APPENDIX

CROSS-DOMAIN INSTABILITY IN FAMILIES WITH SOME COLLEGE EDUCATION

STUDY SOURCES AND METHODS

Study Sample

Table A-1. Children in the Study Sample by Household Education

Education Level	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Less Than High School	1345	9.5	1345	9.5
High School	2388	16.9	3733	26.4
Some College/No Degree	1873	13.2	5606	39.6
VTTB Certificate or Diploma (VTTB)	1932	13.7	7538	53.3
Associate's Degree (AA)	1517	10.7	9055	64.0
College	2998	21.2	12053	85.2
College Plus	2091	14.8	14144	100

Source: Survey of Income and Program Participation (SIPP) 2008 Panel.

Note: The sample total for this analysis (14,144) is lower than that for our prior analysis (14,767) (see Winston, Groves, and Mellgren 2017) because the detailed education information was collected during the second wave of SIPP data collection and not all families that were in the study at baseline participated in this wave.

For additional information on the study sample and more detail on study methods, see Winston, Groves, and Mellgren 2017: https://aspe.hhs.gov/system/files/pdf/258221/FamilyInstabilityResearchBrief.pdf.

https://aspe.hhs.gov/system/files/pdf/258216/FamilyInstabilityBriefAPPENDIXA.pdf

Tabulation of Different Types of Instability Shocks By Household Education

Table A-2. Proportion of Children Experiencing a Shock, by Domain and Household Education (2008-2013)

Education Level	Loss of Full-Time Worker	Loss of Any Worker	Income Loss of > 25%	Earnings Loss of > 25%	Loss of Child Health Coverage	Child Move	Change in Family	Change in Household
Less Than High School	79%	68%	94%	79%	31%	38%	44%	58%
High School	75%	64%	87%	75%	43%	38%	41%	54%
Some College/No Degree	74%	63%	86%	77%	46%	44%	39%	53%
VTTB Certificate or Diploma (VTTB)	78%	71%	87%	74%	45%	42%	40%	55%
Associate's Degree (AA)	72%	59%	80%	72%	39%	34%	33%	46%
College	61%	51%	75%	70%	31%	29%	31%	41%
College Plus	57%	44%	70%	66%	22%	24%	25%	36%

Source: Survey of Income and Program Participation (SIPP) 2008 Panel.

Multivariable Regression Analysis

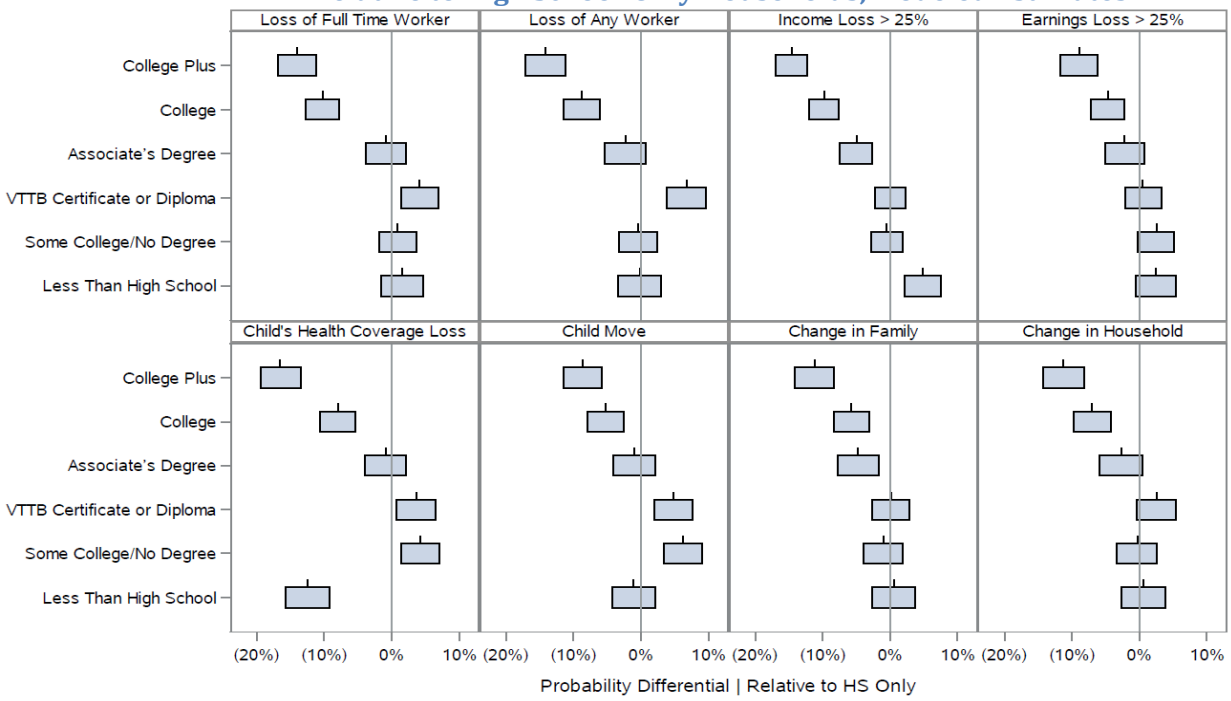
A concern with the study's univariate analysis is that it does not control for other cofounding factors that are correlated with educational attainment. To more precisely estimate the effects of household education, we also simultaneously controlled for other demographic characteristics, such as geography and family structure. This approach allowed us to compare the relative probabilities of children ever experiencing a shock in a study domain during the five-year study period across educational groups, particularly those in the three Some College sub-groups (AA, VTTB, and Some College/No Degree).

With multivariate regression analysis, we controlled for the child's race-ethnicity, age, number of people in the household at baseline, parents' relationship status at baseline, and Census region. Moreover, we contrasted these estimates against estimates for children in households where the highest level of education was only a high school degree, which provided a consistent reference point for comparison across household-education levels.

Figure A-1 presents the results of this analysis, which used a series of linear probability models (LPMs). Advantages of LPMs include:

- All estimates can be calculated relative to a single reference group, allowing for consistent comparisons—in this case, with children in households where the highest level of education was only a high school degree, and
- Estimates of percentage point differences among the education groups and 95 percent confidence intervals can be easily constructed. Each box in Figure B-1 represents an estimate at 95 percent confidence.

Figure A-1. Differences in Probability of Instability Relative to High School-Only Households, Modeled Estimates



Source: Survey of Income and Program Participation (SIPP).
Notes: Estimates are derived from separate linear probability models for each domain. Boxes represent 95 percent confidence intervals

Each panel of Figure A-1 represents the relationship between the education level of the children's households and one of the instability domains. Each box is an estimate of the difference in the probability of the average child in an education group experiencing instability, relative to a child in a household with only a high school degree. The tick mark in each box is the point estimate of that difference, while the left and right borders of the boxes are the 95-percent confidence interval of that estimate. Each box that overlaps the vertical 0 percent line for each domain indicates that on average children in that household-education category are equally likely as children in High School Only households to experience an instability shock (i.e. there is no statistically significant difference between the groups). Boxes to the *right* of the vertical line at 0 indicate that children in the group are *more likely* than children in High School Only households to experience instability in that domain. Boxes to the *left* of the vertical line at 0 indicate that

children in the group are *less likely* to experience instability in that domain relative to children in High School Only households.

For example, looking at the "Loss of Full Time Worker" domain in Figure B-1 we see that the likelihood of experiencing instability is statistically indistinguishable for children in households with AAs, Some College/No Degree, and Less Than High School Households relative to children in High School Only households. However, children in VTTB households are roughly 5 percentage points *more likely* to experience instability in this domain than children in High School Only households. And children in College and College Plus households are over 10 percentage points *less likely* to experience instability in this domain.

The Linear Probability Models in Detail: In this analysis, we estimated eight models that explored the likelihood of a child experiencing instability during the study period in any of the eight study domains, and we summarized the results by household education level.

The study LPMs were estimated using the generalized equation:

$$(1) \quad prob(Outcome)_i = \alpha + \beta_j \boldsymbol{X}_i + \theta \boldsymbol{Z}_i + \varepsilon_i$$

where: An *observation* (i) is defined for each child in our refined SIPP sample;
Outcome are the eight family instability measures, which include Loss of Full Time Worker, Loss of Any Worker, Income Loss > 25%, Earnings Loss > 25%, Child's Health Coverage Loss, Child Move, Change in Family, and Change in Household
prob(Outcome) denotes a linear probability model to estimate the probability of individual child (i) ever experiencing a particular instability shock during the 2008 SIPP;
X contains the categories for maximum education level in the household;
Z contains controls for other demographic factors, including indicators for child race-ethnic groups (e.g., Hispanic; black, non-Hispanic, etc.) and Census Region, as well as baseline measures for the number of persons in the household, parent's relationship status, and age of the child.

Given that outcomes are correlated across models (e.g., a loss of a full time worker most likely affects the probability of a child move), all eight equations are estimated simultaneously using Seemingly Unrelated Regression (SUR) modeling. Furthermore, children living in households where the education level is exactly a high school diploma serve as the reference group in the intercept.

Cumulative Instability Index

The study looked at how children in different household education categories were represented at different levels of cumulative cross-domain instability. We adapted the framework from the

Adverse Childhood Experiences (ACE) study (Felitti et al. 1998; Centers for Disease Control and Prevention 2016) to estimate a cumulative measure of instability across multiple domains. The ACE study links information about the prevalence of adverse childhood experiences to adult health outcomes using a seven-point index (0, 1, 2, 3, 4+) that summarizes participants' experiences with different types of adverse incidents. We used this approach for our index of cumulative instability, which consists of five distinct components that reflect the overall study measures:

- Loss of a full-time worker
- Loss of household income (earnings plus transfers) of more than 25 percent relative to the household average for the entire period
- Loss of the child's health care coverage
- Move by the child
- Change in household composition (gain or loss)

The Any Employment, Earnings, and Family Composition measures were excluded from the index formulation because they were functions of other measures.

Similar to the ACE index, if a child ever experienced a particular instability incident or shock during the study period, the child scored 1 for that domain (0 if not). We then summed these 1s and 0s for each of the more than 14,000 children in the sample—with no attempt to weight the scores—and the range of 0 to 5 reflects the cumulative instability level for that child. Then, to find out how children in different groups were distributed across different levels of cumulative instability, we averaged all children's scores by their household education group. These findings are presented in Figure 2 of the brief, "Cross-Domain Instability in Families with 'Some College'."

Obvious limitations of this approach are that the domains were treated equally when they were unlikely to be so from the child's perspective, and that it cannot capture the intensity of instability within each domain. For example, one move in a five-year period was treated the same as five moves, which would likely be far more disruptive to the child.

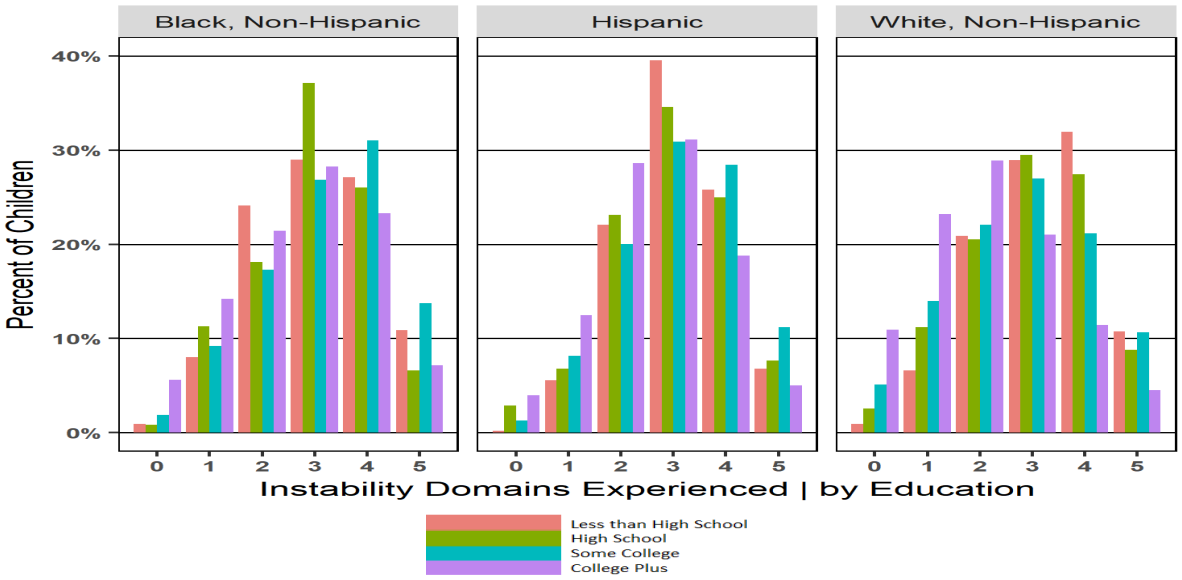
Cumulative Instability Analysis by Household Education and Race-Ethnicity

As noted in the paper, we calculated cumulative instability for the broad household education groups and then for major race-ethnicities. As Figure A-2 indicates, cumulative instability in all race-ethnic groups differed by household education level, but consistently children in Some College households were in the highest-instability category. White children were more likely to experience lower levels of cumulative instability (0, 1, and 2 domains), while black and Hispanic children were more likely to be at the higher levels of instability (3, 4, and 5 domains).

However, cumulative instability varied substantially by household education within each race-ethnic group. The highest-instability category (5 domains) was dominated in all race-ethnic groups by children in Some College households (the teal sub-bar second from the right). Black children in Some College households experienced the most cumulative instability relative to black children in other education groups. Among Hispanic children, the pattern was the same. For white children in the highest-instability (5-domain) category, those in Some College and Less Than High School households were found at similarly high levels. In contrast, in all race-

ethnic groups children in College Plus households were most likely to experience no instability (0 domains) relative to children in other education groups.

Figure A-2. Cumulative Instability: Distribution of Domains Children Experienced, By Race and Education



Strengths and Limitations of the Methodological Approach

As a logical starting point, the univariate analysis provides a sense of the relative prevalence of instability of different types for children of different household education levels. However, it does not control for likely associated factors such as income, race-ethnicity, baseline household structure, etc., which limits the conclusions which can be drawn from this analysis.

The multivariable regression analysis allows us to control for key characteristics while estimating the frequency of shocks that children experienced relative to a reference group—in this case, children in the sample living in households where the highest level of education is a high school degree. This approach permits a more accurate estimate of the relationship between household-education level and the instability that children experienced and allows us to compare the probability of ever experiencing shocks across household education levels. The primary limitation is that this approach is still an exploratory, not causal, analysis.

The cumulative instability index allows us to assess cumulative cross-domain instability for children using a single measure, and to compare children in households of different education levels. But it cannot differentiate the intensity of the children's experience within domains (e.g. one move is treated the same as four), and it weights each domain the same.