' responses to the five items in the emotional symptoms subscale (i.e., "*[child] has many worries"*) and the five items in the peer relationship problems subscale (i.e., *"[child] is rather solitary, tends to play alone"*). *Externalizing behavior problems* describe behaviors that are externalized or occur in interactions with other people, such as aggression or attention problems. We computed scores for externalizing behavior problems by summing across parents' responses to the five items in the conduct problems subscale (i.e., *"[child] often fights with other children or bullies them"*) and the five items in the hyperactivity/inattention subscale (i.e., *"[child] is easily distracted, concentration wavers"*).

Covariates

All models include a set of stable and time-varying control variables that capture household, parent, and child characteristics. Household characteristics include the number of children in the household, total household size, and whether a grandparent lives in the household, all of which are time-varying. Stable parent characteristics include mothers' age at birth, mother's ethnicity (white, black/black British, Pakistani/Bangladeshi, Indian, Asian or other, or mixed), and whether any parent or caregiver is an immigrant. Time-varying parent characteristics include marital status (married/cohabiting or single/widowed/divorced), mothers' education (UK National Vocational Qualification (NVQ) levels), and mothers' serious psychological distress. Mothers' psychological distress was measured using the Kessler six-item (K6) psychological distress scale to screen for moderate mental health issues (Prochaska et al. 2012). We summed across responses to compute a total depression score (scores range from 0 to 24) and use the standard cut-off of 13 or higher to identify serious psychological distress. There is a small, but significant correlation between mothers' psychological distress and mothers' report of subjective

financial stress ($r = 0.25$, $p < 0.01$), showing that subjective financial stress may be affected by but is distinct from mothers' mental health. Finally, child characteristics include the focal child's sex, which is stable, and age in months, which is time-varying. Table 3 shows weighted descriptive characteristics of the sample.

Attrition, Missing Data, and Multiple Imputation

The initial sample included 18,552 families and 13,857 families remained in the sample at wave 4 (Mostafa 2015). Mothers that attrited at or before wave 4 were, on average, more disadvantaged, younger, and held jobs that required longer working hours. To address the potential bias introduced by this systematic attrition, all models use inverse probability weights constructed by the MCS combined with MCS sampling weights (Plewis et al. 2007). Unweighted models provide very similar results.

Approximately 37.8% of survey responses were missing data for some items. Of the surveys with any missing data, most surveys (86.4%) are missing responses to only one item used in these analyses. At most, a survey is missing responses to five items used in the analyses. We could not assume that the data are missing completely at random. Therefore, and in order to use the complete sample of participating respondents at each wave for analyses, we employed multiple imputation to replace missing data with a probable value based on other available information from the dataset. We computed 50 multivariate imputations using Stata version 13.1 with the data structured wide in order to account for the longitudinal structure of the data and the resulting autocorrelation in mothers' responses over time (Young and Johnson 2015). The imputation model included all available information for the outcome, predictor, and control variables. Imputed values for the outcome variables were dropped after the imputation and not used in the analyses.

Analytical Approach

We used linear mixed-effects and fixed-effects modeling approaches to estimate the association between each of the eight economic hardship combinations and children's behavior problems, using no economic hardship as the base. We started with a mixed-effects model that combines a family-level random intercept with select fixed-effect indicator variables. We then built on this approach with a model that includes a family fixed-effect in place of the random intercept. Each of these models answers a different research question, as is explained in more detail below. Moreover, because mixed-effects models are more precise and fixed-effects models better address omitted variable bias, this approach allowed us to leverage the complementary strengths of both models (Bell and Jones 2015; Dieleman and Templin 2014).

Our mixed-effects model is: (1)

$$Y_{ict} = \beta_{0i} + Pov_{ict} + MD_{ict} + Stress_{ict} + PovMD_{ict} + PovStress_{ict} + MDStress_{ict} + All_{ict} + X_{ict} + \theta_t + \theta_c + \varepsilon_{ict} \quad (1)$$

$$\beta_{0i} = \beta_0 + \varepsilon_{0t} ,$$

where Y_{ict} is children's internalizing or externalizing behavior problems in family *i,* country *c,* and wave *t*; Pov_{ict} measures whether family *i* in country *c* is income poor but not materially deprived or financially stressed in wave *t*; MD_{ict} measures whether family *i* in country *c* is materially deprived but not income poor or financially stressed in wave *t*; $Stress_{ict}$ measures whether family *i* in country *c* is financially stressed but not income poor or materially deprived in wave *t*; $PovMD_{ict}$ measures whether family *i* in country *c* is both income poor and materially deprived but not financially stressed in wave *t*; $PovStress_{ict}$ measures whether family *i* in country *c* is both income poor and financially stressed but not materially deprived in wave *t*; $MDStress_{ict}$ measures whether family *i* in country *c* is both materially deprived and financially stressed but not income poor in wave *t*; All_{ict} measures whether family *i* in country *c* is income poor, materially deprived, and financially stressed in wave *t*; and X_{ict} is a vector of all household-,

parent-, and child-level covariates. The mixed-effects model also includes indicators for the survey wave (θ_t) to capture any UK-wide changes that may affect economic hardship and children's behavior problems in a given year, as well as indicators for the country of residence (θ_c) to capture any permanent differences between the four countries. Finally, the mixed-effects model includes a random family intercept (β_{0i}) to account for the correlation between mothers' responses over time, as well as heteroskedasticity-robust standard errors.

Our fixed-effects model is:

$$Y_{ict} = \beta_0 + Pov_{ict} + MD_{ict} + Stress_{ict} + PovMD_{ict} + PovStress_{ict} + MDStress_{ict} + All_{ict} + X_{ict} + \theta_t + \theta_c + \theta_i + \varepsilon_{ict}\,, \quad (2)$$

where θ_i is a family indicator variable that captures any stable differences between families that may affect economic hardship and children's behavior problems. Heteroskedasticity-robust standard errors are clustered at the family-level to adjust for the correlation between responses over time.

Both models estimate the associations between each of the seven economic hardship combinations and children's behavior problems in a given country and year that are not explained by observed demographic characteristics or by changes in household composition, parents' marital status, mothers' education, parents' labor status, or mothers' mental health. The fixed-effects modeling approach additionally controls for any unobserved stable differences between families.

The most important difference between the mixed- and fixed-effects models is the source of variation each model draws on to estimate the parameters (Dieleman and Templin 2014). The mixed-effects model uses both between-family and within-family variation in the predictor variables to estimate the association between economic hardship and children's behavior problems; the fixed-effects model uses only within-family variation. The intra-class correlations

comparing variation between and within families for the economic hardship combinations range between 0.16 and 0.39. That is, families do not change very frequently with respect to their experience of economic hardship and most variation is between families. Therefore, the estimated coefficients of the mixed-effects models likely predominantly reflect the association between consistently experiencing a specific economic hardship combination and children's behavior problems. That is, the mixed-effects models estimate associations between each experience of economic hardship and children's behavior problems relative to families who experience no economic hardship. To the extent that families do change in their experience of economic hardship, the fixed-effects models estimate the association between each economic hardship combination and children's behavior problems relative to when that same family experiences no economic hardship.

To identify whether certain economic hardship combinations were more strongly associated with children's behavior problems than others, we performed Wald tests to compare all coefficients within each model. To reduce the possibility of Type 1 error due to multiple tests, we employed a Bonferroni correction.

Findings

Descriptive Results

Table 3 shows the prevalence of each dimension of economic hardship in the analytic sample. At any given wave, 24.4% of the families were income poor, 14.4% of families were materially deprived, and 36.1% of mothers reported subjective financial stress. Approximately half of the families in the sample did not experience any dimension of economic hardship. The correlations between each of the three dimensions of economic hardship are relatively low, ranging between 0.25 and 0.34, but all are statistically significant (Table 4).

Figure 1 shows the share of families in a given wave who experienced each of the seven economic hardship combinations. Only half of the families who experienced some kind of economic hardship, experienced income poverty alone or in combination with another dimension of economic hardship. Among families that experienced economic hardship without income poverty, 8.5% of families were only materially deprived without being income poor or financially stressed; 34.5% of families were only financially stressed; and 8.0% of families were materially deprived and financially stressed, but not income poor. Among families that experienced economic hardship with income poverty, 13.0% of families were only income poor; 5.7% were income poor and materially deprived, but not financially stressed; 15.8% were income poor and financially stressed, but not materially deprived; and 14.5% of families experienced all three dimensions of economic hardship together.

Table 5 shows descriptive characteristics of the sample by each of the seven economic hardship combinations. Relative to families who experienced no economic hardship, families who experienced any economic hardship combination were younger, less likely to be white, less likely to be married or cohabiting, less educated, and had higher levels of maternal psychological distress. There were also notable differences between families who experienced economic hardship with and without income poverty. On average, families who experienced economic hardship without income poverty were older, more educated, and more likely to be married or cohabiting than income poor families. All differences were significant at the $p < 0.001$ level using a Bonferroni correction for multiple tests.

Mixed-Effects Regression Results

Mixed-effects regression results show that each economic hardship combination was significantly associated with both types of children's behavior problems (Table 6). Relative to children in families with no economic hardship, children in families that were only income poor

had a 0.09 *SD* higher level of internalizing behavior problems ($p < 0.001$). Children in families that were only materially deprived had a 0.11 *SD* higher level of internalizing behavior problems ($p < 0.001$) and children in families that were only financially stressed had a 0.10 *SD* higher level of internalizing behavior problems ($p < 0.001$). Compared to children in families with no economic hardship, children in families that were both income poor and materially deprived had a 0.13 *SD* higher level of internalizing behavior problems ($p < 0.001$). Children in families that were income poor and financially stressed had a 0.13 *SD* higher level of internalizing behavior problems ($p < 0.001$). Children in families that were materially deprived and financially stressed had a 0.24 *SD* higher level of internalizing behavior problems ($p < 0.001$). Finally, relative to children in families with no economic hardship, children in families that experienced all three dimensions of economic hardship had a 0.26 *SD* higher level of internalizing behavior problems ($p < 0.001$). Comparing across coefficients, we found that children in families who were materially deprived and financially stressed but not income poor and children in families who experienced all three dimensions of economic hardship had significantly higher levels of internalizing behavior problems than children in families with any other economic hardship combination ($p < 0.01$).

The results for externalizing behavior problems are very similar. Relative to children in families with no economic hardship, children in families that were only income poor had a 0.07 *SD* higher level of externalizing behavior problems ($p < 0.01$). Children in families that were only materially deprived had a 0.12 *SD* higher level of externalizing behavior problems ($p < 0.001$) and children in families that were only financially stressed had a 0.10 *SD* higher level of externalizing behavior problems ($p < 0.001$). Relative to children in families with no economic hardship, children in families that were both income poor and materially deprived had a 0.15 *SD* higher level of externalizing behavior problems ($p < 0.001$). Children in families that were

income poor and financially stressed had a 0.10 *SD* higher level of externalizing behavior problems ($p < 0.001$). Children in families that were materially deprived and financially stressed had a 0.22 *SD* higher level of externalizing behavior problems ($p < 0.001$). Finally, children in families that experienced all three dimensions of economic hardship had a 0.19 *SD* higher level of externalizing behavior problems ($p < 0.001$). Again, children in families who were materially deprived and financially stressed but not income poor and children in families who experienced all three dimensions of economic hardship had significantly higher levels of externalizing behavior problems than children in families with any other economic hardship combination ($p < 0.05$).

Fixed-Effects Regression Results

According to the fixed-effects regression results, only material deprivation combined with subjective financial stress and the combination of all three dimensions were significantly associated with children's internalizing behavior problems (Table 7). Specifically, relative to when their families had no economic hardship, children had a 0.09 *SD* higher level of internalizing behavior problems when their families were materially deprived and financially stressed, but not income poor ($p < 0.01$). Children also had a 0.07 *SD* higher level of internalizing behavior problems when their families experienced all three dimensions of economic hardship at once ($p < 0.05$). Moreover, children's internalizing behavior problems were significantly higher when their families were materially deprived and financially stressed but not income poor and when their families experienced all three dimensions of economic hardship at once than when their families experienced any other manifestation of economic hardship ($p < 0.01$). The other five manifestations of economic hardship were not significantly associated with children's internalizing behavior problems.

Only material deprivation alone and the combination of material deprivation and financial stress were associated with externalizing behavior problems. Relative to when a family experienced no economic hardship, children had a 0.06 *SD* higher level of externalizing behavior problems when their families were only materially deprived ($p < 0.05$). Children also had a 0.07 *SD* higher level of internalizing behavior problems when their families were materially deprived and financially stressed but not income poor ($p <0 .05$). However, these coefficients did not differ significantly from the coefficients for any other manifestation of economic hardship. The other five manifestations of economic hardship were not significantly associated with children's externalizing behavior problems.

Robustness Checks

We conducted several robustness checks (all results available from authors upon request). To address potential concerns that the findings represent spurious correlations between the economic hardship combinations and children's behavior problems, we included children's behavior problems at the prior wave in both the mixed- and fixed-effects models. Including a lagged dependent variable as a predictor addresses potential selection bias associated with the possibility that children's behavior problems at an earlier time point systematically predict both children's later outcomes and the family's later economic hardship. Including the lagged dependent variable did not substantially change the results. However, our preferred specifications do not include the lagged dependent variable because this inclusion can suppress the coefficients of other independent variables in multi-level models (Allison 2015).

We estimated both models using two alternative definitions for subjective financial stress. First, we estimated the models using hardship indicators based on a severe financial stress indicator, which includes only families who are *"finding it quite difficult"* or *"finding it very difficult"* and excluding the category *"just about getting by."* The results using this more severe

operationalization look substantially similar under the mixed effects specification, though the coefficient estimates for economic hardship combinations that include financial stress are somewhat larger than in the models using the original operationalization. Likely because this more severe financial stress is less common, the standard errors are also larger when using this specification, but this does not influence the statistical significance of the coefficients. The results do differ under the fixed effects specification. In fact, no experience of economic hardship is associated with children's behavior problems using this operationalization of severe financial stress. This may be because most of the variation in these more severe responses is between mothers, rather than within. Since the fixed-effects analyses use only within-family variation, they are unlikely to find any associations. Second, we also estimated the same models using hardship indicators based on a financial stress indicator that includes the response *"doing alright."* We define this as financial discomfort. Under both the mixed-effects and fixed-effects specifications, this operationalization of financial stress is not associated with children's behavior problems on its own or in combination with other hardship types, suggesting a qualitative difference between the categories *"just about getting by"* and *"doing alright"*.

We also estimated both models using two specifications of material deprivation. First, we tested a specification of material deprivation that excludes damp or condensation in the home. This specification bases the material deprivation score only on originally dichotomous variables. Though most coefficients and the overall patterns are substantially similar to results from the models using our preferred specification, there are two notable differences using this specification. The mixed-effects results using this alternative specification of material deprivation show that children in families that only experience material deprivation (without damp) do not have a significantly higher levels of internalizing problems than children who experience no economic hardship. The fixed-effects results using this alternate specification show that children

who experience all three dimensions of economic hardship do not have a significantly higher level of internalizing problems than children who experience no economic hardship. Because having problems with damp or condensation in the home is a relatively rare experience and because damp is associated with health problems for children, such as poor respiratory health (Panico et al., 2014), we have chosen to keep damp as part of our preferred specification of material deprivation. Second, we also tested a specification of material deprivation that uses a dichotomous cut-point of two or more deprivations, rather than one or more. We found that, while the predictive power of the coefficients was reduced, the overall patterns were substantially similar to those using our preferred specification.

Finally, because the fixed-effects regression models exclude families with no variation in the independent variables, it is possible that the sample in the fixed-effects regression models differs in important ways from the full sample. To check that the fixed-effects regression results do not reflect a selection bias, we repeated all mixed-effects analyses with only parents in the fixed-effects sample. The results did not differ substantially from the mixed-effects regression results using the full sample. The results were also robust to other analytic sample specifications, such as the inclusion of families in which the respondents change and the exclusion of non-white families.

Discussion

In this study, we bridge two largely disparate strands of research by bringing what is known about the multiple, distinct dimensions of economic hardship to research on the effects of economic hardship on children. To our knowledge, no prior study has yet documented the multiple possible experiences of economic hardship among families with children based on the different combinations of income poverty, material deprivation, and subjective financial stress, or examined the differential effects that these different combinations might have on children. We

address this gap by taking advantage of the UK Millennium Cohort Study, which is, to our knowledge, one of the few longitudinal datasets in the world to include measures of all three dimensions of economic hardship as well as information on children's outcomes, to examine the different possible types of economic hardship experienced by children in the UK and to assess their differential associations with children's behavior problems.

Approximately half of the families in the sample experienced some kind of economic hardship at any given data collection wave. Consistent with prior literature, the correlations among the three dimensions of economic hardship are statistically significant, but relatively weak, suggesting that these dimensions are related but distinct and independent. In other words, families who experience one dimension of economic hardship may not also experience a second or third dimension. Accordingly, we propose seven distinct experiences of economic hardship based on the possible combinations of the three dimensions. We found that half of the families who experienced economic hardship were not income poor, but nevertheless experienced material deprivation, subjective financial stress, or both. While these families who experienced economic hardship without being income poor were, on average, more advantaged than income poor families, they were, nevertheless, less advantaged than families who experienced no economic hardship at all. That such a large share of families experienced economic hardship even in the absence of income poverty suggests that research focused on income poverty is not sufficient to capture all families who are experiencing economic hardship. Therefore, we argue that it is necessary to consider material deprivation and subjective financial stress as distinct dimensions of economic hardship rather than only the mediators of income poverty, as many prior empirical studies and theoretical frameworks have done.

Our mixed-effects regression results show that children in families with any kind of economic hardship experience had significantly higher levels of internalizing and externalizing

behavior problems than children in families with no economic hardship. The association of material deprivation and financial stress with children's behavior problems even in the absence of income poverty is consistent with prior research (Gershoff et al. 2007; Lee and Lee 2016; Leininger and Kalil 2014; Ponnet 2014; Zilanawala and Pilkauskas 2012). The effect sizes, which ranged from 0.06 *SD* and 0.25 *SD*, depending on the specific economic hardship combination and the type of behavior problems, are relatively consistent with prior research on the effects of income poverty on children's mental health and behavior problems (Costello et al. 2003; Kaiser et al. 2017; McLeod and Shanahan 1993). While we found that all economic hardship combinations were associated with higher levels of children's behavior problems, the combination of material deprivation and subjective financial stress and the combination of all three dimensions of economic hardship were associated with the highest levels of behavior problems.

The significant differences between associations of the various economic hardship combinations with children's behavior problems are consistent with our hypotheses that not all experiences of economic hardship affect children in the same way. First, as we hypothesized, combinations of multiple dimensions of economic hardship were more strongly associated with behavior problems than experiences of any single dimension of economic hardship, which is consistent with prior literature that finds that an accumulation of stressors is more detrimental to children's development than a single stressor (Evans and Kim 2012, 2013). Second, the differential associations are consistent with prior literature that different dimensions of economic hardship influence different domains in children's development. Specifically, Gershoff et al. (2007) found that material deprivation is associated with behavior problems, while income poverty is associated with cognitive outcomes. Therefore, the fact that the associations with behavior problems were relatively weaker for the combinations of economic hardship that

included income poverty without material deprivation fits our hypothesis and may be because income poverty itself is less strongly associated with behavioral outcomes. Thus, our findings may be reflective of the specific outcome domain chosen and further research is necessary to examine associations with other spheres of child well-being, such as cognitive outcomes. We interpret these cumulative and differential associations to provide further indication that income poverty is an important, but insufficient measure of economic hardship for children, and to underscore the need to differentiate between the various possible experiences of economic hardship in future research.

Given that the three dimensions of economic hardship are not perfectly correlated, that families experience a variety of different possible combinations of these three dimensions, and that these combinations are differentially associated with children's behavior problems, we propose that economic hardship is not a homogenous experience. It is possible that the construct of economic hardship, which underlies each of these varied experiences, confounds the results and, therefore, we cannot draw firm conclusions about the relative effects of each individual dimension of economic hardship on children. However, we do take this evidence to suggest that this underlying construct actually has heterogeneous profiles. In other words, there is no single experience of economic hardship and each experience may influence children differently. This study is the first to document the associations of these heterogeneous experiences of economic hardship with children's outcomes. Future research should reflect the full range of possible economic hardship experiences rather than assume a single and uniform effect. Since neither the FIM, nor the FSM framework account for this heterogeneous and multidimensional nature of economic hardship, these results also call for a revision of the existing theories. Building on Gershoff et al.'s (2007) model that combines the pathways of the FIM and FSM to explain child

outcomes, we suggest a further expansion that treats each of the three dimensions of economic hardship as distinct independent variables that may interact or act as mediators.

The fixed-effects models provide information about the within-family association of moving into a given economic hardship experience and children's behavior problems. These findings differ from the mixed-effects regression findings. Using our fixed-effects specification, we found that only the combination of material deprivation and subjective financial stress and the combination of all three dimension of economic hardship were associated with higher levels of internalizing behavior problems relative to when the family experienced no economic hardship or any other experience of economic hardship. Only material deprivation alone and the combination of material deprivation and subjective financial stress were associated with higher levels of externalizing behavior problems within a family.

We offer two complementary interpretations of the differences between the mixed- and fixed-effects results. First, we propose that the results differ because the two models answer two different research questions based on the variation used to estimate the coefficients. Because families vary little in their experience of economic hardship over time, our mixed-effects regression models, which use both within- and between-family variation to estimate the coefficients, likely predominantly reflect the associations between stable or chronic experiences of the economic hardship combinations and children's behavior problems. As such, these results suggest that chronic, ongoing exposure to any of the economic hardship combinations is associated with children's behavior problems. The fixed-effects models, on the other hand, use only between-family variation and are, therefore, more likely to reflect the association between each economic hardship combination and children's behavior problems when the family experiences a change in its economic circumstances. Therefore, we interpret the fixed-effects results to suggest that only certain economic hardship combinations are associated with

children's behavior problems if the exposure is short-term. The combination of material deprivation and subjective financial stress without income poverty and the combination of all three dimensions of economic hardship are the most strongly linked to children's behavior problems in the mixed-effects models (i.e., under chronic exposure) and are the only two combinations robust to the fixed-effects specification (i.e., shorter-term exposure). We interpret this to suggest that these are the two most severe experiences of economic hardship vis-à-vis their influence on children.

A second explanation for the differences in results is that the fixed-effects specification controls for potential omitted variable bias due to observed and unobserved time-invariant differences between families not addressed by the mixed-effects specification. Thus, the mixed-effects results may reflect, to some degree, spurious correlations, that are accounted for by the family fixed effect. However, even under the fixed-effects specification, the combination of material deprivation and subjective financial stress without income poverty and the combination of all three dimensions of economic hardship are associated with children's internalizing behavior problems. That only these associations are robust to the inclusion of the family fixed effect suggests that not all economic hardship combinations influence children in the same way. These results also support our hypothesis that income poverty is not necessary for children to be affected by economic hardship.

The primary goal of this article was to document the different possible experiences of economic hardship in childhood and to offer insight into whether these different experiences of economic hardship are differentially associated with children's behavior problems. Although our findings underscore the importance of expanding our theoretical and empirical conceptualization of childhood economic hardship to consider all of these multiple possible economic hardship combinations, our analyses cannot provide causal estimates of the relationships between the

various combinations of economic hardship and children's behavior problems. We can rule out the possibility that the associations are driven by changes in education, household composition, or mothers' psychological distress, as well as changes at the national level that could affect both economic hardship and children's behavior problems. We can also confirm that mothers' experience of subjective financial stress is not driven by mothers' psychological distress, as their correlation is low. Nor are the associations explained by stable observed demographic differences between families or, in the case of the fixed-effects specification, other unobserved stable differences between families. However, our analyses do not address unobserved time-varying factors that may confound the relationship between economic hardship and children's behavior problems, such as parents' substance use problems or a serious health diagnosis. Further research will be necessary to identify whether each of these associations between the different experiences of economic hardship and children's behavior problems is causal.

Another limitation of this study lies in our measurement of the three dimensions of economic hardship. Though we considered a number of alternative approaches, we concluded that using dichotomous indicators of income poverty, material deprivation, and subjective financial stress was necessary in order to answer the posed research questions. Dichotomizing these variables allowed us to construct discrete and mutually exclusive categories for each of the seven possible economic hardship combinations. However, there is no theoretical reason to believe that an underlying dichotomy exists in these constructs. Rather, we would expect that economic hardship and its individual dimensions exist on a continuum. Moreover, dichotomizing categorical or continuous variables leads to the loss of information and the underestimation of variation within groups and, as such, reduces statistical power to detect associations (Altman & Royston, 2006). For these reasons, we cannot rule out measurement error related to our choice to

dichotomize and we cannot conclude that our findings are generalizable to all families with children. Additional research using alternative measurement approaches is necessary.

We use a relative measure of income poverty (i.e. 60% below the median income) based on net income. This is the standard UK poverty measure and is relevant for this policy context, given the number of transfers that could raise households out of poverty. In fact, because this poverty threshold was constructed using data on incomes from the MCS sample, it measures poverty only relative to UK families with children between ages 3 and 7. This measure differs from absolute poverty measures based on gross income frequently used in other countries, such as the United States. Moreover, because net income includes benefits and transfers that raise families out of poverty, fewer families fall into the category of income poor than would be the case under a definition using gross income. As such, the results may not generalize to contexts with less or more generous benefit policies. For example, it is possible that these analyses underestimate the associations between children's behavior problems and economic hardship experiences that include income poverty for a context in which poor families receive significantly fewer benefits. It is also important to note that measurement error, in particular underreporting of income, is a concern at the bottom of the income distribution (Brewer et al. 2017). Therefore, it is possible that families categorized as income poor in this sample may have higher incomes and are, thus, better off than they reported.

Our results were relatively robust to both of the alternative specifications of material deprivation, but our specification of subjective financial stress may bias the results. Our definition of subjective financial stress includes mothers who report *"just about getting by"* and who may be on the margin of subjective financial stress relative to mothers who report *"finding it quite difficult"* or *"finding it very difficult."* However, our robustness check results using the mixed-effects specification also show a significant association between all combinations of

economic hardship and children's behavior problems. That these coefficients are slightly larger than when using our original operationalization suggests that the original operationalization may actually underestimate the associations between economic hardship experiences that include financial stress. The reported difference in results of the fixed-effects specification is likely explained by a lower within-person variance in the more severe categories of financial stress. This prevents us from being able to adequately estimate the within-person association between becoming severely financial stress (possibly in combination with any other hardship type) and children's behavior problems.

Finally, we used MCS data because, to our knowledge, the MCS is the only large-scale, nationally representative study that longitudinally measures children's outcomes, as well as all three dimensions of economic hardship, while also capturing families at all socioeconomic levels. However, the findings may not be generalizable to policy settings that differ from the UK. For example, families with children in the UK experience far greater protection from income poverty than families in the US. In addition to welfare policies that incentivize work similar to those in the US, UK families with children also have access to both universal and means-tested unconditional cash benefits and to universal care and education for three to four-year old children, which is not available in the US (see Waldfogel and Washbrook, 2011, for a comprehensive comparison of the UK and US family policies). Because of these policy differences, the families in our sample were likely more advantaged and had higher net incomes than similar families in the US. Moreover, because the benefit transfers available to UK families were labeled to be specifically for the benefit of children, parents generally invested these additional resources to meet their children's needs (Gregg et al. 2006). Therefore, our results likely underestimate the prevalence of economic hardship among families with children, as well as the association between economic hardship and children's behavior problems, particularly for

combinations of economic hardship with income poverty. Therefore, additional research is necessary in alternative policy settings.

It was beyond the scope of this study to identify the mediating mechanisms that explain the associations between each of the combinations of economic hardship and children's behavior problems. Findings from prior research suggest that the three dimensions of economic hardship may operate through different mechanisms (Gershoff et al. 2007). Therefore, it is probable that each of the possible economic hardship combinations also influences children through different pathways. Because children's cognitive outcomes in the MCS could not be consistently measured across time within each cognitive domain, we did not investigate whether the different manifestations of economic hardship were associated with children's cognitive outcomes. However, prior research suggests that income poverty is more strongly associated with cognitive outcomes, while material deprivation is more strongly associated with mental health outcomes (Gershoff et al. 2007). Given this, we expect that the various economic hardship combinations are differentially associated with different domains of children's well-being. For example, the economic hardship combinations that include income poverty may be more strongly associated with cognitive outcomes than what our findings suggest is true for behavior problems. Research to identify these different mechanisms and differential effects by domain would provide insight into why some economic hardship combinations are more strongly associated with children's behavior problems than others.

This study provides compelling evidence that there are multiple, diverse experiences of economic hardship and that income poverty is an important but insufficient measure of childhood economic hardship. Consistent with prior literature on the distinction between the three distinct dimensions of economic hardship, we find that approximately half of the families in a UK sample of young children who experienced economic hardship were not income poor. By focusing only

on income poverty, much of the prior research on the effects of economic hardship on children has not accounted for the experiences of these families. Based on our finding that all combinations of the three dimensions of economic hardship, including those without income poverty, are associated with higher levels of children's behavior problems, we argue that a broader conceptualization of economic hardship as a heterogeneous construct is necessary both in our theoretical and empirical literature. Moreover, it is not sufficient that studies consider each of the three dimensions of economic hardship in isolation. We believe that, in order to develop a comprehensive understanding of the effects of economic hardship on children, it is important to consider the multiple possible combinations of the three dimensions of economic hardship, as each of these may influence children differently. However, for future research to be able to further investigate these more nuanced conceptualizations of economic hardship, it is first necessary for more studies to collect information on all three dimensions of economic hardship, particularly longitudinal studies that allow researchers to model dynamic relationships over time.

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References

Alkire, S., & Foster, J. (2011). Counting and multidimensional poverty measurement. *Journal of Public Economics, 95*(7-8), 476-487.

Allison, P. (2015, June 2). Don't Put Lagged Dependent Variables in Mixed Models. *Statistical Horizons*. https://statisticalhorizons.com/lagged-dependent-variables

Althoff, R. R., Verhulst, F. C., Rettew, D. C., Hudziak, J. J., & van der Ende, J. (2010). Adult outcomes of childhood dysregulation: a 14-year follow-up study. *Journal of the American Academy of Child and Adolescent Psychiatry*, *49*(11), 1105–1116. doi:10.1016/j.jaac.2010.08.006

Altman, D. G., & Royston, P. (2006). The cost of dichotomising continuous variables. *BMJ : British Medical Journal*, *332*(7549), 1080.

Babinski, L. M., Hartsough, C. S., & Lambert, N. M. (1999). Childhood Conduct Problems, Hyperactivity-impulsivity, and Inattention as Predictors of Adult Criminal Activity. *The Journal of Child Psychology and Psychiatry and Allied Disciplines*, *40*(3), 347–355.

Bell, A., & Jones, K. (2015). Explaining Fixed Effects: Random Effects Modeling of Time-Series Cross-Sectional and Panel Data. *Political Science Research and Methods*, *3*, 133–153. doi:10.1017/psrm.2014.7

Blake, K. S., Kellerson, R. L., & Simic, A. (2007). *Measuring Overcrowding in Housing*. Fairfax, VA: U.S. Department of Housing and Urban Development.

Bona, K., London, W. B., Guo, D., Frank, D. A., & Wolfe, J. (2016). Trajectory of Material Hardship and Income Poverty in Families of Children Undergoing Chemotherapy: A Prospective Cohort Study. *Pediatric Blood & Cancer*, *63*(1), 105–111. doi:10.1002/pbc.25762

Boushey, H., & Gundersen, B. (2001). *When Work Just Isn't Enough: Measuring hardships faced by families after moving from welfare to work*. Washington, DC: Economic Policy Institute. http://www.epi.org/publication/briefingpapers_hardships/. Accessed 3 July 2017

Bradbury, B., Corak, M., Waldfogel, J., & Washbrook, E. (2015). *Too Many Children Left Behind: The U.S. Achievement Gap in Comparative Perspective*. New York: Russell Sage Foundation.

Bradshaw, J., & Finch, N. (2003). Overlaps in Dimensions of Poverty. *Journal of Social Policy*, *32*(04), 513–525. doi:10.1017/S004727940300713X

Brewer, M., Etheridge, B., & O[],"omitted":[],"custom":[]} CSL_BIBLIOGRAPHY ectivengpapers_hardships/. AccesseThe Economic Journal, 127(605), F24–F49. doi: 10.1111/ecoj.12334

Conger, R., & Conger, K. J. (2002). Resilience in Midwestern Families: Selected Findings from the First Decare of a Prospective, Longitudinal Study. Journal of Marriage and Family, 64(2), 361–373.

Conger, R. D., Conger, K. J., Elder, G. H., Lorenz, F. O., Simons, R. L., & Whitbeck, L. B. (1992). A Family Process Model of Economic Hardship and Adjustment of Early Adolescent Boys. *Child Development*, *63*(3), 526–541. doi:10.1111/j.1467-8624.1992.tb01644.x

Conger, R. D., & Donnellan, M. B. (2007). An Interactionist Perspective on the Socioeconomic Context of Human Development. *Annual Review of Psychology*, *58*(1), 175–199. doi:10.1146/annurev.psych.58.110405.085551

Costello, E. J., Compton, S. N., Keeler, G., & Angold, A. (2003). Relationships between poverty and psychopathology: A natural experiment. *Jama*, *290*(15), 2023–2029.

Dearing, E., McCartney, K., & Taylor, B. A. (2006). Within-child associations between family income and externalizing and internalizing problems. *Developmental Psychology*, *42*(2), 237–252. doi:10.1037/0012-1649.42.2.237

Dieleman, J. L., & Templin, T. (2014). Random-Effects, Fixed-Effects and the within-between Specification for Clustered Data in Observational Health Studies: A Simulation Study. *PLoS ONE*, *9*(10). doi:10.1371/journal.pone.0110257

Elder, G. H. (1998). *Children of the Great Depression, 25th Anniversary Edition* (25th Anniversary, Updated edition.). Boulder, Colo: Westview Press.

Evans, G. W., & Cassells, R. C. (2013). Childhood Poverty, Cumulative Risk Exposure, and Mental Health in Emerging Adults. *Clinical Psychological Science*, *2*(3), 287–296.

Evans, G. W., & Kim, P. (2012). Childhood Poverty and Young Adults' Allostatic Load: The Mediating Role of Childhood Cumulative Risk Exposure. *Psychological Science*, *23*(9), 979–983. doi:10.1177/0956797612441218

Evans, G. W., & Kim, P. (2013). Childhood Poverty, Chronic Stress, Self-Regulation, and Coping. *Child Development Perspectives*, *7*(1), 43–48. doi:10.1111/cdep.12013

Fusco, A., Guio, A.-C., & Marlier, E. (2011). *Income poverty and material deprivation in European countries* (LISER Working Paper Series No. 2011– 04). LISER. http://econpapers.repec.org/paper/irscepswp/2011-04.htm. Accessed 22 December 2015

Gaunt, R., & Benjamin, O. (2007). Job Insecurity, Stress and Gender. *Community, Work & Family*, *10*(3), 341–355. doi:10.1080/13668800701456336

Gauthier, A. H., & Furstenberg, F. F. (2010). *The experience of financial strain among families with children in the United States* (Research Working Paper No. 10–17). Bowling Green, OH: National Center for family and Marriage.

Gershoff, E. T., Aber, J. L., Raver, C. C., & Lennon, M. C. (2007). Income Is Not Enough: Incorporating Material Hardship Into Models of Income Associations With Parenting and Child Development. *Child Development*, *78*(1), 70–95. doi:10.1111/j.1467-8624.2007.00986.x

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A Research Note. *Journal of Child Psychology and Psychiatry*, *38*(5), 581–586. doi:10.1111/j.1469-7610.1997.tb01545.x

Goodman, R., Ford, T., Simmons, H., Gatward, R., & Meltzer, H. (2000). Using the Strengths and Difficulties Questionnaire (SDQ) to screen for child psychiatric disorders in a community sample. *The British Journal of Psychiatry*, *177*(6), 534–539. doi:10.1192/bjp.177.6.534

Goodman, A., Lamping, D. L., & Ploubidis, G. B. (2010). When to use broader internalising and externalising subscales instead of the hypothesised five subscales on the Strengths and Difficulties Questionnaire (SDQ): data from British parents, teachers and children. *Journal of Abnormal Child Psychology, 38*(8), 1179-91.

Gregg, P., Waldfogel, J., & Washbrook, E. (2006). Family expenditures post-welfare reform in the UK: Are low-income families starting to catch up? *Labour Economics*, *13*(6), 721–746.

Guo, G. (1998). The Timing of the Influences of Cumulative Poverty on Children's Cognitive Ability and Achievement. *Social Forces*, *77*(1), 257–287. doi:10.1093/sf/77.1.257

Hansen, K. (2014). *Millennium Cohort Study: A Guide to the Datasets (Eighth Edition)*. London, UK: Centre for Longitudinal Studies.

Heflin, C. M., & Iceland, J. (2009). Poverty, Material Hardship, and Depression*. *Social Science Quarterly*, *90*(5), 1051–1071. doi:10.1111/j.1540-6237.2009.00645.x

HM Revenue and Customs. (2009). *Child Benefit Statistics: Geographical Analysis*. London, UK.

Iceland, J., & Bauman, K. J. (2007). Income poverty and material hardship: How strong is the association? *The Journal of Socio-Economics*, *36*(3), 376–396. doi:10.1016/j.socec.2006.12.003

Kaiser, T., Li, J., Pollmann-Schult, M., & Song, A. (2017). Poverty and Child Behavioral Problems: The Mediating Role of Parenting and Parental Well-Being. *International Journal of Environmental Research and Public Health*, *14*(9), 981. doi:10.3390/ijerph14090981

Lansford, J. E., Malone, P. S., Tapanya, S., Tirado, L. M. U., Zelli, A., Alampay, L. P., et al. (2018). Household income predicts trajectories of child internalizing and externalizing behavior in high-, middle-, and low-income countries , Household income predicts trajectories of child internalizing and externalizing behavior in high-, middle-, and low-income countries. *International Journal of Behavioral Development*, 0165025418783272. doi:10.1177/0165025418783272

Lee, J.-S., & Lee, K. (2016). Material Hardships and Social Support Among Australian Families with Children. *Journal of Child and Family Studies*, *25*(5), 1539–1549. doi:10.1007/s10826-015-0327-z

Leininger, J. L., & Kalil, A. (2014). Economic Strain and Children's Behavior in the Aftermath of the Great Recession. *Journal of Marriage and Family*, *76*(5), 998–1010. doi:10.1111/jomf.12140

Markman, M., & Luce, R. (2010). Impact of the Cost of Cancer Treatment: An Internet-Based Survey. *Journal of Oncology Practice*, *6*(2), 69–73. doi:10.1200/JOP.091074

Marks, G. N. (2007). *Income Poverty, Subjective Poverty and Financial Stress* (SSRN Scholarly Paper No. ID 1728587). Rochester, NY: Social Science Research Network. http://papers.ssrn.com/abstract=1728587. Accessed 22 December 2015

McKernan, S.-M., Ratcliffe, C., & Vinopal, K. (2009). *Do Assets Help Families Cope with Adverse Events?* Washington, DC: Urban Institute.

McLeod, J. D., & Shanahan, M. J. (1993). Poverty, Parenting, and Children's Mental Health. *American Sociological Review*, *58*(3), 351–366.

McLoyd, V. C. (1990). The impact of economic hardship on Black families and children: Psychological distress, parenting and socioemotional development. *Child Development*, *61*, 311–346.

Mistry, R. S., Lowe, E. D., Benner, A. D., & Chien, N. (2008). Expanding the Family Economic Stress Model: Insights From a Mixed-Methods Approach. *Journal of Marriage and Family*, *70*(1), 196–209.

Mostafa, T. (2015). *Sample design and attrition in MCS*. London, UK: Centre for Longitudinal Studies.

Neckerman, K. M., Garfinkel, I., Teitler, J. O., Waldfogel, J., & Wimer, C. (2016). Beyond Income Poverty: Measuring Disadvantage in Terms of Material Hardship and Health. *Academic Pediatrics*, *16*(3, Supplement), S52–S59. doi:10.1016/j.acap.2016.01.015

Newland, R. P., Crnic, K. A., Cox, M. J., Mills-Koonce, W. R., & Family Life Project Key Investigators. (2013). The family model stress and maternal psychological symptoms: mediated pathways from economic hardship to parenting. *Journal of family psychology: JFP: journal of the Division of Family Psychology of the American Psychological Association (Division 43)*, *27*(1), 96–105. doi:10.1037/a0031112

Panico, L., Stuart, B., Bartley, M., & Kelly, Y. (2014). Asthma Trajectories in Early Childhood: Identifying Modifiable Factors. *PLoS ONE, 9*(11):e111922. doi:10.1371/journal.pone.0111922.

Plewis, I., Calderwood, L., Hawkes, D., Hughes, G., & Joshi, H. (2007). Millennium Cohort Study: technical report on sampling. *London: Centre for Longitudinal Study, Institute of Education*. http://www.esds.ac.uk/doc/5350/mrdoc/pdf/mcs_technical_report_on_sampling_4th_edition.pdf. Accessed 25 March 2016

Ponnet, K. (2014). Financial Stress, Parent Functioning and Adolescent Problem Behavior: An Actor–Partner Interdependence Approach to Family Stress Processes in Low-, Middle-, and High-Income Families. *Journal of Youth and Adolescence*, *43*(10), 1752–1769. doi:10.1007/s10964-014-0159-y

Prochaska, J. J., Sung, H.-Y., Max, W., Shi, Y., & Ong, M. (2012). Validity Study of the K6 Scale as a Measure of Moderate Mental Distress based on Mental Health Treatment Need and Utilization. *International Journal of Methods in Psychiatric Research*, *21*(2), 88–97. doi:10.1002/mpr.1349

Sayal, K., Washbrook, E., & Propper, C. (2015). Childhood Behavior Problems and Academic Outcomes in Adolescence: Longitudinal Population-Based Study. *Journal of the American Academy of Child & Adolescent Psychiatry*, *54*(5), 360-368.e2. doi:10.1016/j.jaac.2015.02.007

Schenck-Fontaine, A., Lansford, J. E., Skinner, A. T., Deater-Deckard, K., Di Giunta, L., Dodge, K. A., … Chang, L. (2018). Associations Between Perceived Material Deprivation, Parents' Discipline Practices, and Children's Behavior Problems: An International Perspective. *Child Development*. [Epub ahead of print.] doi: 10.1111/cdev.13151

Sharp, L., Carsin, A.-E., & Timmons, A. (2013). Associations between cancer-related financial stress and strain and psychological well-being among individuals living with cancer. *Psycho-Oncology*, *22*(4), 745–755. doi:10.1002/pon.3055

Shaw, R. J., Benzeval, M., & Popham, F. (2014). To What Extent Do Financial Strain and Labour Force Status Explain Social Class Inequalities in Self-Rated Health? Analysis of 20 Countries in the European Social Survey. *PLOS ONE*, *9*(10), e110362. doi:10.1371/journal.pone.0110362

Tay, L., Batz, C., Parrigon, S., & Kuykendall, L. (2016). Debt and Subjective Well-being: The Other Side of the Income-Happiness Coin. *Journal of Happiness Studies*, 1–35. doi:10.1007/s10902-016-9758-5

Wagmiller, R. L. (2015). The Temporal Dynamics of Childhood Economic Deprivation and Children's Achievement. *Child Development Perspectives*, *9*(3), 158–163. doi:10.1111/cdep.12125

Waldfogel, J., & Washbrook, E. (2011). Early Years Policy. *Child Development Research*, *2011*, 1–12. doi:10.1155/2011/343016

Washbrook, E., Waldfogel, J., Bradbury, B., Corak, M., & Ghanghro, A. A. (2012). The Development of Young Children of Immigrants in Australia, Canada, the United Kingdom, and the United States. *Child Development*, *83*(5), 1591–1607. doi:10.1111/j.1467-8624.2012.01796.x

Yabroff, K. R., Dowling, E. C., Guy, G. P., Banegas, M. P., Davidoff, A., Han, X., et al. (2016). Financial Hardship Associated With Cancer in the United States: Findings From a Population-Based Sample of Adult Cancer Survivors. *Journal of Clinical Oncology*, *34*(3), 259–267. doi:10.1200/JCO.2015.62.0468

Young, R., & Johnson, D. R. (2015). Handling Missing Values in Longitudinal Panel Data With Multiple Imputation. *Journal of marriage and the family*, *77*(1), 277–294. doi:10.1111/jomf.12144

Zilanawala, A., & Pilkauskas, N. V. (2012). Material hardship and child socioemotional behaviors: Differences by types of hardship, timing, and duration. *Children and Youth Services Review*, *34*(4), 814–825. doi:10.1016/j.childyouth.2012.01.008

Table 1. Measures of Material Deprivation and Subjective Financial Stress (All waves; weighted sample)

	Mean
Material Hardship	
Behind on utility bills (1/0)	6.2%
Unable to afford warm, waterproof coat (1/0)	1.8%
Crowded housing (1/0)	7.7%
Problems with damp or condensation	
No damp	86.3%
Not much of a problem	6.3%
Some problems	5.5%
Great problems	2.0%
Subjective Financial Stress	
Living comfortably	23.7%
Doing alright	38.1%
Just about getting by	27.8%
Finding it quite difficult	7.7%
Finding it very difficult	2.8%
N (Family-Waves)	52,623

Notes: Means calculated using all waves of data for weighted sample

Table 2. Correlations of material deprivation measures

	1	2	3	4
1. Behind on utility bills	-			
2. Unable to afford warm, waterproof coat	0.17	-		
3. Problems with damp and condensation	0.12	0.10	-	
4. Crowded housing	0.17	0.09	0.10	-

Note: All correlations are significant at the $p < 0.001$ level. Correlations calculated using all waves of data for weighted sample

Table 3. Descriptive characteristics (All waves; weighted sample)

	Mean (SD)
Household Characteristics	
# of children	2.3 (1.0)
Live-in grandparent (%)	3.9%
Total HH size	4.2 (1.2)
Parent Characteristics	
Mother age at birth	29.7 (5.8)
Mother ethnicity (%)	
White	91.1%
Black/Black British	2.2%
Pakistani/Bangladeshi	3.0%
Indian	1.8%
Asian or other	1.1%
Mixed	0.8%
Immigrant (%)	9.1%
Married or cohabiting (%)	64.9%
Education (%)	
None	8.8%
NVQ Level 1 (Less than lower secondary qualifications)	7.2%
NVQ Level 2 (Lower secondary qualifications)	28.6%
NVQ Level 3 (Upper secondary qualifications)	15.4%
NVQ Level 4 (First tertiary degree (BA))	34.3%
NVQ Level 5 (Postgraduate degree)	5.8%
Mother serious psychological distress (%)	26.4%
Focal Child Characteristics	
Male (%)	51.5%
Age	5.1 (1.7)
Internalizing behavior problems (0-20)	2.0 (2.5)
Externalizing behavior problems (0-20)	4.1 (3.9)
Economic Hardship	
No economic hardship (%)	50.3%
Income poverty (%)	24.4%
Material deprivation (%)	14.4%
Subjective financial stress (%)	36.1%
N (Family-Waves)	52,623

Note: Standard deviations in parentheses. Means calculated using all waves of data for weighted sample

Table 4. Correlations of economic hardship dimensions (weighted sample)

	1	2	3
1. Income poverty	-		
2. Material deprivation	0.34	-	
3. Subjective financial stress	0.30	0.25	-

Note: All correlations are significant at the $p < 0.001$ level. Correlations calculated using all waves of data for weighted sample

Table 5. Descriptive characteristics by combination of economic hardship dimensions (weighted sample)

	No Economic Hardship	Economic Hardship Without Income Poverty			Economic Hardship With Income Poverty			
		MD Only	Stress only	MD + Stress	Poverty Only	Poverty + MD	Poverty + Stress	All
Household Characteristics								
# of children	2.1 (0.8)	2.7 (1.2)	2.2 (0.8)	2.6 (1.2)	2.3 (1.0)	3.3 (1.6)	2.3 (1.0)	3.0 (1.5)
Live-in grandparent (%)	2.5%	6.9%	2.9%	5.7%	7.7%	9.9%	5.8%	5.1%
Total HH size	4.1 (0.9)	4.9 (1.5)	4.1 (0.9)	4.6 (1.4)	4.1 (1.2)	5.3 (1.9)	3.9 (1.2)	4.7 (1.8)
Parent Characteristics								
Mother age at birth	31.4 (4.9)	29.3 (5.8)	30.9 (5.3)	29.1 (6.1)	27.0	26.5	27.7 (6.3)	26.9 (6.2)
Mother ethnicity (%)								
White	95.0%	86.6%	94.0%	86.7%	85.6%	75.5%	86.2%	80.2%
Black/Black British	0.8%	3.5%	2.4%	6.4%	2.3%	4.4%	3.2%	6.2%
Pakistani/Bangladeshi	0.9%	4.5%	0.8%	2.4%	8.0%	15.0%	5.9%	9.2%
Indian	1.8%	3.0%	1.3%	1.6%	2.4%	1.6%	1.9%	1.0%
Asian or other	0.9%	1.6%	0.8%	2.1%	1.0%	1.8%	1.3%	1.6%
Mixed	50.0%	0.8%	0.7%	0.8%	0.7%	1.6%	1.6%	1.8%
Immigrant parent (%)	7.2%	13.0%	6.7%	10.8%	10.2%	20.1%	9.6%	14.9%
Married or cohabiting (%)	93.9%	89.0%	87.2%	80.2%	58.7%	66.0%	45.4%	51.9%
Education (%)								
None	2.7%	8.8%	4.0%	11.8%	18.0%	36.0%	20.2%	29.5%
NVQ Level 1 (Basic school leaving certifica	4.2%	8.5%	5.6%	9.9%	14.0%	13.6%	13.5%	14.0%
NVQ Level 2 (Vocational training)	24.7%	30.2%	30.2%	32.8%	34.5%	31.6%	36.3%	35.0%
NVQ Level 3 (Advanced vocational training	15.5%	14.3%	17.8%	16.9%	15.8%	9.6%	14.2%	11.6%
NVQ Level 4 (A.A or B.A.)	44.8%	31.4%	36.8%	24.6%	15.9%	8.7%	14.4%	9.1%
NVQ Level 5 (M.A. or Ph.D.)	8.1%	6.8%	5.6%	4.1%	1.8%	0.5%	1.6%	0.8%
Any parent employed (%)	99.7%	97.8%	99.1%	97.0%	88.4%	72.1%	82.6%	64.7%
Mother serious psychological distress (%)	2.8%	7.2%	5.3%	10.8%	8.4%	17.0%	13.8%	20.7%
Focal Child Characteristics								
Male (%)	51.2%	52.0%	50.3%	55.1%	51.6%	52.6%	49.4%	49.1%
Age	5.1 (1.7)	5.3 (1.7)	5.2 (1.7)	5.4 (1.7)	4.9 (1.6)	5.0 (1.7)	5.1 (1.6)	5.2 (1.7)
Internalizing behavior problems (0-20)	2.1 (2.2)	2.7 (2.6)	2.6 (2.5)	3.3 (3.1)	2.9 (2.7)	3.2 (2.8)	3.2 (2.9)	3.7 (3.1)
Externalizing behavior problems (0-20)	4.5 (3.3)	5.5 (3.8)	5.3 (3.6)	6.3 (3.9)	6.0 (3.9)	6.2 (4.3)	6.1 (4.1)	6.7 (4.3)

Note: Poverty = income poverty; MD = material deprivation; Stress = subjective financial stress. (N = 52,623 family-waves). Standard deviations in parentheses.

Table 6. Weighted mixed-effects regression results: Relationship between economic hardship combinations and children's behavior problems

	Internalizing behavior	Externalizing behavior
Poverty Only	0.094***	0.065**
	(0.023)	(0.021)
MD Only	0.107***	0.123***
	(0.027)	(0.024)
Stress Only	0.104***	0.098***
	(0.015)	(0.014)
Poverty + MD	0.130***	0.148***
	(0.034)	(0.033)
Poverty + Stress	0.129***	0.096***
	(0.023)	(0.022)
Stress + MD	0.236***[a]	0.216***[b]
	(0.031)	(0.027)
All	0.257***[a]	0.186***[b]
	(0.027)	(0.025)

Note: All models include full set of covariates, as well as country and wave fixed effects. Coefficients presented in SD units. Clustered robust standard errors in parentheses. Poverty = income poverty; MD = material deprivation; Stress = subjective financial stress. N = 52,623 family-waves.

[a]Coefficients are significantly different from all other coefficients in the model ($p < 0.01$); not significantly different from each other.

[b]Coefficients are significantly different from all other coefficients in the model ($p < 0.05$); not significantly different from each other.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Table 7. Weighted fixed-effects regression results: Economic hardship combinations and children's behavior problems

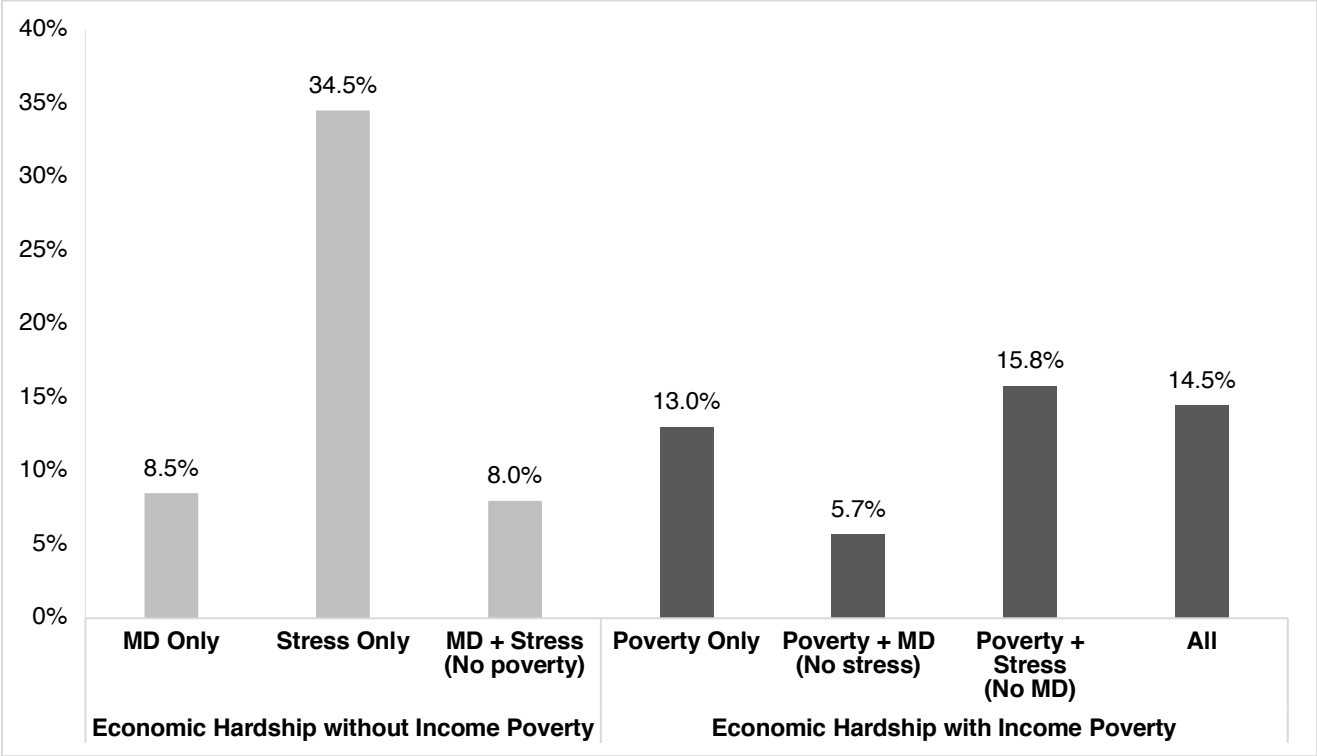
	Internalizing behavior	Externalizing behavior
Poverty Only	0.011	0.003
	(0.026)	(0.024)
MD Only	0.032	0.055*
	(0.031)	(0.026)
Stress Only	0.035	0.025
	(0.018)	(0.016)
Poverty + MD	-0.034	0.067
	(0.042)	(0.039)
Poverty + Stress	-0.016	-0.008
	(0.028)	(0.025)
Stress + MD	0.091**[a]	0.070*
	(0.035)	(0.031)
All	0.070*[a]	0.035
	(0.035)	(0.031)

Note: All models include full set of covariates, as well as family, country, and wave fixed effects. Coefficients presented in SD units. Clustered robust standard errors in parentheses. Poverty = income poverty; MD = material deprivation; Stress = subjective financial stress. $N = 40{,}317$ family-waves.

[a]Coefficients are significantly different from all other coefficients in the model ($p < 0.05$); not significantly different from each other.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Fig. 1 Prevalence of economic hardship combinations in weighted sample



Note: Poverty = income poverty; MD = material deprivation; Stress = subjective financial stress. (*N* = 52,623 family-waves).