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Emotional Reactivity and Exposure to Household Stress in Childhood Predict Psychological Problems in Adolescence

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Abstract

In recent years, research has examined the role of heightened emotional reactivity and poor regulation on maladjustment during childhood and adolescence. Although much of this research has shown a direct link between high emotional reactivity and maladjustment, there is less research on the ways in which reactivity interacts with contextual factors. Using data from the NICHD Study of Early Child Care and Youth Development (SECCYD), the current study asks how emotional reactivity in childhood, household chaos, and household income impact changes in emotional and behavioral problems between childhood and adolescence. Participants in the SECCYD were followed from birth until adolescence. Of these, 958 youth (52% male; 80% Caucasian, 13% African American, 2 % Asian, and 5% Other) who completed measures at age 15 were included in the current study. Results indicate that emotional reactivity and low household income during childhood directly predict higher levels of emotional and behavioral problems in adolescence. In contrast, the impact of household chaos on adolescent mental health depends on the child's emotional reactivity. Specifically, the adverse impact of household chaos on emotional problems was observed among adolescents who were highly emotionally reactive as children, but not among their less reactive counterparts. Taken together, the relationship between an individual's childhood context and temperament are important aspects in the prediction of outcomes in adolescents.

Keywords

Emotion Regulation; Adolescence; Stress; Poverty; Internalizing; Externalizing

Introduction

In recent years, a growing body of research has examined the role of poor emotion regulation and maladjustment during childhood and adolescence (Cicchetti & Cohen, 2006; Eisenberg, Spinrad, & Eggum, 2010). Research generally has examined how emotional dysregulation can impair functioning and contribute to the development of psychopathology (Eisenberg et al., 2010). Within the study of emotion regulation, many researchers have focused on emotional reactivity, which is generally conceptualized as a dimension of temperament that refers to an individual's inclination to affective arousal (Nock et al., 2008; Rothbart & Bates, 2006; Thompson, Lewis, & Calkins, 2008). This examination has aimed

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Author Contributions

BGS conceived of the study, participated in its design and coordination, performed statistical analysis and drafted the manuscript. LS participated in the design and interpretation of the data, coordination of the study and measurement, and overall guidance and revision of the manuscript. All authors read and approved the final manuscript.

at understanding risk factors that divert normal developmental trajectories into those that may lead to emotional or behavioral problems.

Emotional reactivity is an aspect of individual functioning that may help explain why some people are more vulnerable than others to develop psychological problems in the face of stressful life events. According to Nock and colleagues (2008), emotional reactivity is defined by the extent to which an individual experiences emotions, the range of stimuli to which he or she responds, the intensity of the individual's response, and the duration of the individual's arousal before returning to baseline. Due to the link between temperament and emotional reactivity, researchers suggest that this vulnerability develops early in life (Zemon et al., 2006). The family environment is important in the development of emotion regulation, with children developing emotional competencies and strategies through the direct observation of parents, as a consequence of specific parenting practices, and through the emotional climate of the family (Morris et al., 2007).

Adolescence marks an important transition in the normative development of emotional reactivity (Spear, 2009). Stressful life events experienced by youth increase from childhood to adolescence (Ge et al., 1994). Additionally, the relationship between stress and negative affect in adolescence is stronger than at earlier ages (Larson & Ham, 1993). Taken together, some researchers report that adolescence is a time of significant increases in emotional reactivity and heightened sensitivity to stressors (Casey et al., 2010).

While much of the work on emotional reactivity and maladjustment has focused on young children, there is also evidence that poor emotion regulation may be linked to psychological symptomatology in adolescence. For example, Silk, Steinberg, and Morris (2003) examined the effects of emotional reactivity on both internalizing and externalizing problems in adolescence using the experience sampling methodology. Adolescents reported on the intensity and lability of their emotions and the strategies they used to regulate their emotions over a one-week period. Individuals who reported more intense and labile emotions and less effective regulation strategies reported more problem behaviors and more depressive symptoms. In a longitudinal examination, Charbonneau, Mezulis, and Hyde (2009) found that those high in emotional reactivity were more likely to experience depressive symptoms in response to stress compared to those lower in reactivity. Hessler and Katz (2010) examined the relationship between emotional competence and externalizing behavior from childhood to adolescence. Their findings suggest that children with poor emotional competence (i.e., deficits in awareness, expression, and regulation) had a higher likelihood of problem behaviors during adolescence, including using hard drugs and evincing more behavioral adjustment difficulties. Additionally, emotion dysregulation has been linked to clinical levels of anxiety (Carthy et al., 2010) and depression (Kovacs, Joorman, & Gotlib, 2008) as well as self-injurious behaviors (Hasking, et al., 2010; Nock et al., 2008). Taken together, poor emotion regulation has been shown to predict both internalizing and externalizing problems in children and adolescents, and heightened emotional reactivity during adolescence may be an especially important risk factor for problematic development given the multitude of demands and developmental changes characteristic of this stage.

Although much of this research has shown a direct link between poor emotional reactivity and maladjustment, there is less research on the ways in which reactivity interacts with contextual factors in the genesis of psychopathology. There is a growing literature indicating that children are differentially susceptible to the adverse consequences of exposure to stress (Belsky, 1997; Ellis et al., 2011) and that the same type and magnitude of stress may be far more harmful to some children than others. Additionally, research has begun to examine how a stressful childhood environment interacts with biological reactivity to produce maladaptive emotional and behavioral outcomes (McLaughlin et al., 2010; Obradovic et al.,

2010). One form of stress to which children may be differentially vulnerable is stress in the home environment.

Exposure to family stress is associated consistently with maladaptive outcomes in childhood and adolescence. Research suggests that early exposure to stressful contexts, including substandard housing, crowded households, family turmoil, and poverty, alter physiological responses to stress (Evans et al., 2007; Evans & Kim, 2007). Early life stressors and childhood adversity have long lasting effects by altering the reactivity and regulation of the stress response (Gustafson et al., 2010). According to Evans and colleagues (2005), growing up in a chaotic household, characterized by a lack of structure and routine, high levels of noise, and overcrowding, may interfere with developmental competencies. These researchers suggest that living in a household in which routines are inconsistent and unpredictable may lead to feelings of helplessness in children and may undermine a child's ability to self-regulate.

Poverty is also an important influence on adolescents' psychological development. Economic deprivation during childhood may alter normative developmental trajectories and influence academic, cognitive, and behavioral outcomes later in life (Duncan et al., 1994; 1998). For example, Brooks-Gunn and Duncan (1997) found that individuals who live in poverty during childhood have lower rates of school completion than those who experience comparable economic disadvantage in later years. Importantly, Evans et al. (2005) found that low-income families tend to have more chaotic, noisier, and less structured households compared to wealthier families, and that these environmental conditions are associated with poorer socioemotional adjustment during adolescence. Moreover, household chaos mediated the effect of family income on adjustment. This suggests that children in households with high levels of chaos, irrespective of a household's socioeconomic status, may be at greater risk for problems in emotion regulation.

Other studies have examined the role of stressful events and emotion regulation in relationship to adolescents' externalizing (Hertz, McLaughlin, & Hatzenbuehler, 2012; Walton & Flouri, 2009) and internalizing problems (McLaughlin & Hatzenbuehler, 2009). In a long-term longitudinal study, McLaughlin et al. (2010) found that children who grew up with a lower socio-economic status and with childhood environments characterized by greater conflict and adversity demonstrated higher levels of emotional reactivity that, in turn, predict the onset of adult mood and anxiety disorders. High levels of stress and poor emotion regulation jointly contribute to maladjustment, particularly during adolescence.

The Current Study

Much prior research on the contribution of family context to the development and consequences of poor emotional reactivity has used a cross-sectional design and data obtained from a single reporter (Eisenberg et al., 2010). In contrast, the current study examines family context and emotional reactivity in childhood and their joint impact on subsequent adolescent internalizing and externalizing problems using information from both the children and parents who participated in the National Institute of Child Health & Human Development (NICHD) Study of Early Child Care and Youth Development (SECCYD). Consistent with prior studies, we hypothesize (1) that more emotionally reactive children will evince a greater increase in internalizing and externalizing problems in adolescence, (2) that children living in a chaotic or economically disadvantaged home environment will evince a greater increase in problems in adolescence, and (3) that emotional reactivity will moderate the relationship between psychological problems and both household income and household chaos, such that the adverse consequences of having lived during childhood in a chaotic or disadvantaged home environment will be accentuated among individuals who, as

children, were relatively more reactive. We also explore whether household chaos mediates the relationship between household income and adolescent problems and if emotional reactivity moderates this relationship. Here we hypothesize (4) that lower household income will lead to a more chaotic home environment and increased problems in adolescents. Consistent with our prior hypotheses, we expect that this relationship will be exacerbated by a child's emotional reactivity, in that higher emotional reactivity would lead to more problems.

Method

Participants

Participants in the SECCYD were recruited from 24 designated hospitals at ten data collection sites following IRB Approval (NICHD ECCRN, 2001). A total of 1,364 families with healthy newborns were initially recruited into the study in 1991, with approximately equal number of families at each site. Children were followed at frequent intervals from birth through age 15. At age 15, measures of adolescent outcomes were obtained for 958 youth (70% of the original sample). Comparisons of the age 15 sample and the other 406 youth in the birth cohort sample indicated that nonparticipants at age 15 were more likely to be boys (56% vs. 50%) and come from households with less educated mothers (13.4 years vs. 14.3 years). Data for the current analyses come from the middle childhood (grade 3) and adolescent (age 15) assessments. In these analyses, 956 participants with complete data were included (52% male; 80% Caucasian, 13% African American, 2 % Asian, and 5% Other).

Procedures

While the NICHD SECCYD obtained information over a number of time points throughout the child's life, the variables used in the current study consisted of measures obtained during childhood and adolescence. (For further information on the study's design see, <http://www.nichd.nih.gov/research/supported/seccyd/overview.cfm>.) The specific age of childhood assessment was chosen because one of the main variables in our analyses (Household Chaos) was measured only during the 3rd grade. Information about the child and home context were completed by parental reports during childhood, and outcome measures were completed by the child during adolescence (age 15).

Measures

Emotional Reactivity—Mothers completed a 10-item questionnaire about their perceptions of how their child expresses emotions in response to events (Eisenberg et al., 1995) (e.g., “My child responds very emotionally to stories, movies and events”). Respondents rated their child's frequency of display of emotions on a 5-point scale from never to always. An emotional reactivity (EMR) score was computed, with higher values indicating a higher perceived EMR of the child. Reliability estimates in the SECCYD data are consistent with previous studies and had α 's = .76, .74, and .77 for the 3rd, 4th, and 5th grades, respectively (Kliewer, 1991; Stocker, Dunn, & Plomin, 1989). The 3rd grade measure of EMR was used to coincide with the timing of assessment of other study variables.

Household Chaos—In the NICHD study, the CHAOS (Confusion, Hubbub, and Disorder) scale was only given to mothers at the 3rd grade assessment, where mothers were asked to complete a 15-item true/false questionnaire on their perceptions of the degree of environmental chaos in the study child's home (Matheny, Wachs, & Ludwig, 1995) (e.g., “There is often a fuss going on at our home”). Item scores were summed, with higher scores indicating more household chaos, with a range of scores from 15 to 30. A subsample (N = 42) of mothers completed two CHAOS questionnaires 12 months apart. The test-retest

stability correlation was .74, indicating good reliability. Matheny, et al. (1995) assessed the construct validity of this measure by comparing mother reports on the CHAOS with observers' assessments of the home environment. Results showed that higher ratings of environmental confusion by parents were associated significantly with observers coding homes as noisier, more crowded, and having a higher "traffic pattern."

Household Income—Household Income is based on the family's income-to-needs ratio, which is computed by dividing the total family pre-tax income by the poverty threshold, with higher scores indicating higher income. The mean of the sample on this variable is 4.39 (SD = 3.77), which indicates that the average family in the current sample has roughly four times more income than the poverty threshold; the large SD indicates that there was considerable diversity in income, however. This measure was given at grades 3, 4, and 5 and at the age 15 assessment. Household income at 3rd grade was correlated with the 4th and 5th grade, and age 15 income (r 's = .90, .86, and .74, respectively) and thus was considered relatively stable. Household income at the 3rd grade was used in the present study.

Adolescent Emotional and Behavioral Problems—The Youth Self-Report (YSR; Achenbach & Rescorla, 2001), a widely used scale that assesses a broad range of behavioral and emotional problems during adolescence, was administered to all SECCYD participants at the age 15 assessment. The scale consists of items rated on a 3-point Likert scale (0 = not true, 1 = somewhat or sometimes true, 2 = very true or often true), with higher scores indicating more behavioral/emotional problems. The standardized scores (T-scores) for the three superordinate scales: Internalizing (Withdrawn, Somatic Complaints, and Anxious/Depressed Syndromes); Externalizing (Delinquent Behavior and Aggressive Behavior); Total Problems (all scales combined) were used in the current study. The Internalizing subscale consisted of 31 items (α = .89), the Externalizing subscale consisted of 30 items (α = .86), and the Total Problems subscale consists of 101 items (α = .94).

Childhood Emotional and Behavioral Problems—The Child Behavior Checklist (CBCL; Achenbach, 2001) is a widely used measure to assess the social competence and problem behavior of children 4–18 years, and was completed by the child's mother. The scales used match those in the YSR include those measuring Internalizing (31 items; α = .85), Externalizing (33 items; α = .89), and Total Problems (118 items; α = .94). The CBCL was given during childhood in the 3rd, 4th, and 5th grades. The 3rd grade Total Problems scale score was correlated with the 4th and 5th grade scores, with r 's = .82 and .75, respectively. Because the CBCL levels were relatively stable, the 3rd grade mother report CBCL scale scores were used.

Results

Descriptive Data

Table 1 presents the bivariate correlations between all variables in the present analyses. As expected, maternal reports of childhood emotional reactivity were correlated negatively with household income and correlated positively with their reports of household chaos and with adolescent-reported problems. Additionally, household chaos during childhood was correlated positively with adolescent-reported problems and correlated negatively with income. Lastly, household income was associated negatively with adolescent-reported problems. Race, but not gender, was correlated significantly with the dependent variables and, accordingly, was included as a covariate in analysis.

Hypothesis 1, 2, and 3: Does emotional reactivity, chaotic home environments, or economic disadvantage during childhood predict increases in adolescent internalizing and

externalizing problems? Does emotional reactivity moderate the relationship between household income/household chaos and adolescent problems?

Scores on measures of household chaos and emotional reactivity were mean-centered (Aiken & West, 1991). To examine whether emotional reactivity, household income, and household chaos predicted increased psychological problems in adolescence (hypotheses 1 and 2), and to examine whether emotional reactivity moderated the relationship between household chaos or low household income during childhood and adolescent psychological problems (hypothesis 3), we conducted a series of hierarchical linear regression analyses. In step 1, household chaos, household income, and emotional reactivity were entered to examine the main effects of these variables on adolescent problems, using separate analyses for total problems and the internalizing and externalizing subscales. In step 2, we entered the relevant childhood problem score to control for a child's initial level of problems and race as a covariate. In step 3, we entered the interaction terms of household chaos-by-reactivity and household income-by-reactivity to examine a moderating effect of reactivity on the impact of these contextual variables.

As shown in Table 2, household chaos during childhood did not significantly predict problems during adolescence directly. In contrast, household income predicted increases in problems between childhood and adolescence, such that increases in problems were more commonly evinced at lower incomes. In general, childhood emotional reactivity was significantly predictive of increases in emotional/behavioral problems during adolescence, with higher levels of emotional reactivity predicting higher levels of problems.

As hypothesized, the interaction of household chaos and childhood emotional reactivity significantly predicted increases in adolescent total problems and internalizing problems, but not externalizing problems (Table 2). At low levels of household chaos, emotional reactivity does not predict adolescent psychopathology. In the context of above average household chaos, however, individuals with high emotional reactivity evinced more problems in adolescence than did those with low reactivity (Figure 1). To examine this interaction further, we tested the simple slopes of chaos and emotional reactivity at one standard deviation above and below the mean. Among individuals who were low in emotional reactivity as children, the effect of chaos on total problems in adolescence was not significant ($t = -1.40, p = .16$). Among individuals with high emotional reactivity in childhood, however, there was a significant effect of household chaos, $t = 2.12, p = .03$, such that at higher levels of chaos, adolescents reported more total problems. Contrary to expectations, reactivity did not moderate the relationships between income and increases in problem behaviors (Table 2). Thus, the impact of low income on adolescent psychological problems does not depend on the child's emotional reactivity, but the impact of household chaos does.

Hypothesis 4: Does household chaos mediate the relationship between household income and adolescent symptoms, and does emotional reactivity moderate this indirect effect?

To examine whether household chaos mediates the impact of household income on adolescent symptoms, and to evaluate whether this indirect effect was moderated by emotional reactivity (i.e., moderated mediation; Preacher, Rucker, & Hayes, 2007), we employed an SPSS macro (PROCESS) to test the significance of the indirect effect with a bootstrapping approach to obtain confidence intervals (Hayes, 2012). We constructed a conditional process model (Figure 2) that proposed that low income in childhood led to increased household chaos, and that high household chaos interacted with emotional reactivity to result in increased emotional/behavioral problems in adolescence. In other

words, the model postulated an indirect effect of household income on adolescent problems through household chaos that was moderated by emotional reactivity.

Using the macro, we estimated the effect of household income on adolescent symptoms directly as well as indirectly, through household chaos, with both direct and indirect effects moderated by emotional reactivity. Bootstrapping is superior to other common methods for determining the significance of indirect effects, as the assumption of normality for the sampling distribution is not required and power is improved (Preacher & Hayes, 2004). The macro generated bias-corrected 95% bootstrap confidence intervals using 5,000 bootstrap samples for the conditional direct and indirect effects of emotional reactivity at the mean and \pm one standard deviation from the mean.

Consistent the regression analysis, within the moderated mediation model, emotional reactivity interacted with household chaos to predict increases in total problems and internalizing problems, but not externalizing problems (Table 3: Moderating Effects subheading). As expected, lower levels of income predicted increased household chaos (Figure 2; M ; $t = -3.17$, $p = .0016$), but as was the case in the regression analysis, emotional reactivity did not moderate the relationship between income and adolescent problems. However, for the prediction of total and internalizing problems, we found a significant positive indirect effect of income on adolescent symptoms through household chaos that was moderated by emotional reactivity (Table 3; Conditional Indirect subheading). That is, among children with low emotional reactivity (1 SD below mean; 28.18), the effect of low income on adolescent symptoms was mediated by household chaos. Taken further, the moderated mediation analysis shows that for children with high emotional reactivity (1 SD above mean; 39.44), the effect of income on adolescent symptoms was not mediated by household chaos. The direct moderation analysis suggests that those with high emotional reactivity are at a heightened risk if their childhood environment is especially chaotic. The moderated mediational analysis suggests that children are protected against the direct effects of low household income if their emotional reactivity is relatively lower.

Discussion

In recent years, research has examined the role of heightened emotional reactivity and poor emotion regulation on maladjustment during childhood and adolescence. While much of this research has shown a direct link between high emotional reactivity and maladjustment, there is less research on the ways in which reactivity interacts with contextual factors. Using data from the large-scale SECCYD, our analyses show that emotional reactivity and low household income during childhood are associated directly with increased levels of emotional and behavioral problems in adolescence. Consistent with prior research, higher levels of emotional reactivity and poverty are both associated with adverse outcomes (Hessler & Katz, 2010), but the present study extends these results using a prospective design and different informants for predictors (maternal report) and outcomes (adolescent report). Although adolescent problems also are correlated with exposure to family chaos, this correlation does not hold once household income is taken into account. In light of this, future research on the effects of family chaos on adolescent psychopathology should be sure to control for income. Taken together, this highlights the effects of temperamental and contextual factors during childhood as important factors for the development of problems during adolescence.

The fact that family chaos did not have a direct impact on adolescent behavior problems does not mean that it is unimportant, however. Indeed, our findings indicate that the impact of family chaos on psychopathology depends on the child's temperament. Specifically, high emotional reactivity appears to exacerbate the adverse consequences of exposure to family

chaos, whereas low reactivity appears to protect against it. Thus, whereas poverty may be an “equal opportunity” stressor, chaos appears to have a disproportionately harmful effect on individuals with poor emotion regulation skills. In retrospect, this is as expected, because chaos is something whose impact is amenable to self-regulation (e.g., one can calm oneself down, distract oneself, or remove oneself from the chaotic situation) whereas poverty is not (i.e., no amount of self-regulation can counter the impact of poor nutrition or substandard housing).

We also examined the relationship between low income and adolescent emotional and behavioral problems. We hypothesized that lower income would predict adolescent problems through its impact on household chaos. As anticipated, households with lower income had higher levels of chaos. The mediated moderation analysis shows that a chaotic home environment disproportionately affects those with relatively higher emotional reactivity. Children with less reactivity had lower levels of internalizing symptoms compared to those with high reactivity, and were thus protected against the chaotic home environment. Our results suggest a pattern of diathesis-stress as opposed to differential susceptibility (cf., Belsky & Pleuss, 2012), because higher levels of emotional reactivity did not lead to a negative outcome in some individuals and a positive outcome in others. Instead, high emotional reactivity appears to be a consistent vulnerability, while low reactivity appears to protect against environmental stressors.

Contrary to expectation, our results suggest that the impact of household chaos on adolescents may be specific to internalizing problems. While both high emotional reactivity and low household income predict both internalizing and externalizing problems, when chaotic home environments are included as a contributing factor, externalizing problems are not predicted. Prior work highlights the detrimental effect of physical and psychological aspects of the home environment that can lead to maladaptive outcomes, with poverty and poorer household quality associated with elevated levels of learned helplessness in children (Evans, 2003). This is one possible mechanism through which a childhood environment characterized by low income and household chaos may lead to internalizing problems in adolescence.

Although the current analyses are based on data from a large scale, longitudinal study, there are limitations that should be noted. First, since the measure of chaos was administered only at one time point, our approach was to a prospective analysis that linked factors specifically at 3rd grade to subsequent problems. While this does not take full advantage of the larger SECCYD, the current analysis provides important insights into the effects of a more stressful childhood environment and temperament on adolescent problems. Second, all of the data come from questionnaires, and we do not know if maternal reports of family chaos or children’s emotional reactivity are accurate, since these are subjective perceptions. (There is less reason to be concerned about the veracity of the information on household income or adolescent-reported problems). Third, although the sample is socioeconomically and ethnically diverse, it is disproportionately composed of relatively better functioning youth, because many categories of at-risk individuals were not eligible for participation in the SECCYD (e.g., infants from families living in dangerous neighborhoods; infants with birth complications). As a consequence, only a small proportion of the sample reported especially elevated levels of problems, which precludes an examination of whether the predictors studied here are related to clinical diagnoses. Finally, we recognize that other elements of the home context or child’s temperament may interact with household income or family chaos in predicting psychopathology that are not examined here. Our point, however, is that some stressors may have universally bad effects whereas others may be more limited in their reach. Future research may benefit from an explicit recognition of this.

Taken together, while research has explored the role of emotional dysregulation on maladjustment, less research has examined its interaction with contextual factors. The findings reported here suggest that higher levels of emotional reactivity and poverty are both associated with adverse outcomes, but that the impact of household chaos depends on the child's temperament. In essence, stressful contexts have a disproportionately harmful effect on individuals with poor emotion regulation skills. Future research should examine the interaction between an individual's childhood environment and his or her temperament in the prediction of outcomes in adolescents.

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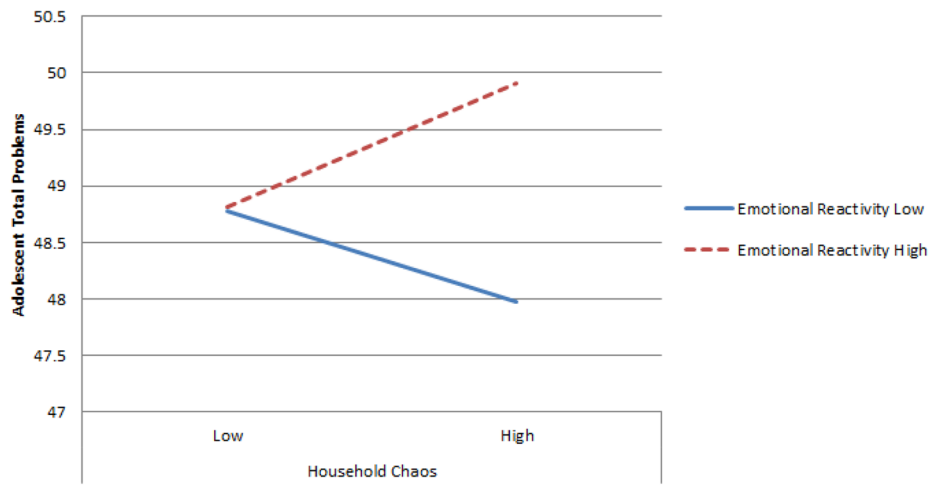


Figure 1. Interaction of childhood emotional reactivity and household chaos.
Note: High indicates 1 standard deviation above the mean; Low indicates 1 standard deviation below the mean.

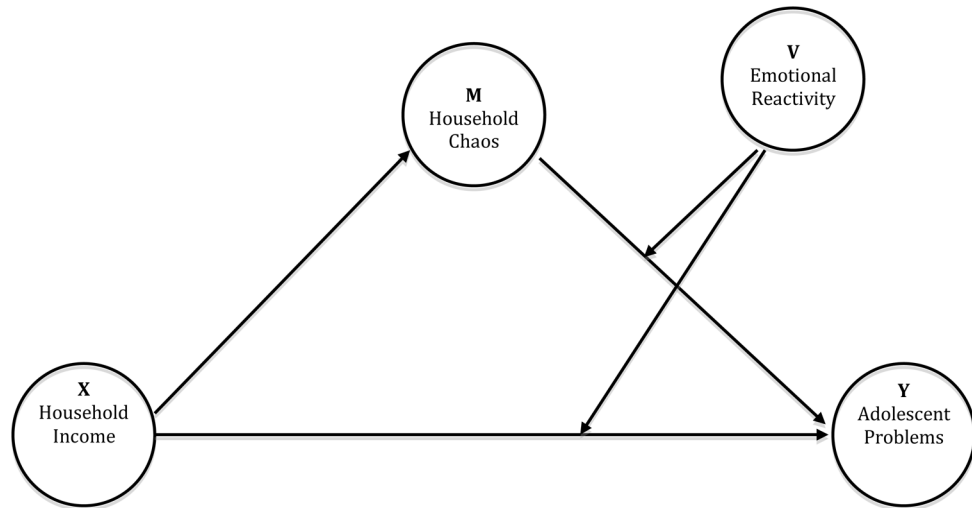


Figure 2. Model for the indirect effect of childhood household income on adolescent symptoms through household chaos moderated by emotional reactivity.

Table 1

Correlation between main study variables

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-------------------------------------|-------|--------------------|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
| 1 Emotional Reactivity | - | -0.06 [§] | 0.24 ^{***} | 0.27 ^{***} | 0.08 ^{**} | 0.42 ^{***} | 0.12 ^{***} | 0.38 ^{***} | 0.12 ^{***} |
| 2 Household Income | | - | -0.16 ^{***} | -0.10 ^{**} | -0.08 [*] | -0.20 ^{***} | -0.13 ^{***} | -0.20 ^{***} | -0.14 ^{***} |
| 3 Household Chaos | | | - | 0.20 ^{***} | .049 | 0.34 ^{***} | 0.10 ^{**} | 0.32 ^{***} | 0.09 ^{**} |
| 4 Childhood Internalizing Problems | | | | - | 0.17 ^{***} | 0.55 ^{***} | 0.09 ^{**} | 0.81 ^{***} | 0.17 ^{***} |
| 5 Adolescent Internalizing Problems | | | | | - | 0.07 [*] | 0.51 ^{***} | 0.14 ^{***} | 0.85 ^{***} |
| 6 Childhood Externalizing Problems | | | | | | - | 0.19 ^{***} | 0.87 ^{***} | 0.15 ^{***} |
| 7 Adolescent Externalizing Problems | | | | | | | - | 0.15 ^{***} | 0.82 ^{***} |
| 8 Childhood Total Problems | | | | | | | | - | 0.19 ^{***} |
| 9 Adolescent Total Problems | | | | | | | | | - |
| Mean | 33.91 | 4.39 | 18.99 | 48.43 | 47.29 | 47.40 | 49.31 | 47.38 | 49.18 |
| SD | 5.59 | 3.77 | 3.24 | 9.89 | 10.17 | 9.82 | 9.91 | 10.29 | 10.09 |

Note:

[§] $p < .10$,

* $p < .05$,

** $p < .01$,

*** $p < .001$

Hierarchical regression model of the effect of childhood household chaos, household income and emotional reactivity on adolescent problems

Table 2

| Variables | Main Effects | | Interaction with Covariates | | Stepwise Change | |
|--|--------------|------|-----------------------------|------|-----------------|----------|
| | B | SE | B | SE | R ² | F |
| Adolescent Total Problems | | | | | | |
| Household Chaos ¹ | .111 | .108 | .035 | .111 | .005 | |
| Emotional Reactivity ¹ | .219 | .062 | .122*** | .065 | .077* | |
| Household Income | -.351 | .091 | -.130*** | .093 | -.100** | .038 |
| Childhood Total Problems | | | .145 | .037 | .146*** | 11.67*** |
| Race | | | 1.00 | .902 | .037 | .018 |
| Household Chaos ¹ × Emotional Reactivity ¹ | | | | | .093** | 8.57*** |
| Home Income × Emotional Reactivity ¹ | | | | | -.027 | .008 |
| Adolescent Internalizing Problems | | | | | | |
| Household Chaos ¹ | .013 | .110 | .004 | .111 | -.018 | |
| Emotional Reactivity ¹ | .162 | .063 | .090* | .064 | .052 | |
| Household Income | -.209 | .092 | -.077* | .094 | -.065 | .015 |
| Childhood Internalizing Problems | | | .162 | .036 | .158*** | 4.47** |
| Race | | | -.017 | .914 | -.001 | .022 |
| Household Chaos ¹ × Emotional Reactivity ¹ | | | | | .104** | 10.12*** |
| Household Income × Emotional Reactivity ¹ | | | | | -.085 | .012 |
| Adolescent Externalizing Problems | | | | | | |
| Household Chaos ¹ | .145 | .107 | .047 | .109 | .010 | |
| Emotional Reactivity ¹ | .200 | .061 | .113** | .064 | .061 | |
| Household Income | -.338 | .090 | -.127*** | .090 | -.103** | .037 |
| Race | | | 2.59 | .890 | .099** | 11.29*** |
| Childhood Externalizing Problems | | | .157 | .039 | .153*** | .027 |
| Household Chaos ¹ × Emotional Reactivity ¹ | | | | | .036 | 12.45*** |
| Household Income × Emotional Reactivity ¹ | | | | | .053 | .003 |
| | | | | | | 1.23 |

Note:

└ Indicates Group Centered;

* $p < .05$,

** $p < .01$,

*** $p < .001$

Table 3

Moderated Mediation Results

| Moderating Effects (Y) within the Model illustrated in Figure 2 | | | | | | | | | | | |
|--|----------------|-------|---------|------------------------|-------|---------|------------------------|-------|---------|--|--|
| Variable | Total Problems | | | Internalizing Problems | | | Externalizing Problems | | | | |
| | B | SE | t | B | SE | t | B | SE | t | | |
| Constant | 70.61 | 13.54 | 5.22*** | 70.84 | 13.77 | 5.14*** | 56.81 | 13.37 | 4.25*** | | |
| Race | 0.59 | 0.71 | 0.83 | 0.15 | 0.72 | 0.21 | 0.10 | 0.70 | 0.14 | | |
| Childhood Problems | 0.14 | 0.94 | 3.91*** | 0.16 | 0.04 | 4.34*** | 0.16 | 0.04 | 3.98*** | | |
| Household Chaos | -1.81 | 0.66 | 2.72** | -1.96 | 0.67 | 2.92** | -0.79 | 0.66 | 1.20 | | |
| Household Income | -0.30 | 0.54 | 0.57 | 0.37 | 0.54 | 0.69 | -0.90 | 0.53 | 1.70 | | |
| Emotional Reactivity | -0.84 | 0.38 | 2.20* | -0.85 | 0.38 | 2.20* | -0.43 | 0.37 | 1.14 | | |
| Emotional Reactivity × Household Chaos | 0.05 | 0.02 | 2.74*** | 0.05 | 0.02 | 2.85*** | 0.02 | 0.02 | 1.28 | | |
| Emotional Reactivity × Household Income | 0.00 | 0.02 | 0.01 | -0.02 | 0.02 | 1.05 | 0.02 | 0.02 | 1.18 | | |

| Conditional Indirect (X to Y through M) effects of household economic context on adolescent symptoms | | | | | | | | | | | |
|---|----------------------|---------|---------|-------------|--------------|--|--|--|--|--|--|
| Total Problems | | | | | | | | | | | |
| Mediator | Emotional Reactivity | Effect | Boot SE | Boot Low CI | Boot High CI | | | | | | |
| Household Chaos | 28.18 | 0.0317 | 0.0179 | 0.0035 | 0.0752 | | | | | | |
| Household Chaos | 33.81 | 0.0059 | 0.0103 | -0.0125 | 0.0286 | | | | | | |
| Household Chaos | 39.44 | -0.0198 | 0.0148 | -0.0556 | 0.0032 | | | | | | |
| Internalizing Problems | | | | | | | | | | | |
| Mediator | Emotional Reactivity | Effect | Boot SE | Boot Low CI | Boot High CI | | | | | | |
| Household Chaos | 28.18 | 0.0547 | 0.0251 | 0.0125 | 0.1103 | | | | | | |
| Household Chaos | 33.81 | 0.0164 | 0.0149 | -0.0094 | 0.0498 | | | | | | |
| Household Chaos | 39.44 | -0.0218 | 0.0197 | -0.0663 | 0.0131 | | | | | | |
| Externalizing Problems | | | | | | | | | | | |
| Mediator | Emotional Reactivity | Effect | Boot SE | Boot Low CI | Boot High CI | | | | | | |
| Household Chaos | 28.18 | 0.0104 | 0.0149 | -0.0164 | 0.0047 | | | | | | |
| Household Chaos | 33.81 | -0.0007 | 0.0094 | -0.0198 | 0.0178 | | | | | | |
| Household Chaos | 39.44 | -0.0119 | 0.0131 | -0.0432 | 0.0096 | | | | | | |

Note:

* $p < .05$,

**

$p < .01$,

$p < .001$;

Moderator Emotional Reactivity are presented for the Mean and \pm 1 SD from the Mean