

# Economic Instability, Food Insecurity, and Child Health in the Wake of the Great Recession

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**ABSTRACT** Although there is a wealth of research on the relationship between income level and employment status and child well-being, the relationship between economic instability and health during early childhood is understudied. We examine the associations between the incidence, accumulation, and timing of in-year employment and income instability with household and child food insecurity and child health using a nationally representative sample of households. The sample includes children age 3–5 from households in the 2008 Survey of Income and Program Participation ( $N = 5,056$ ). We find that young children’s households experience high levels of both income and employment instability. Both the incidence and the accumulation of instability predict poorer child outcomes, more recent instability is more strongly associated with child outcomes, and these relations are stronger for children with less educated parents. Employment and income changes have separate, unique associations with each outcome and operate in somewhat different ways.

## **INTRODUCTION**

In early childhood, nutrition and health are critical to meet a child’s growth and developmental needs. Recent research suggests that income-based health disparities in early childhood are another consequence of growing income inequality (Crosnoe, Bonazzo, and Wu 2015). In addition to growing income disparities, there is an expanding gap between low- and high-income households’ income instability, with a steady rise in instability among low-income households with children over the past 3 decades (Morris et al. 2015). This growing instability gap may be one explanation for the

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growing health and achievement gaps observed between low- and high-income children (Reardon 2011; Crosnoe et al. 2015).

A wealth of research has linked family income, which affects the resources available for activities or commodities, to family outcomes and children's development, with an increasing focus on the importance of income during early childhood in particular (Edin and Kissane 2010; Duncan, Magnuson et al. 2011; Duncan, Morris, and Rodrigues 2011). Similarly, research has identified links between parental employment characteristics (e.g., work hours) and children's well-being (Ruhm 2004; Han 2005; Kalil et al. 2014; Li et al. 2014) and health (Morrissey, Dunifon, and Kalil 2011).

Separate from resource levels, however, instability in and uncertainty about future financial resources during this sensitive period could uniquely affect children's development. Recent research demonstrates that income instability experienced during childhood predicts poorer short- and long-term behavioral and educational outcomes, particularly for children in low-income families (Hardy 2014; Gennetian et al. 2015; Miller and Votruba-Drzal 2016). Likewise, parental job loss, separate from income loss, is associated with poorer child behavior and academic outcomes (Kalil and Ziol-Guest 2005; Kalil and Wightman 2011; Johnson, Kalil, and Dunifon 2012). Economic instability, which is more common among disadvantaged families (Acs and Nichols 2010; Wolf et al. 2014; Morris et al. 2015) and grew during the recent Great Recession (which occurred between December 2007 and June 2009; Kalleberg 2009; Lambert, Fugiel, and Henly 2014), may serve as a mechanism underpinning the relationship between economic resources and children's development. Further, it is possible that chronic instability, as opposed to infrequent events, and events that occurred in the more recent past are more harmful to children's well-being. These characteristics of instability remain unexplored, particularly during the preschool period, when child-rearing expenses such as child care are high and families are not yet benefiting from publicly supported K–12 education. Thus, the preschool period may be a particularly important time to consider these issues.

In this study, we examine the patterns, accumulation, and recency of household income and employment changes experienced by preschool-age children and how these patterns relate to children's food security and health in the wake of the Great Recession, a period of particularly large economic uncertainty and instability. Further, we investigate how these associations differ by family socioeconomic status.

**ECONOMIC INSTABILITY**

Economic instability—also referred to as economic insecurity or volatility—can describe both income instability and employment instability. Income instability refers to substantial changes in household income (including earnings and public or private income support), while employment instability refers to a substantial change in employment status (i.e., a status change from unemployment to employment or vice versa or a large increase or decrease in work hours; Sandstrom and Huerta 2013). These changes and patterns of instability have theoretical and empirical relevance to the investigation of how resources, and inequality in resources, affect families and children. For example, figure 1 shows household income levels over the course of 1 year for five households with the same annual income of \$22,000. As the figure illustrates, household income trajectories vary dramatically over the course of the year, which could result in dramatically different consequences for family and child well-being and investments in children over the course of the year. Investigating average income alone

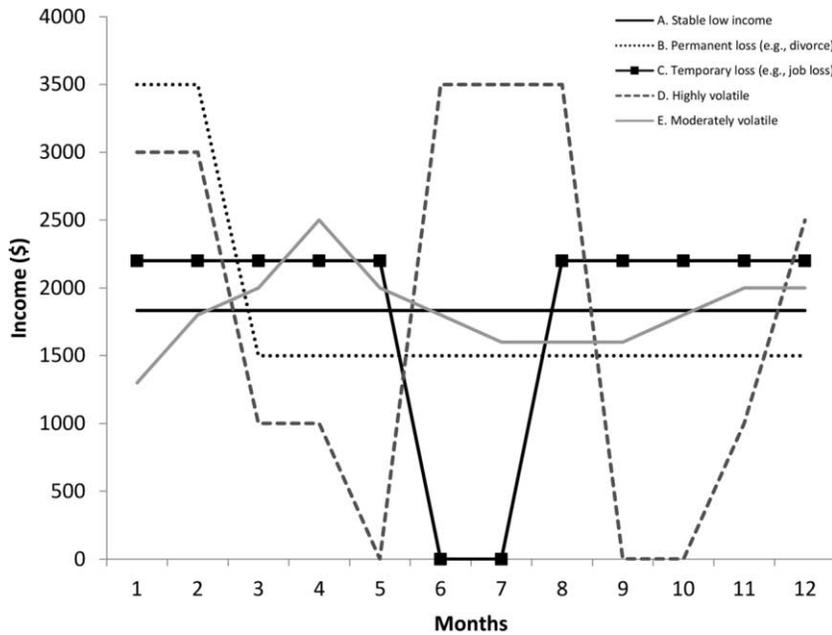


FIGURE 1. Hypothetical monthly income patterns of households with \$22,000 yearly income. Source: Heather Hill, personal communication.

would mask these patterns, which are a potentially important source of heterogeneity in children's outcomes from low resource levels.

Of course, income and employment changes are interrelated; households that experience higher levels of income instability are more likely to experience higher levels of employment instability. Indeed, job loss is one of the primary causes of income instability (Acs, Loprest, and Nichols 2009; Acs and Nichols 2010). However, the two are not always linked. First, individuals may receive raises or reductions in pay while remaining in a single employment position or changing from one job to another without a gap in employment. Second, nonearned income may change without corresponding changes in employment. For example, economic downturns are associated with decreases in some measures of child support compliance (Mincy, Miller, and De la Cruz Toledo 2016). Similarly, the public safety net is designed to smooth or guarantee a base level of household resources; thus, the period after a job loss may result in lower earnings but not necessarily substantially lower household resource levels.

Economic instability grew dramatically during the recent Great Recession. Unemployment more than doubled within a 3-year period (from 5 percent in January 2007 to 10 percent in October 2009) and was particularly high among less educated populations (BLS 2012). In 2009, about 7 million children under age 17 lived with at least one unemployed parent, and another 4 million lived with parents who were working part-time involuntarily (Isaacs 2013). In addition, from 2008 to 2010, there was growth in low-wage sector jobs, which are generally less stable in terms of job security and work hours, while middle- and high-wage sector jobs were lost (BLS 2012). Public assistance, particularly Emergency Unemployment Compensation and the Supplemental Nutrition Assistance Program (SNAP) benefits, was temporarily expanded during this period as well (Nord and Prell 2011; Oliveira 2015).

#### **ECONOMIC INSTABILITY AND CHILDREN'S FOOD SECURITY AND HEALTH**

Several theoretical perspectives based on economic hardship generally can be used to explain why income and employment instability may affect children's well-being. The family stress model suggests that economic hardship affects parental stress, mental health, and family functioning and, thus, child outcomes (Conger and Conger 2002). The family investment model (Becker

and Tomes 1976) suggests that a lack of predictable income results in a lack of parental investment (both time and money) in children and thus in reduced human capital development. Therefore, the incidence of instability would be predictive of poor outcomes. The bioecological model suggests that events that are more proximal in terms of timing and in their effect on daily functioning within the home (e.g., household income changes or changes in parents' work hours/time at home) would alter outcomes more than those occurring further in the past or outside of the home (Bronfenbrenner and Morris 2006). That is, the effects of an event would be expected to vary with its timing or recency. Further, a cumulative risk perspective would predict an additive effect of repeated or multiple experiences of instability on children's capacity to overcome such adverse events (Evans 2003). Indeed, previous research finds physiological consequences from exposure to constantly changing contexts (Ganzel, Morris, and Wethington 2010). From this perspective, the accumulation of unstable events, or the experience of chronic instability, would be expected to have more harmful consequences than relatively infrequent events.

Both income instability and employment instability can change the level of families' economic and time resources, interrupt family routines, and increase stress and uncertainty within the home. However, it is possible that different types of changes (income or employment), different directions of changes (positive or negative), and the different family contexts in which changes occur can alter the magnitude and direction of effects on children. Abrupt decreases in income may lead to poorer child outcomes by disrupting family routines, changing children's environments (e.g., changing child care), and contributing to increased stress among parents and other family members (Raver, Roy, and Pressler 2015). Research in Finland finds that reductions in disposable family income predict negative consequences for children's mental health through increased economic pressure and poorer parental mental health, marital interactions, and parenting quality (Solantaus, Leinonen, and Punamaki 2004). Further, families who experience sharp decreases in income may change their spending habits (Yeung and Hofferth 1998; Mills and Amick 2010), potentially skipping or delaying health care (Mills and Amick 2010).

While a parent's job loss could have negative consequences for children similar to the consequences of decreases in income, a potentially positive result is that the parent is home more often. Time-use research suggests that during economic downturns, children spend more time engaged with

their fathers in enriching activities (Morrill and Pablionia 2012). This could also improve health if families prepare more nutritious meals at home rather than eating out (Guthrie, Lin, and Frazao 2002). However, if it generated high levels of stress within the home or a loss of health insurance or other benefits, the job loss may be less beneficial to children's health. Likewise, achieving employment gains, moving into the labor force, or increasing work hours could be beneficial for parents' mental health, stress, or health care access but could also decrease the amount of time parents spend with their children (Li et al. 2014).

Children in disadvantaged families experience higher rates of economic instability than their more advantaged peers (Acs and Nichols 2010; Morris et al. 2015). In the lowest income quintile, about 20 percent of individuals with children lose at least half of their incomes at some point over the course of a year; of these individuals, only about half recover to predecrease income levels within the subsequent year (Acs et al. 2009). Such instability may be more harmful to families with fewer economic or educational resources that could be used help to buffer any negative effects (Yeung and Hofferth 1998; McKernan, Ratcliffe, and Vinopal 2009; Mills and Amick 2010). For example, households with fewer assets and those living in areas with high unemployment are more likely to cut food expenditures following a substantial loss in income or job change (Yeung and Hofferth 1998). Substantial income increases could have opposite effects.

Indeed, an emerging body of evidence finds that income instability is negatively associated with children's educational and behavioral outcomes (Hardy 2014; Morrissey, Hutchison, and Winsler 2014; Gennetian et al. 2015), and, independent of changes in household income, employment instability is linked with poorer academic outcomes (Kalil and Ziol-Guest 2005; Hill et al. 2011; Kalil and Wightman 2011). To date, however, little research has examined how economic instability affects children's health and food security. Changes in parents' mental health or a loss of health insurance resulting from job or income loss may negatively influence children's health and health care use, including lower rates of well-child doctors' visits (Sills et al. 2007). Research finds that welfare exits (and presumably the sharp decrease in household resources) are associated with poorer physical and general health among preschool-age children, particularly in vulnerable immigrant families (Kalil and Crosby 2010).

Economic instability may also lead to food insecurity, which is defined as "limited or uncertain availability of nutritionally adequate and safe foods

or limited or uncertain ability to acquire acceptable foods in socially acceptable ways” (Bickel et al. 2000, 6). Previous research finds that substantial reductions in income, particularly when they are unexpected, create budget constraints (Gundersen and Gruber 2001) and increase the likelihood of food insecurity (Leete and Bania 2010; Dahl, DeLeire, and Mok 2014; Jacknowitz, Morrissey, and Brannegan 2015), whereas increases in income are associated with exits from food insecurity (Jacknowitz et al. 2015). In turn, food insecurity, whether directly experienced by children through reduced food intake or indirectly via parents’ stress or depression, can have harmful effects on children’s development, including health (Bronte-Tinkew et al. 2007; Nord 2009).

### **THE CURRENT STUDY**

Despite the emerging body of research surrounding income instability and employment instability, the literature has largely focused on the outcomes of adolescents or adults, with few studies focused on young children. Further, most research to date has investigated either income changes or employment changes, while few studies have attempted to disentangle the two using longitudinal data. This study makes several contributions to the emerging literature on economic instability and children’s well-being by examining the unique associations among income changes, employment changes, and the food security and health outcomes of young children. Further, we build on the growing body of research that examines the incidence of stability to also study the timing and accumulation of economic instability in relation to children’s outcomes. We focus on children age 3–5 to eliminate planned parental exits from the labor force near the time of the birth of a child. Using monthly data on households with young children from the 2008 Survey of Income and Program Participation (SIPP), we test the following research questions:

1. Is the incidence of employment and income change (positive and negative) over the course of 3 years associated with higher food insecurity and poor health among children age 3–5?
2. Do the numbers of employment and income changes have cumulative associations with food insecurity and poor health among children age 3–5?

3. Are employment and income changes that occurred in the more recent past more predictive of food security and health among children age 3–5 years?

We hypothesize that greater and more recent economic instability, regardless of the direction of change, will be associated with poorer child health and food security. We expect more recent job and income changes and the experience of multiple events to have stronger relations with children's outcomes than more temporally distant or infrequent changes. Finally, we investigate heterogeneity by family socioeconomic status and hypothesize that these associations will be stronger among children with less educated parents.

## **METHOD**

### **DATA**

We use data from the 2008 SIPP panel. Collected by the US Census Bureau, the SIPP is uniquely positioned to investigate instability because it collects monthly household income and employment information on a nationally representative sample of households over several years, along with two rounds of data on parenting and child outcomes. We use the most recent SIPP panel, beginning in 2008, to examine patterns of instability in the lives of children age 3–5 and how these patterns relate to their food security and health outcomes. This allows us to examine the proximal monthly changes in households' economic contexts and to assess the timing of changes among employment and income instability in relation to later outcomes, using a data set collected during the Great Recession.

The main objective of the SIPP is to provide accurate and comprehensive information about the income of families and households in the United States. In each survey wave, the core (administered every 4 months) collects information on demographic characteristics, labor force and program participation, and the amounts and types of earned and unearned income from each adult in the household over age 15. Other questions, collected as part of the topical modules, provide in-depth information on specific subjects and are asked less frequently. In this study, we use data from both the core and topical modules.

## ANALYTIC SAMPLE

The 2008 SIPP panel surveyed households from September 2008 through December 2011 in the 10 waves of data used in this study. Thus, we follow children and their households over a span of 36 months. The unit of analysis in this sample is children age 3–5 years at the tenth wave of the panel; this eliminates planned parental exits from the labor force near the time of the birth of a child. Each sample child had household data (i.e., household was present in the panel) for at least 2 full years (i.e., three consecutive waves in 2 of the years). In addition, we exclude children whose households were missing more than two waves of data in any of the 3 years (976 children). Our final sample size is 5,056 children (83.8 percent of preschool-age children in the data set) in 4,258 households. Each adult in the household was interviewed, and our data were reported by the child’s “designated parent,” to whom we refer as the primary parent, and the spouse or cohabiting unmarried partner of the designated parent. In our sample, over 97.1 percent of the designated parents are female, 86.1 percent are mothers, 1.9 percent are fathers, 8.5 percent are grandmothers, 0.6 percent are grandfathers, 1.3 percent are other female relatives, 0.1 percent are other male relatives, and the remaining 1.4 percent are foster parents, roommates, or other nonrelatives.

We used multiple imputation (with Stata’s “ice” command) to handle missing data on covariates only. We followed recommendations by Allison (2001), using the full set of covariates in our imputation model because we did not want to lose cases on the basis of missing covariate data (see Janssen et al. [2010] for the bias this can cause). We imputed all missing covariates, but we do not impute key independent (i.e., employment status and income level) or dependent variables. All estimates (calculated using Stata’s “mi estimate” command) were derived using data from 20 multiply imputed data sets. The covariates with the highest rates of missingness were marital status at wave 10 (12.2 percent), followed by child race (2.1 percent) and child and parent sex (1.8 percent).

## MEASURES

*Household Income Instability*

Average monthly income is a composite variable computed by the Census Bureau that sums the reported pretax income of everyone in the house-

hold. This includes earned income, cash transfer payments (i.e., benefits from means-tested programs including cash values of SNAP), lump-sum and one-time payments, regular salary or other income from self-owned businesses, property income, and any interest and dividend income (Westat 2007). It is collected at each wave (once every 4 months) and is reported on for each of the previous 4 months. The inclusion of public cash and cash-like assistance in the calculation of monthly income is particularly useful for our purposes in separating the independent associations between parental employment changes and household cash resources changes.

Studies have shown that the income data collected in the SIPP are subject to reporter seam bias, such that income is reported with more error when recalled back to previous months but much less error when reporting for the current month (Hill 1987; Moore 2007). In addition, survey respondents are more likely to assign transitions in income level to the month in which the survey is administered rather than to other months. Acs and colleagues (2009) find that large drops in income of 50 percent or greater are five times more likely to occur in months that cross a wave boundary than in months within a wave. Therefore, we use only income reported for the month in which the data were collected at each wave. Given this restriction, monthly income is reported three times per year for each household.

To avoid counting small income changes that would have a minimal effect on consumption or family life, we define a change in income across consecutive waves at or above a magnitude of 33 percent, following recent literature (see Wolf et al. 2014; Gennetian et al. 2015). We distinguish between *positive income change* (a 33 percent or greater income increase) and *negative income change* (a 33 percent or greater income decrease).

#### *Employment Status Instability*

Employment status is a self-reported variable for the child's primary parent and the primary parent's married spouse or cohabiting partner and is defined as the average number of hours worked per week in the previous month. Employment status is coded for each adult and each wave. Similar to our treatment of the measure of household income, we use the response for the month in which the data were collected at each wave. Responses were categorized into three categories: full-time employed (worked 35 weekly hours or more throughout the month), part-time employed (worked fewer than 35 weekly hours throughout the month or 35

or more hours for part of the month), and unemployed (did not work/did not have a job or was absent without pay from a job for all weeks in the previous month). *Employment declines* are defined as moving from full-time employment to part-time employment or unemployment and as moving from part-time employment to being unemployed. *Employment inclines* are defined as moving from being unemployed to part-time or full-time employment or from part-time employment to full-time employment. If employment status changed for either parent, it was coded as such.

#### *Household Food Insecurity*

In the ninth wave, every adult in the household responded to a five-item scale adapted from the standard short six-item US Food Security Survey Module. All households were asked at least the first three food security questions of the scale: (1) “In the last four months, the food that (I/WE) bought just didn’t last and (I/WE) didn’t have money to get more (*often true, sometimes true, or never true*),” (2) “In the last four months, (I/WE) couldn’t afford to eat balanced meals (*often true, sometimes true, or never true*),” and (3) “Getting enough food can be a problem for some people.” Respondents reported which of these statements best described the food eaten in their household in the last 4 months: “enough of the kinds of food we want; enough but not always the kinds of food we want to eat; sometimes not enough to eat; often not enough to eat.” We categorize children’s household as food insecure if respondents indicated any food security problems or food insufficiency (17.3 percent of the sample).

#### *Child Food Insecurity*

Respondents who indicated any food security problems or food insufficiency in response to the questions above were also asked about child food insecurity. Specifically, they were asked: “In the last four months, (MY CHILD WAS/OUR CHILD WAS) not eating enough because (I/WE) couldn’t afford enough food. Was that often, sometimes or never true?” Households that indicated this to be “sometimes true” or “often true” were categorized as having child food insecurity (5.1 percent of the sample).

#### *Child Health Status*

In the tenth wave, primary parents reported on the health status of their child. Specifically, respondents were asked: “Would you say (CHILD NAME)’s health in general is excellent, very good, good, fair, or poor?” We

dichotomize this variable to indicate whether children's health is "excellent" or "very good" (88.9 percent) and "good," "fair," or "poor" (11.1 percent). This parent-reported measure of child health has been used in other child development research (e.g., Ziol-Guest and Kalil 2012) and is predictive of school readiness outcomes in early childhood (Crosnoe et al. 2015).

#### *Parent Education*

In each wave, survey respondents were asked about their highest degree received or grade completed. On the basis of the response in the first wave of the panel, we categorize parents as less than a high school degree (15.3 percent), high school degree but no college degree (including some college but no degree; diploma or certificate from vocational, technical, trade, or business school; associate's degree; 54.2 percent), and bachelor's degree or more (bachelor's degree, any secondary degree; 30.5 percent). We stratify our analyses by the education level of the primary parent (survey respondent). We do not take into account the second parent's education among two-parent households, given that 86 percent of primary parents are mothers and research demonstrates the importance of maternal education in predicting children's outcomes (Bradley and Corwyn 2002).

#### *Covariates*

All models include a number of control variables, which include parent, child, and household characteristics at wave 10. These include gender of the primary parent (97.2 percent female), child's gender (48.7 percent female), child's age measured at the wave of the dependent variable ( $M = 4.20$  years), marital status of the designated parent (70.5 percent married), child's race (56.4 percent white, non-Hispanic; 13.1 percent black, non-Hispanic; 22.5 percent Hispanic; 3.0 percent other), and average monthly household income over the 10 waves of the study ( $M = \$5,649$ ). The mean average monthly income varies substantially based on the education level of the primary parent: less than a high school degree ( $M = \$2,563$ ), high school degree and some college ( $M = \$4,453$ ), and college degree or more ( $M = \$9,310$ ).<sup>1</sup> Finally, we include parents' employment status (unemployed, part-time, or full-time) and household income level at wave 10 (concurrent with the dependent variables).

1. All descriptive estimates are weighted.

## ANALYTIC PLAN

We use multivariate linear probability models (LPMs) to estimate the associations between measures of employment instability or income instability and each outcome in a series of four separate regressions for each outcome, with standard errors adjusted for children clustered in the same households. The coefficients can be interpreted as the percentage point change in the probability that the dependent variable will be endorsed. We include measures of both employment and income instability, and inclines/positive and declines/negative changes, in the same models in order to isolate the effects of each, also recognizing that inclines and declines are correlated with each other.

First, we estimate the association between any experience of household income and employment instability (incidence model) over the 10 waves (model 1). Second, we estimate the additive effects or number of changes in income and employment instability over the course of the 10 waves (cumulative model; model 2). We then estimate these models by the education level of the primary parent to test our hypothesis that associations between economic instability are stronger among less educated households. To do so, we rerun models 1 and 2 on three subsamples based on the primary parent's education level. Third, we estimate the recency of changes in instability for each outcome (timing model), examining binary measures of any instability within each of the 3 years (i.e., any instability in year 1, any instability in year 2, and any instability in year 3; model 3) for the full sample and by education groups. Finally, we estimate the association between the additive effects and recency of instability with each outcome by measuring cumulative instability within years (model 4) for the full sample and by education groups. Specifically, we estimate the following equation for each model:

$$Y = \alpha + b_1\text{EmployInc} + b_2\text{EmployDec} + b_3\text{IncomePos} + b_4\text{IncomeNeg} + b_5X_{it}, \quad (1)$$

where  $Y$  is the dependent variable (household or child food insecurity or child health),  $b_1$  represents the association between employment status inclines and the dependent variable,  $b_2$  represents the association between employment status declines and the dependent variable,  $b_3$  represents the association between positive income changes and the dependent variable,

and  $b_4$  represents the association between negative income changes and the dependent variable. We include both employment and income changes in the model to tease apart their independent relationships with child well-being. A vector of demographic characteristics of the child, primary parent, and the household is  $X$ .

## RESULTS

Table 1 presents descriptive statistics on the rates of instability experienced across the entire sample, as well as by parental education. Similar to prior research (Wolf et al. 2014; Gennetian et al. 2015), household income and employment instability were quite high across all households. Over 60 percent all children's households experienced a negative income shock of 33 percent or more over the course of the study, and close to 70 percent experienced a positive income shock. For nearly three-quarters of our sample, at least one parent experienced some change in employment status over the study period, and over half experienced a decline in employment status (e.g., job loss or a move from full-time to part-time status). For more than one in five children, at least one parent experienced a decline in employment status each year. Inclines in employment (job gain/entry into the workforce) occurred at much higher rates than declines among primary parents, possibly as mothers entered or reentered the labor force after taking time with their young children.

In results not shown, about one-quarter (25.8 percent) of children lived in households that experienced no income shocks throughout the study period, while nearly half (49.0 percent) experienced both positive and negative income shocks. More children lived in households that (16.4 percent) experienced a positive income shock only compared to a negative income shock only (8.7 percent). Regarding employment shocks, only 16.0 percent of children lived in households that experienced no shocks, while 46.5 percent experienced both an incline and a decline in employment status. Interestingly, only a small proportion of children (2.9 percent) lived in households that experienced a decline in employment status with no subsequent incline, while 34.6 percent of children lived in households that experienced an incline in employment status with no decline.

While the experience of changes in household income and employment status is high for all households, children whose primary parents had less

**TABLE 1.** Weighted Descriptive Statistics of Household Employment and Income Instability, for Full Sample and by Primary Parent's Education Level

|  | Primary Parent's Education Level |       |       |       | Statistical Difference |      |
|--|----------------------------------|-------|-------|-------|------------------------|------|
|  | All                              | <HS   | HS    | BA+   | t                      | p    |
| Employment status of primary parent (wave 1):      |                                  |       |       |       |                        |      |
| Unemployed   | 43.2%                            | 66.7% | 42.7% | 32.4% | -15.05                 | .000 |
| Part time  | 19.1%                            | 13.0% | 20.0% | 20.5% | 3.83                   | .000 |
| Full time  | 37.8%                            | 20.2% | 37.3% | 47.2% | 11.63                  | .000 |
| Employment status changes of either parent:        |                                  |       |       |       |                        |      |
| Any decline in employment status:                  |                                  |       |       |       |                        |      |
| Year 1   | 29.2%                            | 36.7% | 31.2% | 22.1% | -7.76                  | .000 |
| Year 2   | 22.9%                            | 21.6% | 24.3% | 20.6% | -1.24                  | .214 |
| Year 3   | 21.5%                            | 25.4% | 22.8% | 17.5% | -4.81                  | .000 |
| Years 1-3  | 51.7%                            | 58.5% | 54.6% | 42.9% | -7.84                  | .000 |
| Any incline in employment status:                  |                                  |       |       |       |                        |      |
| Year 1   | 70.8%                            | 49.4% | 70.7% | 82.2% | 16.07                  | .000 |
| Year 2   | 70.2%                            | 50.4% | 69.2% | 81.8% | 15.51                  | .000 |
| Year 3   | 70.3%                            | 50.6% | 69.2% | 81.8% | 16.21                  | .000 |
| Years 1-3  | 80.1%                            | 50.6% | 68.8% | 82.8% | 11.84                  | .000 |
| No. of declines in employment status:              |                                  |       |       |       |                        |      |
| Year 1   | .33                              | .44*  | .35   | .24   | -7.86                  | .000 |
| Year 2   | .25                              | .25   | .27   | .22   | -1.78                  | .076 |
| Year 3   | .23                              | .29   | .25   | .19   | -5.14                  | .000 |
| Years 1-3  | .82                              | .98   | .87   | .65   | -8.41                  | .000 |
| No. of inclines in employment status:              |                                  |       |       |       |                        |      |
| Year 1   | 1.81                             | 1.09  | 1.80  | 2.25  | 21.11                  | .000 |
| Year 2   | 1.79                             | 1.19  | 1.72  | 2.23  | 18.80                  | .000 |
| Year 3   | 1.74                             | 1.22  | 1.66  | 2.15  | 16.14                  | .000 |
| Years 1-3  | 5.35                             | 3.50  | 5.18  | 6.63  | 21.35                  | .000 |
| Household income changes ( $\pm 33\%$ or greater): |                                  |       |       |       |                        |      |
| Any negative income shocks:                        |                                  |       |       |       |                        |      |
| Year 1   | 34.4%                            | 47.2% | 34.7% | 28.5% | -8.39                  | .000 |
| Year 2   | 29.1%                            | 40.5% | 30.8% | 20.6% | -10.32                 | .000 |
| Year 3   | 30.7%                            | 38.8% | 33.3% | 22.3% | -8.60                  | .000 |
| Years 1-3  | 61.5%                            | 77.0% | 63.8% | 50.6% | -12.19                 | .000 |
| Any positive income shocks:                        |                                  |       |       |       |                        |      |
| Year 1   | 38.9%                            | 53.3% | 40.3% | 30.7% | -10.62                 | .000 |
| Year 2   | 37.1%                            | 48.4% | 39.4% | 26.9% | -10.68                 | .000 |
| Year 3   | 33.5%                            | 42.5% | 34.2% | 27.7% | -6.70                  | .000 |
| Years 1-3  | 68.6%                            | 83.6% | 71.0% | 57.3% | -13.21                 | .000 |
| No. of negative income shocks:                     |                                  |       |       |       |                        |      |
| Year 1   | .40                              | .56   | .41   | .31   | -10.00                 | .000 |
| Year 2   | .33                              | .45   | .35   | .23   | -9.96                  | .000 |
| Year 3   | .33                              | .43   | .35   | .24   | -8.49                  | .000 |
| Years 1-3  | 1.05                             | 1.45  | 1.11  | .78   | -14.10                 | .000 |
| No. of positive income shocks:                     |                                  |       |       |       |                        |      |
| Year 1   | .45                              | .64   | .47   | .34   | -11.54                 | .000 |
| Year 2   | .43                              | .55   | .47   | .30   | -11.15                 | .000 |
| Year 3   | .40                              | .53   | .41   | .32   | -7.35                  | .000 |
| Years 1-3  | 1.28                             | 1.72  | 1.34  | .96   | -15.32                 | .000 |
| Sample size  | 5,056                            | 774   | 2,739 | 1,534 |                        |      |

Note.—An incline in employment is a change from unemployment to part-time employment, unemployment to full-time employment, or part-time employment to full-time employment. A decline in employment is a change from part-time employment to unemployment, full-time employment to part-time employment, or full-time employment to unemployment. Year 1 corresponds to September through December, 2008-9 (based on four rotation groups, one interviewed in each of the 4 months); year 2 corresponds to September through December, 2009-10; and year 3 corresponds to September through December, 2010-11. HS = high school degree; BA = college degree.

than a high school degree experienced income shocks and declines in employment status at higher rates than those whose parents had more education. Similarly, children whose primary parents had a college degree were more likely than their peers to experience inclines in their employment status. The correlations between employment and income instability are low to moderate in size (see table 2), indicating that these are distinct indicators of household economic stability and may be due to the inclusion of means-tested benefits in the income measure.

#### INCIDENCE AND ACCUMULATION OF ECONOMIC INSTABILITY AND HOUSEHOLD FOOD INSECURITY

The first panel in table 3 displays the results of LPMs estimating the association between economic instability incidence and accumulation and household food insecurity. Results from model 1 show that there is a statistically significant, positive association between a parent experiencing any declines in employment across the 10 waves and household food insecurity ( $b = .040, p < .01$ ; an increase of 4.0 percentage points in the probability of

**TABLE 2.** Weighted Intercorrelations between Income and Employment Instability, Food Insecurity, and Child Health

|   | (1)   | (2)   | (3)    | (4)   | (5)   | (6)   | (7)   | (8)   | (9)   | (10)  |
|---|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|
| Any decline in employment status          |       |       |        |       |       |       |       |       |       |       |
| Any incline in employment status          | .401  |       |        |       |       |       |       |       |       |       |
| No. of declines in employment status      | .874  | .371  |        |       |       |       |       |       |       |       |
| No. of inclines in employment status      | .177  | .809  | .180   |       |       |       |       |       |       |       |
| Any negative income shocks                | .226  | .015* | .227   | -.054 |       |       |       |       |       |       |
| Any positive income shocks                | .157  | .020* | .174   | -.051 | .463  |       |       |       |       |       |
| No. of negative income shocks             | .241  | .004* | .258   | -.082 | .766  | .438  |       |       |       |       |
| No. of positive income shocks             | .179  | .027* | .218   | -.049 | .475  | .729  | .567  |       |       |       |
| Household food insecurity                 | .115  | -.036 | .129   | -.115 | .124  | .119  | .138  | .137  |       |       |
| Child food insecurity                     | .078  | -.047 | .102   | -.086 | .079  | .069  | .078  | .095  | .503  |       |
| Child health (1 = very good or excellent) | -.012 | .070  | -.015* | .081  | -.070 | -.058 | -.065 | -.032 | -.052 | -.044 |

Note.—Employment and income instability were calculated across waves 1–10.

\* Correlation is not statistically significant at  $p < .05$ .

**TABLE 3.** Results from Linear Probability Models Estimating the Relationships between the Incidence and Accumulation of Employment and Income Instability and Outcomes

|   | Model 1<br>Any (1/0) Instability | Model 2<br>Number of Changes |
|---|----------------------------------|------------------------------|
| Household food insecurity:              |                                  |                              |
| Employment declines                     | .040**<br>(.013)                 | .027***<br>(.007)            |
| Employment inclines                     | -.026<br>(.019)                  | -.009***<br>(.002)           |
| Negative income shocks                  | .025+<br>(.014)                  | .006<br>(.008)               |
| Positive income shocks                  | .033*<br>(.014)                  | .016*<br>(.007)              |
| N                                       |                                  | 4,900                        |
| Child food insecurity:                  |                                  |                              |
| Employment declines                     | .020**<br>(.007)                 | .012**<br>(.005)             |
| Employment inclines                     | -.017*<br>(.009)                 | -.004**<br>(.001)            |
| Negative income shocks                  | .005<br>(.009)                   | .001<br>(.005)               |
| Positive income shocks                  | .013<br>(.009)                   | .006<br>(.004)               |
| N                                       |                                  | 4,900                        |
| Child in very good or excellent health: |                                  |                              |
| Employment declines                     | -.012<br>(.012)                  | -.010<br>(.007)              |
| Employment inclines                     | .001<br>(.020)                   | -.001<br>(.002)              |
| Negative income shocks                  | -.022<br>(.013)                  | -.016*<br>(.007)             |
| Positive income shocks                  | -.013<br>(.013)                  | .007<br>(.006)               |
| N                                       |                                  | 3,763                        |

Note.—Results are shown for waves 1–10. All estimates are derived from 20 multiply imputed data sets. Only covariate data were imputed; independent and dependent variables were not imputed. Coefficients for covariates are not shown. Standard errors (in parentheses) adjust for clustering of children within households.

+  $p < .10$ .

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .

household food insecurity). Somewhat surprisingly, the experience of one or more positive income shocks ( $b = .033, p < .05$ ) or one or more negative income shocks ( $b = .025, p < .10$ ) are both associated with increases in the likelihood of household food insecurity (although the latter is only marginally statistically significant). Cumulative employment inclines are negatively associated with household food insecurity ( $b = -.009, p < .001$ ). The results suggest that while inclines in employment predict lower house-

hold food insecurity, instability in income, regardless of its direction, predicts higher food insecurity. These associations are substantial, given the baseline household food insecurity rate of 17.3 percent.

#### INCIDENCE AND ACCUMULATION OF ECONOMIC INSTABILITY AND CHILD FOOD INSECURITY

The second panel in table 3 presents the results for child food insecurity. Results from model 1 show that employment instability is a significant predictor of child food insecurity in the expected directions. The experience of one or more employment declines predicts a higher likelihood of child food insecurity ( $b = .020, p < .01$ ), and inclines predict a lower likelihood of child food insecurity ( $b = -.017, p < .05$ ). Coefficients are smaller than they are with household food insecurity, likely because adults tend to shelter children from food insecurity (Nord 2009). As is shown in model 2, the association is cumulative. Specifically, each additional decline in employment status is associated with a higher likelihood of child food insecurity ( $b = .012, p < .01$ ), while each additional incline in employment is associated with a lower likelihood of child food insecurity ( $b = -.004, p < .01$ ). There is no association between positive income shocks and child food insecurity.

#### INCIDENCE AND ACCUMULATION OF ECONOMIC INSTABILITY AND CHILD HEALTH

The third panel in table 3 presents the results of parent-reported child health, showing few statistically significant associations. Of the instability indicators, only negative income shocks modeled as cumulative are negatively associated with child health ( $b = -.016, p < .05$ ).

#### TIMING OF ECONOMIC INSTABILITY, FOOD INSECURITY, AND CHILD HEALTH

Table 4 displays the associations between the outcomes and the timing of instability, showing both the presence of an economic change in each year (model 3) and the accumulation of economic changes in each year (model 4). Experiencing a negative income shock in year 1 (but not in years 2 or 3)

**TABLE 4.** Results from Linear Probability Models Estimating the Relationships between Employment and Income Instability and Outcomes, by Recency

|                        | Household Food Insecurity           |                                 | Child Food Insecurity               |                                 | Child in Very Good or Excellent Health |                                 |
|------------------------|-------------------------------------|---------------------------------|-------------------------------------|---------------------------------|--|---------------------------------|
|                        | Model 3<br>Any (1/0)<br>Instability | Model 4<br>Number of<br>Changes | Model 3<br>Any (1/0)<br>Instability | Model 4<br>Number of<br>Changes | Model 3<br>Any (1/0)<br>Instability    | Model 4<br>Number of<br>Changes |
| Year 1:                |                                     |                                 |                                     |                                 |  |                                 |
| Employment declines    | .012<br>(.017)                      | .013<br>(.014)                  | .006 <sup>d</sup><br>(.011)         | .003 <sup>h</sup><br>(.009)     | .007 <sup>i</sup><br>(.014)            | .005 <sup>a</sup><br>(.012)     |
| Employment inclines    | -.037<br>(.026)                     | -.017 <sup>*.b</sup><br>(.009)  | -.013<br>(.017)                     | -.013 <sup>*.i</sup><br>(.006)  | .022 <sup>n</sup><br>(.022)            | .005<br>(.007)                  |
| Negative income shocks | .037 <sup>*.a</sup><br>(.018)       | .014 <sup>c</sup><br>(.014)     | .019 <sup>+.f</sup><br>(.012)       | .015 <sup>k</sup><br>(.009)     | -.027 <sup>+</sup><br>(.014)           | -.022 <sup>+</sup><br>(.012)    |
| Positive income shocks | .014<br>(.016)                      | .02<br>(.013)                   | .011<br>(.011)                      | .010<br>(.008)                  | .005<br>(.013)                         | .009 <sup>r</sup><br>(.010)     |
| Year 2:                |                                     |                                 |                                     |                                 |  |                                 |
| Employment declines    | .038 <sup>*</sup><br>(.019)         | .039 <sup>*</sup><br>(.016)     | .004 <sup>e</sup><br>(.010)         | .012<br>(.011)                  | .006 <sup>m</sup><br>(.015)            | -.003<br>(.013)                 |
| Employment inclines    | .020<br>(.032)                      | .010 <sup>b</sup><br>(.010)     | -.002<br>(.022)                     | .009 <sup>j</sup><br>(.007)     | -.037 <sup>n.o</sup><br>(.025)         | .011<br>(.008)                  |
| Negative income shocks | -.010 <sup>s</sup><br>(.018)        | -.016<br>(.016)                 | .008 <sup>g</sup><br>(.012)         | -.001<br>(.009)                 | -.013<br>(.015)                        | -.009<br>(.013)                 |
| Positive income shocks | .019<br>(.017)                      | .020 <sup>c</sup><br>(.014)     | .006<br>(.011)                      | .003<br>(.008)                  | -.008 <sup>p</sup><br>(.014)           | -.014 <sup>r.s</sup><br>(.012)  |
| Year 3:                |                                     |                                 |                                     |                                 |  |                                 |
| Employment declines    | .037 <sup>+</sup><br>(.019)         | .037 <sup>*</sup><br>(.017)     | .037 <sup>**.d.e</sup><br>(.013)    | .031 <sup>*.h</sup><br>(.012)   | -.035 <sup>*.l.m</sup><br>(.016)       | -.020 <sup>q</sup><br>(.013)    |
| Employment inclines    | -.030<br>(.030)                     | -.017 <sup>+</sup><br>(.009)    | -.018<br>(.019)                     | -.006 <sup>j</sup><br>(.006)    | .023 <sup>o</sup><br>(.025)            | .004<br>(.007)                  |
| Negative income shocks | .015<br>(.019)                      | .019<br>(.018)                  | -.018 <sup>t.g</sup><br>(.011)      | -.018 <sup>+.k</sup><br>(.011)  | -.009<br>(.015)                        | -.015<br>(.014)                 |
| Positive income shocks | .018<br>(.018)                      | .017<br>(.014)                  | .002<br>(.011)                      | .009<br>(.010)                  | .020 <sup>p</sup><br>(.014)            | .019 <sup>+.s</sup><br>(.011)   |
| N (total = 5,056)      | 4,900                               | 4,900                           | 4,900                               | 4,900                           | 3,763                                  | 3,763                           |

Note.—All estimates are derived from 20 multiply imputed data sets. Only covariate data were imputed; independent and dependent variables were not imputed. Coefficients for covariates are not shown. Standard errors (in parentheses) adjust for clustering of children within households. Years 1, 2, and 3 calculated from waves 1–4, 4–7, and 7–10, respectively. Paired superscript letters represent results of tests for whether the differences in coefficients within models across years were statistically different from each other using a z-statistic calculation. c, g, p, q, r:  $p < .05$ ; j, n, o:  $p < .01$ ; a, b, d, e, f, h, i, k, l, m, s:  $p < .001$ .

<sup>+</sup>  $p < .10$ .

\*  $p < .05$ .

\*\*  $p < .01$ .

predicts a 3.7 percentage point increase in household food insecurity in the end of year 3. This lagged relation may result from households depleting savings to meet their most essential needs immediately after a loss in income. In contrast, employment declines (both incidence and accumulation) in both years 2 and 3 predict a between 3.7 and 3.9 percentage point increase in the likelihood of household food insecurity at the end of year 3. These coefficients are similar in size, suggesting that most households experience only one employment decline each year.

In contrast, employment changes, but not income changes, are associated with child food insecurity in the timing models. Each additional employment incline in year 1 predicts a 1.3 percentage point decrease in the likelihood of child food insecurity at the end of year 3. Concurrent job changes, specifically employment declines in year 3 (both incidence and accumulation) predict a 3–4 percentage point increase in child food insecurity that same year. This is similar to child health, for which the experience of any employment decline at year 3 predicts poorer child health at year 3 ( $b = -.035, p < .05$ ).

#### INCIDENCE AND ACCUMULATION OF ECONOMIC INSTABILITY, FOOD INSECURITY, AND CHILD HEALTH BY PARENTAL EDUCATION LEVEL

Table 5 shows the results from models 1 and 2 stratified by parental education level. The first panel displays the results estimating the association between the incidence and accumulation of economic instability and household food insecurity for three groups of children based on their primary parent's (typically their mother's) education level. Results suggest that associations between economic instability, food insecurity, and children's health are concentrated among children whose primary parent has a high school degree or less. The only significant associations for children with a primary parent with a college degree, and not for children with less educated parents (defined as having a high school degree or less), are between inclines in employment status and lower household and child food security, which may be attributed to food assistance that is available to disadvantaged households.

Across the two less educated groups (i.e., high school degree or less), experiencing an employment decline is predictive of food insecurity, and coefficients are larger among children with less educated parents. Positive in-

**TABLE 5.** Results from Linear Probability Models Estimating the Relationships between the Incidence and Accumulation of Employment and Income Instability and Household Food Insecurity, Child Food Insecurity, and Child Health, by Primary Parent’s Education Level

|   | Model 1                      |  |                              | Model 2                         |                                |                              |
|---|------------------------------|--|------------------------------|---------------------------------|--------------------------------|------------------------------|
|   | Any (1/0) Instability        |  |                              | Number of Changes               |                                |                              |
|   | <HS                          | HS                                       | >HS                          | <HS                             | HS                             | >HS                          |
| Household food insecurity:              |                              |  |                              |                                 |                                |                              |
| Employment declines                     | .106* <sup>a</sup><br>(.041) | .043*<br>(.018)                          | .008 <sup>a</sup><br>(.018)  | .039 <sup>+</sup><br>(.021)     | .037*** <sup>c</sup><br>(.010) | .004 <sup>c</sup><br>(.009)  |
| Employment inclines                     | -.084 <sup>+</sup><br>(.047) | -.010<br>(.026)                          | .003<br>(.028)               | -.017*** <sup>d</sup><br>(.006) | -.007*<br>(.003)               | -.003 <sup>d</sup><br>(.003) |
| Negative income shocks                  | -.022<br>(.048)              | .034 <sup>+</sup><br>(.020)              | .017<br>(.017)               | .008<br>(.021)                  | .002<br>(.011)                 | .007<br>(.011)               |
| Positive income shocks                  | .040<br>(.050)               | .044* <sup>b</sup><br>(.020)             | -.006 <sup>b</sup><br>(.017) | .004<br>(.019)                  | .019 <sup>+</sup><br>(.010)    | .002<br>(.011)               |
| Child food insecurity:                  |                              |  |                              |                                 |                                |                              |
| Employment declines                     | .055*<br>(.026)              | .014<br>(.011)                           | .015 <sup>+</sup><br>(.009)  | .022<br>(.016)                  | .014*<br>(.006)                | .004<br>(.004)               |
| Employment inclines                     | -.025<br>(.034)              | -.012<br>(.016)                          | -.009<br>(.014)              | -.004<br>(.005)                 | -.003<br>(.002) <sup>+</sup>   | -.003*<br>(.001)             |
| Negative income shocks                  | .018<br>(.033)               | -.009<br>(.012)                          | .013<br>(.009)               | -.003<br>(.015)                 | -.002<br>(.007)                | .005<br>(.007)               |
| Positive income shocks                  | -.018<br>(.040)              | .029* <sup>e</sup><br>(.011)             | -.007 <sup>e</sup><br>(.009) | .012<br>(.017)                  | .003<br>(.005)                 | .004<br>(.006)               |
| Child in very good or excellent health: |                              |  |                              |                                 |                                |                              |
| Employment declines                     | .018<br>(.042)               | -.017<br>(.018)                          | -.006<br>(.015)              | -.007<br>(.021)                 | -.008<br>(.009)                | -.012<br>(.009)              |
| Employment inclines                     | -.084 <sup>f</sup><br>(.052) | .041 <sup>f</sup> <sup>g</sup><br>(.029) | -.034 <sup>g</sup><br>(.026) | -.011<br>(.008)                 | .002<br>(.003)                 | -.005 <sup>+</sup><br>(.003) |
| Negative income shocks                  | .003<br>(.005)               | -.030<br>(.019)                          | -.018<br>(.017)              | -.003<br>(.017)                 | -.023*<br>(.010)               | -.009<br>(.011)              |
| Positive income shocks                  | -.003<br>(.006)              | .003<br>(.020)                           | -.020<br>(.016)              | .002<br>(.017)                  | .012<br>(.008)                 | .006<br>(.009)               |

Note.—All estimates are derived from 20 multiply imputed data sets. Only covariate data were imputed; independent and dependent variables were not imputed. Coefficients for covariates are not shown. Standard errors (in parentheses) adjust for clustering of children within households. Years 1, 2, and 3 calculated from waves 1–4, 4–7, and 7–10, respectively. HS = high school degree; BA = college degree. Paired superscript letters represent results of tests for whether the differences in coefficients across models were statistically different ( $p < .001$ ) from each other using a z-statistic calculation. Regression coefficients were tested for equality for each of the post hoc comparison estimates between education groups.

- <sup>+</sup>  $p < .10$ .
- \*  $p < .05$ .
- \*\*  $p < .01$ .
- \*\*\*  $p < .001$ .

come shocks positively predict both household and child food insecurity for households headed by a parent with a high school degree only. Patterns are similar in the cumulative models (model 2), with each additional employment incline associated with decreased household food insecurity for households with less educated parents. Cumulative employment declines

are also associated with increased food insecurity (both household and child) only among those with a high school degree. Again, patterns are similar for predicting child health, with each additional negative income shock associated with a reduced likelihood of a child being in excellent or very good health only among households headed by less educated parents.

#### TIMING OF INSTABILITY, FOOD INSECURITY, AND CHILD HEALTH BY PARENTAL EDUCATION LEVEL

Tables 6–8 display the associations between the recency of instability with each of the three outcomes, for both the presence of an economic change in each year (model 3) and the accumulation of economic changes in each year (model 4), by parental education level. Among children with the least educated parents, models 3 and 4 show associations between recent (in year 3) employment dynamics and outcomes and child food insecurity, in expected directions. Surprisingly, both the presence and accumulation of negative income shocks in the most recent year are associated with lower child food insecurity, while the accumulation of positive income shocks in that year is associated with higher child food insecurity. Both the presence and accumulation of positive income shocks are positively associated with child health, in the expected direction.

By contrast, results indicate that experiences of employment instability in each of the 3 years are predictive of household food insecurity, but not of child food insecurity, among children with slightly more educated parents (see tables 6–8). Specifically, employment declines in year 1 predict lower household food insecurity in year 3, while both the presence and accumulation of employment declines in the second and third years predict household food insecurity in year 3. Employment changes in the most recent year only are associated with child health, again in expected directions. Among the most educated households, there are no statistically significant relations observed across all timing models (see tables 6–8).

#### SENSITIVITY ANALYSES

To assess the robustness of our findings, we first ran models 1 and 2 controlling for a measure of the dependent variable measured in wave 4 (child health) or wave 6 (child or household food insecurity). Essentially, these lagged models assess how instability from waves 1–10 is associated with

**TABLE 6.** Results from Linear Probability Models Estimating the Relationships between Recency of Employment and Income Instability and Household Food Insecurity, by Primary Parent's Education Level

|                           | Less than High School    |                      | High School Degree,<br>No College |                      | College or More          |                      |
|---------------------------|--------------------------|----------------------|-----------------------------------|----------------------|--------------------------|----------------------|
|                           | Model 3                  | Model 4              | Model 3                           | Model 4              | Model 3                  | Model 4              |
|                           | Any (1/0)<br>Instability | Number of<br>Changes | Any (1/0)<br>Instability          | Number of<br>Changes | Any (1/0)<br>Instability | Number of<br>Changes |
| Year 1:                   |                          |                      |                                   |                      |                          |                      |
| Employment declines       | -.014<br>(.052)          | .009<br>(.043)       | .023<br>(.023)                    | .013<br>(.018)       | .012<br>(.022)           | .015<br>(.019)       |
| Employment inclines       | -.002<br>(.061)          | -.018<br>(.023)      | -.073*<br>(.036)                  | -.014<br>(.012)      | .052<br>(.037)           | -.003<br>(.015)      |
| Negative income<br>shocks | -.004<br>(.051)          | -.023<br>(.034)      | .047*<br>(.025)                   | .023<br>(.019)       | .022<br>(.024)           | .005<br>(.018)       |
| Positive income shocks    | -.017<br>(.049)          | -.015<br>(.032)      | .030<br>(.023)                    | .041*<br>(.018)      | -.014<br>(.020)          | -.003<br>(.017)      |
| Year 2:                   |                          |                      |                                   |                      |                          |                      |
| Employment declines       | .015<br>(.059)           | .010<br>(.046)       | .059*<br>(.027)                   | .056*<br>(.023)      | .017<br>(.022)           | .028<br>(.023)       |
| Employment inclines       | -.004<br>(.070)          | .005<br>(.026)       | .055<br>(.041)                    | .014<br>(.013)       | -.022<br>(.061)          | -.003<br>(.016)      |
| Negative income<br>shocks | .056<br>(.049)           | .059<br>(.041)       | -.032<br>(.026)                   | -.044<br>(.021)      | -.014*<br>(.021)         | -.011<br>(.020)      |
| Positive income shocks    | .017<br>(.052)           | -.001<br>(.029)      | .009<br>(.024)                    | .021<br>(.020)       | .010<br>(.019)           | .013<br>(.018)       |
| Year 3:                   |                          |                      |                                   |                      |                          |                      |
| Employment declines       | .103*<br>(.057)          | .106*<br>(.049)      | .048*<br>(.028)                   | .047*<br>(.024)      | -.024<br>(.021)          | -.023<br>(.020)      |
| Employment inclines       | -.151*<br>(.072)         | -.045*<br>(.025)     | -.009<br>(.038)                   | -.017<br>(.012)      | -.037<br>(.056)          | -.004<br>(.021)      |
| Negative income<br>shocks | .056<br>(.049)           | .019<br>(.043)       | .018<br>(.025)                    | .019<br>(.024)       | -.014<br>(.021)          | .023<br>(.026)       |
| Positive income shocks    | .059<br>(.052)           | .040<br>(.037)       | .000<br>(.024)                    | .001<br>(.019)       | .001<br>(.025)           | -.004<br>(.021)      |
| N                         | 747                      | 747                  | 2,643                             | 2,643                | 1,510                    | 1,510                |

Note.—All estimates are derived from 20 multiply imputed data sets. Only covariate data were imputed; independent and dependent variables were not imputed. Coefficients for covariates are not shown. Standard errors (in parentheses) adjust for clustering of children within households. Years 1, 2, and 3 calculated from waves 1–4, 4–7, and 7–10 respectively.

+  $p < .10$ .

\*  $p < .05$ .

changes in the outcome from waves 4–10 or 6–9.<sup>2</sup> Table A1 in the appendix, available online, presents the main results from models 1 and 2 (presented in table 3), alongside the results from the lagged models. Results show that

2. The correlation between household food insecurity at waves 6 and 9 is  $r = 0.70$ , child food insecurity at waves 6 and 9 is  $r = 0.20$ , and child health at waves 4 and 10 is  $r = 0.24$ .

**TABLE 7.** Results from Linear Probability Models Estimating the Relationships between Recency of Employment and Income Instability and Child Food Insecurity, by Primary Parent’s Education Level

|                        | Less than High School        |                                | High School Degree,<br>No College |                              | College or More          |                              |
|------------------------|------------------------------|--------------------------------|-----------------------------------|------------------------------|--------------------------|------------------------------|
|                        | Model 3                      | Model 4                        | Model 3                           | Model 4                      | Model 3                  | Model 4                      |
|                        | Any (1/0)<br>Instability     | Number of<br>Changes           | Any (1/0)<br>Instability          | Number of<br>Changes         | Any (1/0)<br>Instability | Number of<br>Changes         |
| Year 1:                |                              |                                |                                   |                              |                          |                              |
| Employment declines    | -.032<br>(.037)              | -.026<br>(.028)                | .011<br>(.013)                    | .002<br>(.010)               | .016<br>(.015)           | .015<br>(.013)               |
| Employment inclines    | .016<br>(.041)               | .006<br>(.017)                 | -.017<br>(.024)                   | -.014 <sup>+</sup><br>(.008) | -.016<br>(.025)          | -.018 <sup>+</sup><br>(.010) |
| Negative income shocks | .059<br>(.039)               | .030<br>(.025)                 | .010<br>(.016)                    | .015<br>(.013)               | .009<br>(.015)           | .002<br>(.011)               |
| Positive income shocks | -.033<br>(.036)              | -.019<br>(.022)                | .027 <sup>+</sup><br>(.015)       | .019 <sup>+</sup><br>(.011)  | -.007<br>(.011)          | -.002<br>(.010)              |
| Year 2:                |                              |                                |                                   |                              |                          |                              |
| Employment declines    | -.023<br>(.029)              | -.018<br>(.031)                | .017<br>(.016)                    | .026<br>(.017)               | .001<br>(.013)           | .005<br>(.013)               |
| Employment inclines    | .019<br>(.054)               | .018<br>(.019)                 | -.009<br>(.025)                   | .004<br>(.008)               | -.001<br>(.052)          | .010<br>(.013)               |
| Negative income shocks | .043<br>(.037)               | .023<br>(.029)                 | -.009<br>(.016)                   | -.011<br>(.012)              | .013<br>(.013)           | .006<br>(.008)               |
| Positive income shocks | .000<br>(.035)               | .001<br>(.024)                 | .001<br>(.015)                    | -.004<br>(.011)              | .011<br>(.008)           | .007<br>(.008)               |
| Year 3:                |                              |                                |                                   |                              |                          |                              |
| Employment declines    | .136 <sup>**</sup><br>(.048) | .113 <sup>*</sup><br>(.044)    | .028 <sup>+</sup><br>(.016)       | .019<br>(.013)               | -.003<br>(.013)          | .001<br>(.015)               |
| Employment inclines    | -.088<br>(.057)              | -.034 <sup>+</sup><br>(.018)   | -.013<br>(.020)                   | -.001<br>(.007)              | .014<br>(.038)           | -.001<br>(.006)              |
| Negative income shocks | -.093 <sup>*</sup><br>(.040) | -.105 <sup>***</sup><br>(.030) | -.009<br>(.013)                   | -.006<br>(.012)              | .014<br>(.012)           | .022<br>(.018)               |
| Positive income shocks | .045<br>(.043)               | .074 <sup>*</sup><br>(.033)    | -.013<br>(.014)                   | -.013<br>(.011)              | -.010<br>(.014)          | -.011<br>(.012)              |
| N                      | 747                          | 747                            | 2,643                             | 2,643                        | 1,510                    | 1,510                        |

Note.—All estimates are derived from 20 multiply imputed data sets. Only covariate data were imputed; independent and dependent variables were not imputed. Coefficients for covariates are not shown. Standard errors (in parentheses) adjust for clustering of children within households. Years 1, 2, and 3 calculated from waves 1–4, 4–7, and 7–10, respectively.

- <sup>+</sup>  $p < .10$ .
- <sup>\*</sup>  $p < .05$ .
- <sup>\*\*</sup>  $p < .01$ .
- <sup>\*\*\*</sup>  $p < .001$ .

the relationship between instability and levels of the dependent variables at waves 9 and 10 differs slightly from the relationship between instability and changes in the dependent variables from waves 4 or 6. This is particularly true for household food security. Whereas employment declines

**TABLE 8.** Results from Linear Probability Models Estimating the Relationships between Recency of Employment and Income Instability and Child Health, by Primary Parent's Education Level

|                        | Less than High School    |                              | High School Degree,<br>No College |                              | College or More              |                              |
|------------------------|--------------------------|------------------------------|-----------------------------------|------------------------------|------------------------------|------------------------------|
|                        | Model 3                  | Model 4                      | Model 3                           | Model 4                      | Model 3                      | Model 4                      |
|                        | Any (1/0)<br>Instability | Number of<br>Changes         | Any (1/0)<br>Instability          | Number of<br>Changes         | Any (1/0)<br>Instability     | Number of<br>Changes         |
| Year 1:                |                          |                              |                                   |                              |                              |                              |
| Employment declines    | .054<br>(.044)           | .059 <sup>+</sup><br>(.032)  | -.004<br>(.020)                   | -.005<br>(.017)              | .021<br>(.019)               | .012<br>(.017)               |
| Employment inclines    | -.003<br>(.050)          | -.023<br>(.022)              | .039<br>(.032)                    | .014<br>(.010)               | -.015<br>(.017)              | -.013<br>(.009)              |
| Negative income shocks | -.034<br>(.039)          | -.027<br>(.032)              | -.026<br>(.021)                   | -.014<br>(.016)              | -.035<br>(.022)              | -.044 <sup>+</sup><br>(.023) |
| Positive income shocks | .012<br>(.038)           | .019<br>(.026)               | .009<br>(.019)                    | .015<br>(.013)               | -.005<br>(.019)              | .003<br>(.014)               |
| Year 2:                |                          |                              |                                   |                              |                              |                              |
| Employment declines    | -.042<br>(.050)          | -.045<br>(.043)              | .016<br>(.021)                    | .006<br>(.017)               | -.007<br>(.020)              | -.012<br>(.019)              |
| Employment inclines    | -.009<br>(.054)          | .014<br>(.021)               | -.038<br>(.035)                   | -.016<br>(.013)              | -.044<br>(.032)              | -.001<br>(.011)              |
| Negative income shocks | -.060<br>(.044)          | -.046<br>(.034)              | -.003<br>(.021)                   | -.005<br>(.018)              | .036 <sup>+</sup><br>(.020)  | .025<br>(.016)               |
| Positive income shocks | -.034<br>(.040)          | -.062 <sup>+</sup><br>(.033) | .009<br>(.019)                    | .002<br>(.016)               | -.029<br>(.023)              | -.008<br>(.017)              |
| Year 3:                |                          |                              |                                   |                              |                              |                              |
| Employment declines    | .017<br>(.043)           | -.013<br>(.038)              | -.050*<br>(.034)                  | -.024<br>(.018)              | -.041 <sup>+</sup><br>(.024) | -.034 <sup>+</sup><br>(.020) |
| Employment inclines    | -.084<br>(.060)          | -.024<br>(.021)              | .059 <sup>+</sup><br>(.033)       | .011<br>(.010)               | .020<br>(.033)               | .000<br>(.011)               |
| Negative income shocks | .045<br>(.040)           | .052<br>(.035)               | -.031<br>(.022)                   | -.039 <sup>+</sup><br>(.020) | .015<br>(.022)               | -.005<br>(.023)              |
| Positive income shocks | .068*<br>(.033)          | .047*<br>(.022)              | .010<br>(.020)                    | .008<br>(.016)               | -.003<br>(.020)              | .006<br>(.016)               |
| N                      | 587                      | 587                          | 2,010                             | 2,010                        | 1,137                        | 1,137                        |

Note.—All estimates are derived from 20 multiply imputed data sets. Only covariate data were imputed; independent and dependent variables were not imputed. Coefficients for covariates are not shown. Standard errors (in parentheses) adjust for clustering of children within households. Years 1, 2, and 3 calculated from waves 1–4, 4–7, and 7–10, respectively.

<sup>+</sup>  $p < .10$ .

\*  $p < .05$ .

and positive income shocks predict household food security in the original models, these relations become nonsignificant when earlier measures of food security are controlled. However, associations between employment declines and increases in child food security, each employment incline and decreased child food security, and each additional negative income shock and poorer child health remain consistent and strong across all models. Second, we tested models that included interactions between employment and

income instability by direction (e.g., positive change with positive, positive with negative) to assess whether the combined or independent changes mattered more for the three outcomes (results not shown; available by request). Notably, the unexpected associations between positive income shocks and increased food insecurity diminished, and in model 2, they reversed such that income inclines were associated with decreased food insecurity.

## DISCUSSION

We investigate the associations between employment instability and income instability—both positive and negative changes—and household food security, child food security, and child health for children age 3–5. We use a nationally representative sample of households during and immediately after the Great Recession, a period of economic insecurity for many families that continues to shape the economic landscape today. Understanding the consequences of unstable economic conditions on child well-being, particularly during the developmentally important period of early childhood, is an area of critical importance.

We find that, in the wake of the Great Recession, young children lived in households that experienced high levels of income and employment instability such that instability was nearly a normative event. Each year, about one-quarter of children's parents experienced a decline in employment (job loss or reduction from full to part time). Over one-third of children experienced a decline, and over one-third experienced an incline, in household income equivalent to or greater than 33 percent of household income. Income instability levels were highest among children with less educated parents, with nearly seven in 10 children whose parents lacked a high school degree experiencing a change in any given year.

We find that employment and income changes had separate, unique associations with measures of food security and child health. While the direction of employment changes is related to the direction of association with food security outcomes (i.e., losing a job is associated with an increase in the likelihood of food insecurity and starting a job is associated with a decrease in the likelihood of food insecurity), the experience of an income change, regardless of its direction, appears to be associated with an increased likelihood of household food insecurity. The direction of these findings is consistent with previous research that finds that both positive and negative income changes are associated with increased rates of adolescent expulsions or suspension from school (Gennetian et al. 2015).

There are a few different mechanisms that may underlie this unexpected association between an increase in income and an increase in food insecurity. It is possible that there is a lagged effect of income on food security, such that it takes time for families to feel food secure after an income increase that they may not be confident will last. Second, it may be that income instability, regardless of its direction, interrupts family functioning by impeding the predictability of economic circumstances and hindering families' ability to plan. A change in job status, however, may provide predictability regarding future income, at least in the short term, and allow families to plan accordingly. A third possibility is that families who experience income increases (which may be the result of the addition of another adult earner in the household) become ineligible and lose in-kind forms of public assistance, such as Medicaid or Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and thus have fewer resources for food. Fourth, this association may be an artifact of how income is measured in the SIPP, in that it includes cash-like public assistance benefits. What appears to be an increase in income may be an increase in resources provided by SNAP or other safety net programs, and those who are experiencing food insecurity are selecting into SNAP. This phenomenon is well-documented in nutrition assistance research (Gregory, Rabbitt, and Ribar 2015). Notably, however, in the lagged models in which earlier food insecurity is controlled, the associations between positive income changes and food insecurity disappear, suggesting that this association may be a result of selection. That is, families who are more likely to experience income swings are also more likely to experience food insecurity. Finally, this association did not hold up in the sensitivity models that included interactions between employment and income instability, and in some cases reversed itself, suggesting that the interactive effects of income and employment should be taken into account in future research investigating either concept.

Furthermore, we find that both the incidence and accumulation of employment and income changes are important to food security. A child's cumulative exposure to employment and income changes predicted food security—each additional event was associated with a change in both measures of food security, although less so for health. Given the particularly high levels of income and employment changes among less educated families, these associations are cause for concern regarding children's development, as food insecurity is linked to achievement and mental health problems

(Jyoti, Frongillo, and Jones 2005; Johnson and Markowitz 2017). Household economic instability may disrupt families' ability to pay for or prepare food. Each additional job loss, in particular, appeared to predict food insecurity.

Consistent with our hypotheses, associations between economic instability and child outcomes appear to be stronger among children in disadvantaged families, specifically those with fewer educational resources. While the general pattern of findings is similar across children, the coefficients tend to be larger among children with mothers who lacked a high school diploma and who had graduated from high school compared to children with mothers who received an education beyond high school. More advantaged families are more likely to have savings (Acs et al. 2009) and may have more financial and other resources that allow them to buffer the effects of economic hardship on food insecurity and child health. Less advantaged households may have few options to compensate for losses when income shocks occur, and thus the effects on disadvantaged children may be the greatest. Notably, however, the household food security and child health outcomes of the middle-socioeconomic-status group—those with a high school degree but no college education—appear particularly affected by job loss. This may be because this group lacks the savings and resources of more educated groups but has less access to the safety net.

This article is the first to examine how the recency, or proximal timing, of an economic change predicts food insecurity and children's health. Findings indicate that the timing of employment changes, particularly job loss, matters to outcomes, such that parental job loss in the prior year predicts increased food insecurity and poorer child health. For example, a parent's job loss in the year prior, but not in earlier years, predicts child food insecurity. It may be that the loss of a predictable income and schedule associated with exit from the labor force interferes more immediately with families' ability to purchase and prepare food. The timing of income changes had less bearing on food security and child health, which may be an artifact of the public or private safety net.

#### IMPLICATIONS FOR ANTIPOVERTY AND WORK SUPPORT POLICY

Our findings have several implications for antipoverty and work support policies. First, our descriptive results show how common economic instability is among families with young children. Given that early childhood is a critical period of neurological and biological development (Shonkoff and

Garner 2012), targeting social safety net programs to families with young children may help smooth income and employment changes and buffer their potential negative effects on short- and long-term outcomes. Very little descriptive research exists on the trends of economic instability among households with children, making it difficult to understand how the high levels of instability observed in this study compare to household circumstances in the past. The one paper on this topic to date suggests that instability rose among households with children since the Great Recession but that this rise is part of a larger trend of growing income instability among low-income households (Morris et al. 2015).

Second, it is critical to understand the extent to which specific income support policies and programs mitigate or aggravate economic instability. National income and work support programs are designed principally to increase employment and self-sufficiency among poor families and thus many have work requirements and income eligibility limits. But current employment conditions for many low-wage workers are volatile, causing strain for individuals and for households with dependents in particular (Lambert et al. 2014). This reality argues for policies that not only help individuals enter the labor force but also assist them to save money and build financial cushions through savings and asset building. Families that have greater assets have been shown to recover more quickly from instability and other adverse events (McKernan et al. 2009). Further, policies that improve working conditions and reduce the income instability experienced by employed individuals (e.g., the Schedules That Work Act, HR 5159) could be very beneficial for parents with young children, who would have more predictability in their income and work schedules as a result. This could reduce parental stress and allow parents to more easily arrange child care for their children and could provide more economic security and predictability for parents who work in hourly jobs.

Finally, we find that the most recent instability affects food security and health, indicating that families need support immediately following an economic shock. Long enrollment periods for social programs may mean that families do not receive support when it is most needed. Thus, reducing administrative burdens and wait times for program enrollment is one approach to addressing the consequences of economic instability.

Indeed, polling research suggests a demand for greater stability. When asked whether “financial stability” or “moving up the income ladder” was

more important to them, 77 percent of the participants in the US Financial Diaries research study chose financial stability (Morduch and Schneider 2013). A recent Pew Economic Mobility Survey finds similar results, with 85 percent of survey respondents indicating that financial stability was more important, compared to 13 percent who chose moving up the income ladder (Pew Charitable Trusts 2011). There is tremendous potential for high-quality financial services and work-support policies to help households achieve greater financial health and better manage income uncertainty.

#### IMPLICATIONS FOR FUTURE RESEARCH

More research is needed to investigate the extent and implications of economic instability, particularly during the recent economic downturn, which increased employment and income instability for many families. Previous work linking income instability to child outcomes has largely focused on adolescent or adult outcomes (Hardy 2014; Gennetian et al. 2015), and it is important to extend this work to young children. For example, assessing how the relations between intrayear economic instability and child outcomes vary by children's developmental stages and the mechanisms through which economic instability affects child and family well-being are important areas for future research.

Further, there has been relatively little research examining employment and income instability and food insecurity and health among households with children. Given the importance of food security and health to school readiness in young children (Crosnoe et al. 2015; Johnson and Markowitz 2017), these findings have potential implications for the achievement gap between advantaged and disadvantaged children. Given the small-to moderate-sized correlations we find between income and employment instability, future work could consider the independent and combined effects of instability in these two indicators of households' economic status. Additionally, our and others' work (Gennetian et al. 2015) finds that both positive and negative income shocks are predictive of negative child well-being, and this warrants greater exploration of the mechanisms underlying these associations. Assessing how instability in other realms of children's lives, such as household composition or family structure, covary with economic instability, and the relative contributions of instability in each of these realms to child well-being, is an important area for future research.

In addition, assessing the moderating role of the predictability of economic instability (e.g., planned vs. unplanned exits from the labor force) is a fruitful direction for future research to consider.

Finally, we draw on previous work (Wolf et al. 2014; Gennetian et al. 2015) to assign household income changes as a shock and changes in labor market status (i.e., unemployment, part-time employment, and full-time employment) as employment shocks. However, no research has systematically assessed what thresholds of change are meaningful for households and how they may differ based on household characteristics. This is an important foundational area for future research on household economic instability.

#### LIMITATIONS

This study's findings must be interpreted within its limitations. First, our results are descriptive and should not be interpreted as causal associations between economic instability and outcomes. Causal research in the area of income and employment instability is difficult, primarily because identifying exogenous variation in economic resources and isolating the effects of job changes from income (and other) changes are problematic. Further, we do not know whether the employment or income changes observed were predictable or voluntary. Second, we lack an understanding of the mechanisms underlying the associations we identify. Theoretical models suggest that reduced or poorer nutrition, increased parental stress or mental health problems, or changes in where children spend their time (which tend to co-occur with economic changes; Crosnoe et al. 2014) may help explain these associations. Third, although we use multiple imputation to address missing covariate data, our sample does not include children who had missing data on dependent or our main independent variables. Thus, our sample may be biased due to possible differential attrition among more disadvantaged children and households. Fourth, we use LPMs, which are easily interpreted but assume that the probability of an event occurring is linearly related to a set of explanatory variables. Notably, when we run our main models using logistic regressions, the findings are very similar. Fifth, all of our measures are self-reported or reported by parents about their children rather than independent assessments of children's health and development. Parent-reported measures are subject to reporter bias. It is possible, for example, that when households experience negative income

shocks, parents are more pessimistic and thus judge their child's health more negatively. However, the income and food security measures in the SIPP are strong and widely used, and it remains the only source of national longitudinal data collected monthly (Gundersen and Gruber 2001; Ratcliffe, McKernan, and Zhang 2011; Dahl et al. 2014; Crosnoe et al. 2015; Gennetian et al. 2015). Finally, we use monthly household data from the reference month at each wave only (i.e., three times per year) because of issues of seam bias that have been identified in the SIPP (Moore 2007). Consequentially, we only estimate a fraction of instability and likely underestimate the amount of economic instability children and their households experience (Morduch and Schneider 2013).

## CONCLUSION

This study adds to the growing body of literature suggesting that changes and instability in economic resources are commonly experienced by children and families, particularly less educated families, and may be drivers of economic inequality and health disparities. Indeed, effect sizes, generally from 1 to 4 percentage points, were relatively substantial, given the baseline estimates of food security (17.3 percent for household food insecurity, 5.1 percent for child food insecurity). Our results highlight the importance of assessing change over time when examining economic resources and children's development and call for more research regarding the causal relations and mechanisms underlying these associations. Building knowledge about the consequences of economic instability and uncertainty on family and child well-being is an important starting place for designing programs and services that help to promote the healthy development of all children.

## NOTE

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