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Household instability and self-regulation among poor children

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Abstract

Past research suggests that poverty may negatively influence children's psychological and behavioral health by increasing their exposure to chaotic living conditions in the household. The present study provides a descriptive 'snapshot' of instability in low-income households, and examines the associations between exposure to major destabilizing events over the course of a year and three domains of poor urban children's self-regulation. Descriptive analyses suggest that although caregivers from unstable households report higher average levels of health problems and depression, they also have greater assets/savings, are more educated, and are less likely to be immigrants than caregivers from stable households. Results of propensity score-matched regression analyses reveal that high levels of household instability are significantly and negatively associated with preschoolers' effortful control and global attention/impulsivity control, but not with their executive function. Children from mildly unstable homes (i.e., those who had experienced a single destabilizing event in the past year) showed no significant differences in any domain of self-regulation relative to their peers from stable households, suggesting a dose-response relationship between the number of destabilizing events experienced by children and their outcomes. Implications for theories of poverty-related adversity, stress, and parenting are discussed in addition to future directions for research.

Keywords

instability; mobility; self-regulation; selection bias

Background

Recent work on the lived experiences of poor households suggests that when income is low and material resources are scarce, families report frequent feelings of marginality, precariousness, and psychological stress (Edin and Lein 1997; Russell, Harris, and Gockel

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2008). Such climates of chaos may compromise young children's sense of predictability and safety in their homes, both of which have been shown to be critical to their successful acquisition of foundational social, behavioral, and cognitive competencies. Indeed, research has drawn direct links between events that disrupt the stability of poor households (e.g., parental divorce, residential mobility, homelessness) and negative long-term psychological, academic, and behavioral outcomes for children (Amato 2001; Dowdney 2000; Jelleman and Spencer 2008; Lengua et al. 1999; Ziol-Guest and McKenna 2014).

Despite mounting evidence to suggest that instability may be problematic for children's psychological and behavioral health, comparatively little is known about the degree to which major life changes cumulatively jeopardize key components of children's self-regulation. Theoretical and empirical research suggests not only that early self-regulatory skills – the capacities needed to control or modulate one's own thoughts and behaviors – set the stage for later academic success, social and behavioral competence, and mental health, but also that they may be negatively affected in particular by early environmental stressors (Blair 2010; Blair and Razza 2007; McCoy 2013). Emerging research suggests that parent-reported levels of daily household chaos relate directly to aspects of children's self-regulation such as attention and inhibitory control, which in turn predict later levels of school readiness, achievement, and social conduct (Brown, Ackerman, and Moore 2013; Dumas et al. 2005; Evans et al. 2007; Martin, Razza, and Brooks-Gunn 2012; Masten et al. 2012; Valiente, Lemery-Chalfant, and Reiser 2007). The present study extends this research on children's exposure to day-to-day household chaos to evaluate whether poor urban preschoolers' exposure to multiple major destabilizing life events – including residential mobility, movement of individuals into the household, and events affecting household structure, such as parental death or change in marital status – relates to several key complementary components of their observed self-regulatory competence. In addition, in order to provide a better descriptive picture of instability within a particularly vulnerable sample of families, we examine the types of demographic risk and protective factors (e.g., health problems, employment) that co-occur with instability in low-income settings.

A multiple-transition framework of instability and self-regulation

As poor families struggle to cover pressing material needs, their children are probabilistically more likely to experience a wide range of destabilizing events that can include frequent residential moves, shifts in the pattern of adults and children who relocate into or out of the household, and increased risk of disruptions in family relationships (Evans 2004; Larson and Meehan 2011; McLanahan and Percheski 2008). Separate strands of research suggest that these transitions in residence, household structure, and caregiver romantic relationships are each related to increased incidence of behavior problems (Adam and Chase-Lansdale 2002; Fomby and Cherlin 2007; Magnuson and Berger 2009; Osborne and McLanahan 2007; Ziol-Guest and McKenna 2014). Emerging work suggests that one mechanism in the relationship between instability and behavioral difficulty is changes in children's emotional and cognitive self-regulation (Evans and English 2002; Raver et al. 2013; Sharkey et al. 2012). In particular, evidence from animal models and the abuse/neglect literature suggests that exposure to multiple destabilizing events may compromise subjects' ability to appropriately regulate their physiological, cognitive, and behavioral

responses to stress, leading to later behavioral difficulty (Lewis et al. 2007; Sanchez, Ladd, and Plotsky 2001). Through changes in physiology known as allostatic load, the stress experienced by children from unsafe or unpredictable environments has been shown to predict less neural activation in brain regions responsible for optimal self-regulation (e.g., the pre-frontal cortex; Arnsten 2000; Blair 2010; Evans and Wachs 2010). From a social perspective, changes in household composition – especially when they occur alongside other stressful life changes – may also compromise children’s ability to form the emotionally supportive, trusting attachment relationships with caregivers that are critical for preschool-aged children’s development of self-regulation (Bernier, Carlson, and Whipple 2010; Davies and Cummings 1994). The stress associated with household changes may also negatively affect caregivers’ ability to model competent coping and regulation for their children (Barnett 2008; Beck et al. 2010).

Despite a large body of research showing more negative outcomes for children from unstable environments, additional work has shown young children to be quite resilient in the face of transitions (Amato 2000; Lin et al. 2004; Ziol-Guest and McKenna 2014). Several theories attempt to explain this multifinality. The present paper tests one of these theories by employing a multiple-transition framework (Amato 2010), which proposes that a child’s well-being following transition is at least partially dependent on the number of concurrent destabilizing events that he/she is facing. Such a framework is supported by a number of developmental theories. Research on stress and brain development, for example, suggests that although low to moderate amounts of stress may facilitate children’s development of coping strategies in the context of supportive relationships, exposure to high levels of stress – particularly during developmentally sensitive periods – is thought to be ‘toxic’ for children’s biological and behavioral development (Shonkoff, Boyce, and McEwen 2009). Similarly, theories of cumulative risk suggest that exposure to multiple transitions may have additive negative effects on child outcomes, particularly for children in early stages of development (Cavanagh and Huston 2008) and from resource-poor families (Evans and English 2002; McLanahan and Percheski 2008).

Despite the growing evidence of the importance of considering the ways that major markers of instability co-occur, the vast majority of research on divorce, mobility, and family composition has focused exclusively on child outcomes following a single type of event. One concern with studies focused on these single destabilizing events is that they may underestimate the number of negative transitions that are triggered by (or co-occur with) with the destabilizing event of interest (Amato 2010). Furthermore, the ways that multiple forms of instability may be related to other risk factors in low-income families’ day-to-day lives remain relatively unexplored. Although it is assumed that poor families experiencing high levels of transition are qualitatively ‘different’ from (i.e., more at risk than) stable low-income households, these differences are rarely well described or taken into account in empirical analysis of the effects of instability on child outcomes.

The present study

The present study builds on emerging work on household instability, child stress, chaos, and cumulative risk to explore the relationships between multiple exposures to household

instability over the course of a year (including residential mobility, movement of individuals into the household, and life events affecting household structure and stress) and low-income, preschool-aged children's self-regulatory skills. More specifically, the first aim is to provide a descriptive snapshot of household instability in this particular context, as well as the ways that demographic, economic, and psychosocial risk factors vary across low-income households experiencing different levels of instability. We hypothesize that a number of risk factors in other areas of parental and family functioning may be related to instability, and that these observed characteristics of vulnerability –rather than instability itself – may underlie observed differences in children's self-regulatory outcomes (a common empirical issue known as selection bias; see Martin, Razza, and Brooks-Gunn 2012, 1249).

Next, we use traditional ordinary least squares (OLS) regression techniques to examine self-regulatory outcomes for children from particularly unstable households (i.e., those experiencing two or more indicators of household instability in the previous year) in comparison with those from stable households. Prior research has demonstrated that young children who have moved three or more times show worse attention and behavioral outcomes, for example, than children who have moved once or twice (Ziol-Guest and McKenna 2014). Accordingly, we also conduct a separate analysis to compare children from households experiencing a single destabilizing event with those from stable households to better understand whether relationships differ based on the 'dose' of instability received by the child. Finally, we use a propensity score method in which children are matched based on a large set of observed demographic, economic, and psychosocial characteristics (e.g., income, parental education, perceived financial hardship, parental depression) in order to compare the self-regulatory skills of children from stable and unstable households that are otherwise similar in terms of their observed demographic and economic characteristics. In so doing, we aim to yield estimates of the impact of instability on children's psychological well-being that are less sensitive to some of the more obvious sources of selection bias (Rosenbaum and Rubin 1983). Across all of these predictive analyses, we hypothesize that higher levels of instability will be related to lower levels of self-regulation in children.

Method

Sample and procedure

Data for the present study were taken from the Chicago School Readiness Project, a socioemotional intervention trial conducted in Head Start preschool programs in Chicago in 2004 and 2005. Children were recruited from 35 classrooms within 18 Head Start sites, which were chosen for participation based on their location in particularly high-poverty, high-crime neighborhoods. All children were eligible for Head Start based on having a family income of less than 100% of the poverty threshold. Data on child self-regulation and household instability were collected for 424 children – the final analytic sample – in the fall of the Head Start year, prior to study randomization (see Table 1 and Appendix for descriptive characteristics of the sample).

Assessments of self-regulation were administered by trained and certified master's level data collectors in Head Start sites. Approximately 20% of assessments of self-regulation were videotaped and double-coded to establish inter-rater reliability. Information on household

instability and demographic characteristics was captured from caregivers either in person or by phone, either in English (89%) or Spanish (11%). (See Raver et al. 2008 for full inclusion criteria and details on study procedures).

Measures

Household instability—Children's exposure to household instability during the previous year was captured using caregivers' reports of: (1) the number of times the family had moved (i.e., residential mobility), (2) the number of adults who had moved into the household, (3) the number of children who had moved into the household, (4) whether any member of the family had died, and (5) whether a family member had gotten married, divorced, or separated. Items were chosen based on their inclusion in past seminal work (e.g., Ackerman et al. 1999; Fomby and Cherlin 2007) as well as their ability to represent distinct dimensions of instability (e.g., residential mobility, household composition changes, and life changes that affect household structure and stress).

As is common in work on cumulative risk, items that were measured on continuous scales were dichotomized to create indicators. Specifically, individuals from households that had moved two or more times during the previous year were given a score of 1 for residential mobility, whereas those who had not moved or moved only once were given a score of 0. Households that had any children move into the home in the previous year were given a score of 1 for child movement, and households that had any adults move into the home were given a score of 1 for adult movement. Those who had no children or adults move into the household were given scores of 0 on their respective variables. Family member death and marriage/divorce/separation were coded as 'yes' = 1 and 'no' = 0. (See Table 2 for a summary of household instability indicators). Using these indicators, children were divided into three instability groups for analyses in order to test for 'dosage' of exposure to household instability and to address the problem of very low frequency with which children experienced three or more indicators of instability (see Table 2). Households with 0 indicators of instability were considered to have 'no instability' or to be 'stable' ($n = 194$), those experiencing 1 indicator were considered to have 'low instability' ($n = 148$), and those experiencing 2 or more indicators were considered to have 'high instability' ($n = 82$).

Child self-regulation—Two complementary techniques were used to capture the three self-regulatory outcomes. First, children's executive function (EF) and effortful control (EC) were assessed using the Preschool Self-Regulation Assessment (PSRA), which has been validated in low-income ethnic minority populations for field use (Smith-Donald et al. 2007). The executive-function assessment includes two tasks – the pencil tap and balance beam –that cover dimensions of children's cognitive self-regulation, including working memory, sustained attention, cognitive flexibility, and inhibition, whereas the effortful-control test specifically captures children's ability to delay gratification and impulsivity, using a snack delay, toy wrap, toy wait, and tongue task (see Raver et al. 2012; Smith-Donald et al. 2007 for details of tasks included). Scores on each task were standardized and aggregated to form the two subscales of EF and EC. Inter-rater reliability for double-coded assessments was high, as indicated by Kappas for individual tasks ranging from .54 to .85. On average, Cronbach's alphas for all continuous variables (e.g., latency) ranged from .73

to .99 across PSRA tasks, with an average alpha of .93. EC and EF were correlated at $r = .32, p < .01$.

Second, children's global attention/impulse control (A/IC) was assessed using the PSRA assessor report as a representation of children's observed self-regulatory skills during the individually administered direct assessment described above. Such an approach provides a complement to more micro-level tasks of measuring child EF and EC by capturing the ways that children's overall self-regulatory capacities are perceived by others in their environment (Smith-Donald et al. 2007). Assessors rated children's A/IC using a Likert-type scale (range = 0–3) on a subset of 17 items that capture children's concentration, distractibility, impulsivity, and regulation of arousal ($\alpha = .92$). A/IC in this sample was correlated with EF at $r = .43, p < .01$, and with EC at $r = .67, p < .01$, indicating significant but incomplete overlap across measurement approaches.

Child-, caregiver-, and household-level covariates—Caregivers reported on child-, caregiver-, and household-level variables including basic demographic information (e.g., child age, race/ethnicity, and gender; caregiver age, age at birth of child, and education status), economic characteristics (e.g., hours worked per week, household income, perceived financial hardship, receipt of public assistance, current assets), and reported risk (e.g., health problems and depressive symptoms [using the K6; Kessler et al. 2002]). A family income-to-needs ratio was calculated by dividing the reported annual household income by the year's family size-adjusted poverty threshold.

Analytic plan

The present study uses several analytic strategies to answer study questions. First, we use descriptive statistics to examine household instability and its relationships with a number of demographic characteristics within the full sample of participants ($n = 424$). Second, we use an OLS regression model with demographic covariates to estimate the relationship between instability and self-regulation within the full sample. Specifically, we compare the EF, EC, and A/IC outcomes of children from high-instability households ($n = 82$) to those of children from stable households ($n = 197$) using the following model:

$$Y_i = \beta_0 + \beta_1 (\text{Instabil}_i) + \sum \beta_n (\text{Cov}_i) + e_i \text{ with } e_i \sim N(0, \sigma^2)$$

where Y_i is equal to the respective self-regulation score for individual i , β_0 represents the overall intercept, Instabil_i represents a dummy indicator for the level of household instability for individual i (where 1 = high instability and 0 = no instability), β_1 represents the estimated effect of high vs. no household instability, represents a set of n child- and family-level covariates for child i , including child age (in months), gender (1 = boy), and race (1 = African-American), and family income-to-needs ratio, and e_i represents the residual error for individual i . Although intra-class correlations indicated minimal between-site variance for children's self-regulatory skills (ICC range = .04–.13), all standard errors were adjusted to account for the non-independence associated with participants' recruitment from and assessment in 18 Head Start sites.

Next, we utilized propensity scores to match children from high- versus no-instability households based on a set of observed variables indicated in past work as showing a relationship with both household instability and self-regulation (e.g., Raver et al. 2012; Riggs, Blair, and Greenberg 2003). One-to-one nearest-neighbor matching with replacement was used to identify participants from stable households who were similar on a set of observed characteristics to children from high-instability households (i.e., a ‘treatment on treated’ technique). All propensity score analyses were conducted in Stata12 using *psmatch2* (Leuven and Sianesi 2003) and included calipers equal to 0.2 times the standard deviation of the logit of the propensity score (Austin 2011). No individuals were excluded based on calipers, and the average difference in propensity score across pairs for the final model was small, at 0.007 ($SD = 0.020$). Only individuals falling within the region of common support were included in analyses. A set of interactions and transformed covariates was included in the propensity-score estimation model to improve sample balance, which was assessed using standardized mean differences and ratios of standard deviations across instability groups. Because matching eliminated most but not all differences between groups, we included all covariates with $d > .10$ or whose ratio of SDs was $< .90$ or > 1.10 in the final regression models as an additional statistical precaution against bias (Imai, King, and Stuart 2008).

In total, 52 no-instability children were matched to the 82 high-instability participants using propensity-score matching. To re-estimate the regression-adjusted treatment effects of coming from a high- versus no-instability household on each outcome, we used the same equation (above) in the limited, matched sample with the addition of propensity-score weights to allow for matching with replacement between the groups. Upon completing analyses of the high- vs. no-instability groups, regression analyses were completed within the full sample of low ($n = 148$) vs. no ($n = 194$) instability families, as well as within a separately matched group of 143 low-instability children and 85 matched stable children. For these analyses, calipers excluded five low-instability children, and the final average difference in propensity scores between matched low- and no-instability participants was 0.003 ($SD = 0.009$). Full information on the mean and distributional balance of full and matched samples is available in Table 1 and Appendix.

Missing data and sensitivity analysis

Although no individuals were missing data on self-regulation or household instability, data were missing from 0.45% of cases across all observed characteristics used for matching (range = 0% for 14 of the variables to 5.42% for income-to-needs). A mean-imputation strategy was used for the propensity-score covariates whereby missing values were replaced with the average of the non-missing values for each variable (Allison 2002). To improve precision and explicitly model missingness, a binary missing-data indicator was added to the logistic regression equation used to estimate the propensity score along with the mean-imputed covariates (Richardson 2010). To examine robustness to endogeneity and missingness, we also tested a model with only time-invariant covariates, which were theoretically unlikely to have been affected by instability (e.g., gender, age, language). Importantly, none of these 12 variables was missing data, which allowed us to test results using exclusively non-imputed data as well.

Results

Descriptive statistics

Frequencies of each type of destabilizing event and rates of cumulative instability are found in Table 2. Graphs of self-regulation scores and standard errors for children experiencing 0, 1, 2, 3, and 4 or more indicators of instability can be seen in Figure 1. These descriptive results show preliminary evidence for a negative, mostly linear relationship between instability and children's EF, EC, and A/IC. Given the low numbers of children experiencing more than two indicators of instability and resulting uncertainty in estimation at the high end of the instability distribution, all children experiencing two or more destabilizing events were condensed into a single group for subsequent analyses.

Additional *t*-tests examining the degree to which other household characteristics varied based on levels of instability revealed significant differences in seven of the demographic, economic, and psychosocial characteristics in the full sample. Specifically, children from high-instability households were marginally less likely to be identified as Hispanic, $t(274) = -1.69, p < .10$, and significantly more likely to be identified as either biracial or white (i.e., 'other' race), $t(274) = -1.93, p < .05$. Caregivers from high-instability households were marginally more likely to have a college education than caregivers from stable households, $t(274) = 1.77, p < .10$, significantly less likely to be immigrants, $t(274) = -2.12, p < .05$, significantly more likely to report depressive symptoms, $t(274) = 3.56, p < .01$, and significantly more likely to report health problems, $t(274) = 3.71, p < .01$. Finally, high-instability households were significantly less likely to be Spanish-speaking than stable households, $t(274) = -2.37, p < .05$. (See Table 1 for group means).

Fewer differences in covariates were seen across the full low and no instability samples. Caregivers in low-instability households reported significantly more pronounced depressive symptoms, $t(340) = -2.55, p < .01$, and more health problems, $t(340) = -2.41, p < .05$, than caregivers from stable households. Low instability households also had significantly higher overall assets, $t(340) = -2.10, p < .05$, than stable households. (See Appendix for group means) These mean differences highlight the value of propensity matching to identify subsets of children facing equivalent rather than different levels of demographic and psychosocial risk.

Model 1. Regression in the full sample

Results of Model 1 (which used the full sample of high- and no-instability children) revealed that children from high-instability households were rated as having significantly lower A/IC than children from stable households, $b = -0.23, SE = 0.08, p < .01$. Holding all else constant, these results suggest that experiencing two or more indicators of household instability was associated with scoring 0.23 points (or 0.39 *SDs*) lower in observed A/IC than experiencing no destabilizing events in the previous year. No statistically significant differences were seen in the EF or EC skills of high- versus no-instability children in Model 1. (See Table 3.) In testing low- vs. no-instability households, results revealed no significant differences in EC, EF, or A/IC across the two groups. (See Appendix)

Model 2. Propensity score weighted regression in the matched sample

Results of Model 2 (which used propensity score-weighted regression in the matched subsample) revealed a statistically significant negative relationship between high (versus no) household instability and children's A/IC, $b = -0.19$, $SE = 0.09$, $p < .05$, $d = -0.32$ *SD*. Children from high-instability households were also found to perform significantly lower on tasks of EC than matched children from stable households, $b = -0.29$, $SE = 0.09$, $p < .01$, $d = -0.43$ *SD*. No significant relationships were observed between high- vs. low-instability and children's EF in the matched sample (See Table 3). When low-instability households were compared with matched stable households, results once again revealed no statistically detectable differences in any of the three self-regulatory outcomes. (See Appendix)

Model 3. Sensitivity analysis using time-invariant, non-missing variables

Results of Model 3 (which tested whether results were similar when only a limited set of time-invariant, non-missing variables for propensity score matching was used) were highly similar to those in Model 2, with children from high-instability households showing significantly lower A/IC, $b = -0.23$, $SE = 0.09$, $p < .05$, and EC, $b = -0.27$, $SE = 0.08$, $p < .01$ than matched children from stable households. No other statistically significant differences in EF were observed between children from high- and no-instability households, nor for any of the three self-regulatory outcomes for children in low- vs. no-instability households. (See Appendix)

Discussion

A primary goal of the present study was to explore relationships between low-income urban preschoolers' exposure to multiple forms of household instability – including residential mobility, movement of individuals into the household, and major life events affecting household structure and stress – and three dimensions of their self-regulation, including EF, EC, and global attention and impulsivity control. A major issue in determining the effects of family instability on children's outcomes is quantifying the degree to which families experiencing high levels of transition are similar to or different from stable families in terms of their exposure to other risk and protective factors. In the present study, we explored this question by examining the similarities and differences among a set of demographic and social characteristics across households that have experienced high, low, or no instability.

Descriptive results reveal that more than half of the children in the present sample came from families experiencing at least one destabilizing event (e.g., the death of a family member, a change in caregiver marital status, or residential transitions), with 20% of the full sample experiencing more than one event over the course of a year. These results suggest that the majority of families in this sample weathered at least some instability in addition to the day-to-day challenges of making ends meet, with high levels of transition experienced for one out of five children. These findings are consistent with previous research suggesting that young children in poor households experience high rates of residential moves and greater turbulence in household composition as compared with non-poor children (Ziol-Guest and McKenna 2014). Also consistent with past work, caregivers from unstable households reported significantly higher levels of depression and health problems than their

stable counterparts. Contrary to our hypothesis, however, instability was also associated with marginally higher educational attainment, significantly greater financial assets, more English-language skills, and lower likelihood of being an immigrant.

These findings suggest that although instability is often associated with more risky household circumstances, in a low-income sample, it may also be related to some positive conditions such as having enough assets on hand to make a voluntary move to better housing or a safer neighborhood. Recent policy work reflects this claim, showing that voluntary, planned mobility, and changes in family structure may both reflect and result in greater access to human, social, and economic resources in poor families (Cohen and Wardrip 2011; Ludwig et al. 2012). These findings provide an empirical window into the heterogeneous experiences of low-income families, highlighting the need for researchers to consider both strengths and risk factors when conducting observational research, as well as the need to account for the possibility that issues associated with selection may bias results in unexpected ways.

To account for these observed sample differences in the present study, we used propensity score matching to evaluate whether otherwise similar children (i.e., those experiencing the same levels of caregiver health problems, caregiver education, etc.) show different levels of self-regulation based on their levels of experienced household instability. Results of these analyses showed that children experiencing two or more indicators of household instability score approximately 0.30 *SDs* lower in their regulation of attention and impulsivity and 0.40 *SD* lower in EC than their stable peers. Although the association between high instability and A/IC was also significant in the full, non-matched sample, the relationship between high instability and EC was not, reinforcing the importance of accounting for the positive and negative characteristics in children's family environments that covary with instability in order to estimate its effects.

Taken together, these results suggest that multiple, additive changes in household structure, caregiver marital status, and residence may have negative impacts on children's abilities to delay gratification, focus and sustain their attention, and maintain behavioral self-control. This work supports (and may help to explain) past research showing that children from high-chaos environments show significantly higher rates of observed behavior problems and self-regulatory difficulties than their peers (Ackerman et al. 1999; Adam and Chase-Lansdale 2002; Dumas et al. 2005; Evans 2004; Evans et al. 2005; Fomby and Cherlin 2007; Magnuson and Berger 2009; Osborne and McLanahan 2007; Valiente, Lemery-Chalfant, and Reiser 2007; Ziol-Guest and McKenna 2014). These results also complement theories of 'toxic' environmental stress, which maintain that exposure to high levels of adversity, chaos, and unpredictability may have lasting impacts on children's impulse control as a result of biological changes in the ways that children react to and regulate stress (i.e., allostatic load; Blair and Raver 2012; Evans and Wachs 2010). In order to confirm this mechanism, further research is needed to understand the degree to which biomarkers of stress (e.g., cortisol) are markedly different for children experiencing particularly high levels of instability, and how these biological changes relate to self-regulatory outcomes.

Somewhat surprisingly, no significant relationship was found between high instability and children's cognitive self-control (as indicated by performance on executive-function tasks measuring set-shifting and working memory) in either the full or propensity score matched sample. Although such null findings may be due to empirical limitations (e.g., limited power, particularly at high levels of instability), they may also result from the present study's focus on recent but not necessarily chronic stressors. Recent work has shown that relative to behavioral self-control, children's cognitive self-regulation is particularly susceptible to more severe, pervasive, or chronic adversity (Evans and Schamberg 2009; Sharkey et al. 2012; Raver et al. 2013), a theory that is supported by descriptive data in this study showing a slight 'dip' in EF scores only for children experiencing extremely high levels of instability (see Figure 1). Additional work is needed to examine the thresholds, timing, and potential biological mechanisms that might explain these differences.

Finally, we found no significant differences in any of the three self-regulatory outcomes for children experiencing a single indicator of household instability compared with those from stable households. On one hand, these results suggest that low-income families in our sample showed resilience in the face of mild instability, and were able to appropriately deploy resources and coping mechanisms to manage the challenges associated with a single major change in everyday life. Alternatively, it is possible that a single 'dose' of instability in the course of the year does in fact have negative effects on children's self-regulation that were simply not detected – due either to imprecise measurement or limited power – in the present study. Regardless, these findings support a multiple-transition framework and dose-response approach to conceptualizing exposure to environmental adversity, with higher levels of risk being more strongly related to negative outcomes than smaller doses.

Limitations and future directions

There are several important limitations to the present study. First, this study relies on observational, cross-sectional data, and therefore cannot be used to confidently establish the directionality of predicted relationships. For example, adults' transitions and children's dysregulation may both be predicted by a third set of omitted, unobserved variables that were not sufficiently captured or controlled for by our propensity score matching methods (e.g., child temperament, neighborhood characteristics), limiting our ability to draw causal inferences. Second, participants for the full sample were recruited in a non-probabilistic fashion from particularly disadvantaged Head Start centers in seven of Chicago's poorest neighborhoods. For that reason, our sample is significantly over-representative of African-American families and urban settings and under-representative of white and Hispanic families and rural settings relative to Head Start programs nationally (Puma et al. 2005). Furthermore, the use of propensity score matching required the removal of a large portion of the full sample, reducing available power to detect statistical significance and limiting generalizability to only that particular subset of participants.

Finally, although we have hypothesized that a large amount of the stress experienced by children during unstable periods can be attributed to the changes themselves, understanding the long-term effects that transitions have for children's outcomes requires a much deeper understanding of the qualitative nature of the events that precipitated the 'shake-up' or

‘break-up,’ the ways that instability may ultimately lead to improvements or increased risk in children’s day-to-day environments, and the protective factors available for buffering children from stress and chaos. For example, a child from a supportive environment who changes residence as a result of a growth opportunity for the family (e.g., a voluntary move to a better, safer neighborhood following an increase in income) is likely to show different long-term outcomes than a child forced into an involuntary change (e.g., a move to lower-quality housing following job loss or eviction; Cohen and Wardrip 2011). Indeed, for children transitioning from low- to high-quality neighborhoods, from chaotic foster homes to responsive adoptive families, and from conflict-ridden two-parent households to stable one-parent households, the short-term stress of change is far outweighed by the long-term gains of a more supportive and stable day-to-day environment (Amato 2000; Roy, McCoy, and Raver 2014; Yarrow and Klein 1980). Although our results suggest that multiple transitions may lead to increased self-regulatory difficulty in the short-term, our data do not allow us to examine either long-term outcomes or heterogeneity in competencies based on the qualitative nature of the instability and other environmental risk and protective factors. Future research using longitudinal data and detailed measurement of the nature of instability and its proximal effects on children’s environments is needed to understand questions of mediation and moderation in diverse samples of children.

Implications and conclusions

Results of the present study reveal that exposure to household instability has significant implications for poor children’s self-regulation. In particular, these findings highlight the ways in which high – but not necessarily low – levels of household instability may affect the skills children need to succeed as they enter school, including the ability to delay gratification, to appropriately pay attention, and to control impulsivity during completion of mildly stressful tasks with an unfamiliar adult. Such global ratings of self-regulatory skill have particularly important implications for understanding the ways in which children from unstable versus stable homes may be perceived by teachers when they enter new classroom contexts.

These results also highlight the pressing need for additional programs and policies that can support families in reducing the short-term costs of household turbulence for young children. In particular, this study highlights the need not only for programs (such as homelessness-prevention services) that lower children’s exposure to negative sources of household instability, but also for interventions that support those children for whom high turbulence cannot be avoided. For example, work by Fisher and Kim (2007) has shown the importance of early intervention in supporting the behavioral and emotional adjustment of children from foster care settings as they transition into preschool. In general, adults in home and school contexts must find ways to collaborate on buffering low-income children from the negative sequelae of involuntary transitions, helping both adults and children to manage the stress of the negative life events that often lead to the instability (e.g., eviction, job loss), as well as the stress inherent in the change (or set of changes) itself.

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Appendix

Table A1

Covariate means and SDs for children from low and no instability households before and after propensity score matching.

	Before matching						After matching Full set of covariates				After matching Time-invariant covariates only			
	Low instability (n = 148)		No instability (n = 194)		d	Ratio of SDs	No instability (n = 85)		d	Ratio of SDs	No instability (n = 79)		d	Ratio of SDs
	Mean	SD	Mean	SD			Mean	SD			Mean	SD		
Child demographics														
Cohort in study (1 = first cohort)	0.54	0.50	0.52	0.50	0.05	1.00	0.48	0.50	0.08	1.00	0.57	0.60	−0.05	1.00
Gender (1 = boy)	0.45	0.50	0.49	0.50	−0.09	1.00	0.43	0.50	0.03	1.00	0.45	0.50	0.00	1.00
Age (in months)	50.28	6.96	50.43	6.58	−0.02	1.06	49.39	7.4	0.15	0.93	49.31	6.71	0.14	1.04
Race														
African-American	0.71	0.46	0.69	0.46	0.04	0.98	0.69	0.47	0.09	0.96	0.68	0.47	0.06	0.97
Hispanic	0.22	0.41	0.24	0.43	−0.05	0.97	0.22	0.41	−0.02	0.99	0.20	0.40	0.03	1.02
Other	0.07	0.26	0.07	0.26	0.01	1.01	0.10	0.30	−0.13	0.82	0.12	0.32	−0.15	0.82
Caregiver demographics														
Age (in years)	30.15	8.75	29.77	7.41	0.04	1.18	30.47	7.38	−0.05	1.19	30.16	7.54	−0.00	1.16
Education														
Less than high school	0.28	0.45	0.27	0.45	0.01	1.01	0.27	0.45	0.03	1.01	0.26	0.44	0.05	1.02
High school or GED	0.35	0.48	0.38	0.49	−0.07	0.09	0.36	0.48	−0.03	0.99	0.37	0.48	−0.04	0.98
Some college or higher	0.38	0.49	0.35	0.48	0.06	1.02	0.37	0.49	0.00	1.00	0.38	0.49	0.00	1.00
Immigrant (1 = yes)	0.13	0.34	0.17	0.38	−0.12	0.89	0.13	0.33	0.00	1.00	0.15	0.36	−0.06	0.94
Spanish speaker (1 = yes)	0.10	0.29	0.15	0.36	−0.19	0.82	0.10	0.30	0.00	1.00	0.10	0.29	0.00	1.00
Depressive symptoms	0.76	0.71	0.57**	0.67	0.27	1.06	0.73	0.80	−0.02	0.85				
Health problems (1 = yes)	0.11	0.31	0.03*	0.20	0.22	1.56	0.10	0.30	−0.07	0.89				
Household economics														
Caregiver weekly hours worked	22.41	19.17	22.72	18.16	−0.02	1.06	23.13	19.26	−0.04	1.00				
Income-to-needs ratio	0.66	0.59	0.69	0.62	−0.04	0.94	0.66	0.56	−0.02	1.05				
Total public assistance received	2.66	1.76	2.38	1.58	0.16	1.11	2.60	1.58	0.03	1.11				
Total assets/savings	1.20	0.09	1.00*	0.81	0.22	1.11	1.15	0.83	0.02	1.08				
Financial hardship	0.92	0.67	0.86	0.52	0.09	1.28	0.87	0.59	0.09	1.14				
Missing data indicator	0.10	0.29	0.09	0.29	0.01	1.01	0.11	0.32	−0.05	0.94				

	Before matching								After matching Full set of covariates				After matching Time-invariant covariates only			
	Low instability (<i>n</i> = 148)		No instability (<i>n</i> = 194)				No instability (<i>n</i> = 85)				No instability (<i>n</i> = 79)					
	Mean	<i>SD</i>	Mean	<i>SD</i>	<i>d</i>	Ratio of <i>SDs</i>	Mean	<i>SD</i>	<i>d</i>	Ratio of <i>SDs</i>	Mean	<i>SD</i>	<i>d</i>	Ratio of <i>SDs</i>		
Mean ^a					0.09	0.10			0.05	0.06			0.05	0.04		

^a Mean *d* equal to the average of the absolute value of the difference in means divided by the pooled *SD*; Mean ratio of *SDs* equal to the average of the absolute value of the ratios' deviation from one.

* $p < .05$;

** $p < .01$ for differences compared to low instability sample.

Table A2

Regression analyses predicting child self-regulation from low vs. no instability in full and propensity score matched samples.

	A/B ^c						EC ^c						EF ^c														
	Model 1 Full sample (n = 276)			Model 2 Propensity score weighted sample; full set of covariates for matching (n = 228)			Model 3 Propensity score weighted sample; time invariant covariates only (n = 227)			Model 1 Full sample (n = 276)			Model 2 Propensity score weighted sample; full set of covariates for matching (n = 228)			Model 3 Propensity score weighted sample; time invariant covariates only (n = 227)											
	B	(SE)		B	(SE)		B	(SE)		B	(SE)		B	(SE)		B	(SE)										
Constant	1.27	**	(0.28)	1.76	**	(0.28)	1.15	*	(0.51)	-1.19	**	(0.40)	-0.80	†	(0.53)	-1.19	†	(0.59)	-2.57	**	(0.32)	-2.60	**	(0.47)	-2.38	**	(0.40)
Child gender (boy)	-0.09	*	(0.04)	-0.21	**	(0.07)	-0.22	*	(0.09)	-0.18	**	(0.06)	-0.39	**	(0.07)	-0.32	**	(0.11)	-0.05	(0.07)	0.05	(0.11)	-0.14	(0.12)			
Child age (in months)	0.02	**	(0.01)	0.02	**	(0.01)	0.03	**	(0.01)	0.03	**	(0.01)	0.03	**	(0.01)	0.03	*	(0.01)	0.05	**	(0.01)	0.06	**	(0.01)	0.04	**	(0.01)
Child race (black)	-0.06		(0.06)	-0.07		(0.06)	-0.18	*	(0.08)	-0.09		(0.08)	-0.02		(0.09)	-0.06		(0.11)	0.11		(0.16)	0.23		(0.20)	0.20		(0.14)
Household income-to-needs	0.05		(0.05)	-0.14	†	(0.08)	-		-	-0.07		(0.05)	-0.18	*	(0.08)	-		-	-0.04		(0.10)	-0.11		(0.08)	-		-
Household instability (low = 1 vs. no = 0)	-0.08		(0.07)	-0.08		(0.09)	-0.04		(0.09)	-0.06		(0.08)	-0.05		(0.11)	-0.15		(0.12)	-0.03		(0.09)	-0.18		(0.15)	0.08		(0.11)

Notes: All *SE* are robust to account for clustering in Head Start sites; Analysis using propensity score weights included additional covariates with suboptimal balance on either means or *SDs*, including six additional covariates for Model 2, and two additional covariates in Model 3. Results were similar with and without these covariates included in the model.

⁺ $p < .10$;

* $p < .05$;

** $p < .01$.

Figure 1. Self-regulatory scores of children facing 0, 1, 2, 3, and 4 or more indicators of instability.

Table 1

Covariate means and SDs for children from high and no instability households before and after propensity score matching.

	Before matching				After matching Full set of covariates				After matching Time-invariant covariates only			
	High instability (<i>n</i> = 82)		No instability (<i>n</i> = 197)		No instability (<i>n</i> = 52)		Ratio of SDs		No instability (<i>n</i> = 54)		Ratio of SDs	
	Mean	SD	Mean	SD	Mean	SD	<i>d</i>		Mean	SD	<i>d</i>	
<i>Child demographics</i>												
Cohort in study (1 = first cohort)	0.50	0.50	0.52	0.50	0.51	0.50	-0.02	1.00	0.48	0.50	0.05	1.00
Gender (1 = boy)	0.45	0.50	0.49	0.50	0.49	0.50	-0.07	0.99	0.52	0.05	0.07	1.01
Age (in months)	49.53	6.86	50.43	6.58	29.63	6.65	-0.02	1.03	49.74	6.44	-0.03	1.06
Race												
African-American	0.71	0.46	0.69	0.46	0.73	0.45	-0.05	1.02	0.76	0.43	-0.11	1.06
Hispanic	0.15	0.36	0.24 ⁺	0.43	0.13	0.34	0.03	1.03	0.11	0.32	0.10	1.13
Other	0.15	0.36	0.07 [*]	0.26	0.13	0.34	0.03	1.03	0.13	0.34	0.03	1.03
<i>Caregiver demographics</i>												
Age (in years)	28.96	7.10	29.73	7.37	28.55	5.75	0.06	1.24	28.73	7.55	0.03	0.94
Education												
Less than high school	0.18	0.39	0.27	0.45	0.21	0.41	-0.03	0.97	0.21	0.41	-0.03	0.97
High school or GED	0.35	0.48	0.38	0.49	0.28	0.45	0.13	1.05	0.33	0.47	0.03	1.01
Some college or higher	0.46	0.50	0.35 ⁺	0.48	0.51	0.50	-0.10	0.99	0.46	0.05	0.00	1.00
Immigrant (1 = yes)	0.07	0.26	0.17 [*]	0.38	0.12	0.33	-0.19	0.79	0.07	0.26	0.00	1.00
Spanish speaker (1 = yes)	0.05	0.22	0.15 [*]	0.36	0.06	0.24	-0.06	0.90	0.05	0.22	0.00	1.00
Depressive symptoms	0.89	0.76	0.57 ^{**}	0.67	0.77	0.69	0.16	1.10				
Health problems (1 = yes)	0.17	0.38	0.04 ^{**}	0.20	0.21	0.41	-0.10	0.92				
<i>Household economics</i>												
Caregiver weekly hours worked	20.06	18.64	22.72	18.16	20.32	17.16	-0.01	1.09				
Income-to-needs ratio	0.73	0.63	0.69	0.62	0.73	0.70	0.01	0.91				
Total public assistance received	2.59	1.77	2.38	1.58	2.41	1.61	0.10	1.10				

	Before matching				After matching Full set of covariates				After matching Time-invariant covariates only			
	High instability (<i>n</i> = 82)		No instability (<i>n</i> = 197)		No instability (<i>n</i> = 52)		No instability (<i>n</i> = 54)		No instability (<i>n</i> = 54)		No instability (<i>n</i> = 54)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Total assets/savings	1.17	0.77	1.00	0.81	0.22	0.94	1.23	0.79	1.23	0.79	1.23	0.79
Financial hardship	0.94	0.61	0.86	0.52	0.13	1.16	0.91	0.69	0.91	0.69	0.91	0.69
Missing data indicator	0.04	0.19	0.06	0.24	-0.13	0.78	0.06	0.24	0.06	0.24	0.06	0.24
Mean ^a					0.19	0.16		0.07		0.07	0.04	0.03

^a Mean *d* equal to the average of the absolute value of the difference in means divided by the pooled SD, Mean ratio of SDs equal to the average of the absolute value of the ratios' deviation from 1.

+ $p < .10$;

* $p < .05$;

** $p < .01$ for differences compared to low instability sample.

Table 2

Number of children experiencing indicators of household instability.

	<i>n</i>	% of sample
<i>Individual household instability indicators</i>		
Residential mobility	19	4.48
Child movement	70	6.51
Adult movement	33	7.78
Family member death	139	32.78
Change in marital status	84	19.81
<i>Total number of indicators</i>		
0	194	45.75
1	148	34.91
2	57	13.44
3	18	4.25
4	6	1.42
5	1	0.24

Table 3

Regression analyses predicting child self-regulation from high vs. no instability in full and propensity score matched samples.

	A/C						E/C						E/F													
	Model 1 Full sample (<i>n</i> = 276)			Model 2 Propensity score weighted sample; full set of covariates for matching (<i>n</i> = 134)			Model 3 Propensity score weighted sample; time invariant covariates only (<i>n</i> = 136)			Model 1 Full sample (<i>n</i> = 276)			Model 2 Propensity score weighted sample; full set of covariates for matching (<i>n</i> = 134)			Model 3 Propensity score weighted sample; time invariant covariates only (<i>n</i> = 136)										
	<i>B</i>	(<i>SE</i>)		<i>B</i>	(<i>SE</i>)		<i>B</i>	(<i>SE</i>)		<i>B</i>	(<i>SE</i>)		<i>B</i>	(<i>SE</i>)		<i>B</i>	(<i>SE</i>)									
Constant	0.41	(0.28)		-0.10	(0.47)		0.05	(0.34)		-1.80**	(0.41)		-1.99**	(0.64)		-1.69**	(0.40)		-2.86**	(0.32)		-3.61**	(0.46)		-2.70**	(0.73)
Child gender (boy)	-0.14	** (0.05)		-0.22	** (0.06)		-0.13	(0.11)		-0.18**	(0.06)		-0.15	(0.12)		-0.21*	(0.10)		-0.09	(0.09)		-0.06	(0.14)		-0.17	(0.15)
Child age (in months)	0.04**	(0.01)		0.04**	(0.01)		0.05**	(0.01)		0.04**	(0.01)		0.04**	(0.01)		0.04**	(0.01)		0.06**	(0.01)		0.07**	(0.01)		0.06**	(0.01)
Child race (black)	-0.02	(0.08)		-0.20	(0.15)		-0.22	(0.13)		-0.09	(0.09)		-0.35*	(0.14)		-0.37*	(0.17)		0.05	(0.15)		-0.19	(0.20)		0.06	(0.15)
Household income-to-needs	0.04	(0.04)		0.11	(0.07)		-	-		0.00	(0.05)		0.07	(0.09)		-	-		0.04	(0.10)		0.01	(0.16)		-	-
Household instability (high = 1 vs. no = 0)	-0.23	** (0.08)		-0.19*	(0.09)		-0.23*	(0.09)		-0.13	(0.11)		-0.29**	(0.09)		-0.27**	(0.08)		0.02	(0.09)		-0.23	(0.17)		-0.11	(0.13)

Notes: All *SE* are robust to account for clustering in Head Start sites; Analysis using propensity score weights included additional covariates with suboptimal balance on either means or *SD*s, including five additional covariates for Model 2, and one additional covariate in Model 3. Results were similar with and without these covariates included in the model.

* $p < .05$;

** $p < .01$.