

Repeated Measures of Youth Perceptions of Household Chaos and its Relation to Adolescent Development: Externalizing, Internalizing Problems & Academic Engagement

by

Daniesha S. Hunter-Rue, MSCP

Bachelor of Science, Villanova University, 2008

Master of Science, Chatham University, 2017

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This thesis was presented

by

Daniesha S. Hunter-Rue

It was defended on

June 21, 2023

and approved by

Jamie Booth, Ph.D., Associate Professor, School of Social Work

Jamie Hanson, Ph.D., Assistant Professor, Department of Psychology

Thesis Advisor: Elizabeth Votruba-Drzal, Ph.D., Professor, Department of Psychology

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Daniesha S. Hunter-Rue, MS

University of Pittsburgh, 2023

A large body of literature has established that chaos in the home environment, characterized by high levels of disorganization, lack of household routine, crowding, noise, and unpredictability, is detrimental to child development. Multiple studies, primarily focused on early childhood, have found household chaos relates to academic achievement, externalizing, internalizing problems. It is, however less clear whether household chaos relates to these types of academic and behavioral issues in adolescence. Adolescence may be a sensitive period where the effects of environmental stimuli, like chaos in the home, are particularly strong. The aims of this study were three-fold: 1) characterize the variability of adolescent and caregiver reports of household chaos; 2) examine associations among caregiver and adolescent reports of chaos over a 9-month period; 3) examine how between- and within- individual variability in household chaos predict academic engagement, externalizing and internalizing problems. This study drew data from the Family Income Dynamics study, a 9-month survey-based, longitudinal study. Participants included 104 adolescents (55% female) and caregiver (92% female) dyads. Results showed that reports of household chaos were less stable over time for adolescents, compared to their caregivers. Household chaos had strong positive within- and between-level associations with externalizing problems. Also, chaos positively related to internalizing and academic engagement at the between-level only. This work highlights the importance of adolescent perceptions of household chaos when considering its links to development.

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1.0 Introduction

Chaos in children's home environments, in the form of ambient noise, overcrowding, and a lack of daily structure and family routine, undermines children's development (K. Andrews et al., 2021; Evans et al., 2005; Marsh et al., 2020). Children growing up in households characterized by higher levels of chaos have more hectic and unpredictable day-to-day experiences (Ackerman & Brown, 2010; Marsh et al., 2020). Household chaos is a pathway through which more distal family risks, including residential instability, disruption in family structure, and neighborhood and socioeconomic disadvantage, influence children's development (Evans et al., 2005). Household chaos is correlated with social economic factors such as education and income (Dumas et al., 2005; Matheny et al., 1995), however, it is distinct from other characteristics of the home environment, including parenting practices and caregiver mental health (Dumas et al., 2005). Instead, household chaos captures global characteristic of the home environment that uniquely associates with child outcomes when controlling for social economic and caregiver characteristics (Dumas et al., 2005; Matheny et al., 1995).

Several studies have found that greater chaos is associated with worse executive functioning, self-regulatory abilities, and behavioral development during early childhood (Marsh et al., 2020). However, less attention is paid to the role of household chaos in shaping adolescent development, which is a crucial period marked by pubertal changes in physical maturation and brain changes contributing to improved cognitive, emotional and interpersonal skills (Kerig et al., 2012). Adolescence may be a sensitive period to environmental stimuli due to alterations in brain development during this phase (Blakemore & Mills, 2014; Fuhrmann et al., 2015). Therefore, it is important to understand how chaos contributes to adolescent development during this

developmental period including externalizing and internalizing behaviors as well as academic engagement.

1.1 Pathways Through Which Household Chaos Relates to Adolescent Development

Adolescence is a period of accelerated changes in physical, cognitive, emotional, and interpersonal growth (Kerig et al., 2012); chaotic homes likely compromise youth behavioral and academic outcomes through three main mechanisms. First, adolescents raised in chaotic homes may experience heightened levels of physiological stress, which hinders emotion and self-regulatory abilities (Dumas et al., 2005). Noisy or crowded homes may provide less support for youth to down regulate emotions or provide physical space to reset. Over time, these chaos-related influences can give rise to problem behaviors (Shapiro & Steinberg, 2013). Recent cross-sectional studies illustrate that household chaos in adolescence may relate to higher externalizing issues, such as aggression and rule-breaking (Chatterjee et al., 2020; Delker et al., 2020; Joo & Lee, 2020). Whereas self-regulatory abilities have been closely linked with improved academic engagement (Wolters & Taylor, 2012). Impaired-self-regulation capacities resulting from a chaotic home environment can hinder academic skills development or adolescent's ability to focus on school related activities (Garrett-Peters et al., 2016).

Second, during adolescence, cognition is shifting from concrete to abstract thought with marked improvements in reasoning, perspective taking, and meta-cognition (Steinberg, 2005), which supports more complex goal-directed behavior. Adolescents who experience unpredictable social interactions in their homes may exhibit deficits in social information processing (Dumas et al., 2005). A household high in chaos may make it more difficult for youth to reliably identify

social cues and respond with socially appropriate behavior (Taylor & Hart, 2014). These interpersonal challenges can impact youth interactions by increasing their risk of engaging in delinquent behaviors or negatively impact social skills development that can impair their ability to connect with peers.

Third, a home characterized by disorganization may create increased opportunities for frustration and distress (Murray & Rosanbalm, 2017) which might impair adolescents' development of competence or the belief in their ability to effectively achieve desired outcomes in their home environment (Evans et al., 2005; Shapero & Steinberg, 2013). Adolescents who do not feel a sense of mastery at home may feel helplessness, and disengage from an environment which they cannot control (Evans et al., 2005; Shapero & Steinberg, 2013). Learned helplessness may increase behavioral disengagement and reduce motivation (Brown & Low, 2008; Garrett-Peters et al., 2016; Nota et al., 2004) outside of the home such as in school, which may undermine adolescents' academic success. Adolescent perceptions of elevated household chaos reduce mastery beliefs towards the future (e.g., having a successful career, ability to attend college) and diminish expectations for the future (Tucker et al., 2017). Chaotic homes impair adolescents' self-regulation, social information processing skills, and disrupt development of competency beliefs with possible subsequent negative impacts on externalizing, internalizing behaviors and academic engagement.

1.2 Literature Linking Chaos to Adolescent Behavioral Functioning

Most literature examining chaos in the home focuses on early childhood, a small subset of studies examines relations between household chaos and adolescent externalizing and internalizing

behavior. Cross-sectional studies show that household chaos is associated with increased risk for aggressive behaviors, such as carrying a weapon or fighting (Chatterjee et al., 2020; Delker et al., 2020; Joo & Lee, 2020). Similarly, a longitudinal study finds a positive relation between household chaos and externalizing problems (Jaffee et al., 2012). In contrast, studies examining links between household chaos and youth internalizing issues are more mixed, with some finding no association between chaos and internalizing problems (Shapero & Steinberg, 2013), and others finding that household chaos is associated with more internalizing problems (Shamama-tus-Sabah et al., 2011). A two-year longitudinal study by Human and colleagues (2016), finds adolescents who reported higher chaos, compared to their caregivers, also reported increases in depression and stress. In contrast, a recent cross-sectional study by Lobo and colleagues (2021) finds no direct link between household chaos and adolescent depressive symptoms. Overall, there is a small but growing body of work showcasing consistent links between household chaos and externalizing behaviors in adolescence. For internalizing issues, results vary across studies and this is an area that would benefit from further examination.

1.3 Literature Linking Household Chaos to Academic Outcomes

Far fewer studies have considered relations between household chaos and academic or cognitive outcomes during adolescence. A recent review highlights mixed evidence for the links between household chaos and academic achievement and cognitive ability (Marsh et al., 2020). For example, a longitudinal twin-study of young adolescents finds that youth reports of chaos in the home predict variance in academic achievement (i.e. English, mathematics, science) above and beyond shared genetic factors (Hanscombe et al., 2011). This is supported by similar results in

younger children which finds household chaos relates to differences in academic skills (Hart et al., 2007). Conversely, a cross-sectional study of Pakistani children finds no significant associations between of household chaos and cognitive skills (Shamama-tus-Sabah et al., 2011).

Academic engagement, a deep cognitive and emotional focus on learning materials and activities (Amerstorfer & Freiin von Münster-Kistner, 2021) is a possible precursor to academic achievement (M.-T. Wang et al., 2011), which may explain the mixed associations between household chaos and academic and cognitive ability. Household chaos relates to less academic engagement in early childhood (Garrett-Peters et al., 2016) and may negatively relate to aspirations and expectations related to school and academic performance in adolescence (Tucker et al., 2017). The small literature connecting household chaos to academic achievement and cognition during adolescence is mixed; and the association between household chaos and academic engagement is generally understudied in adolescence.

1.4 Limitations of Existing Literature

Overall, there is evidence that household chaos may undermine adolescent behavioral functioning and academic engagement. However, several limitations make it difficult to draw clear conclusions from the literature. First, most studies assess chaos in the home environment at one point in time and ignore fluctuations that may occur in household chaos within a year. Measuring household chaos at one-time point fails to capture fluctuations in household chaos that could occur over time. However, shifts in caregiving responsibilities, job loss or variable work schedules, changes in cohabitation with household members moving in and out of the home, or normative transitions at the start of summer or the beginning of the school year may lead to within year

variability in household chaos. In the few studies that measure household chaos at more than one-time point, the assessments often cover very large swaths of time. For example, Deater-Deckard and colleagues (2009) captured mother-father reports annually over three years, and Jaffee and colleagues (2012) measured chaos at age nine and again three years later (at age 12); these studies suggest stability of household chaos from year- to-year. However, failing to assess household chaos at multiple time points during the year may obscure meaningful variability in levels of chaos within the household and their concurrent effects on behavior. Examining inner-year fluctuations in both household chaos and adolescent problem behaviors and academic engagement is critical for testing these more proximal associations.

Second, existing studies drawing on longitudinal data are often characterized by long temporal lags between the assessment of chaos and later behavior or academic problems. Moreover, the temporal lags between constructs are quite variable. Some studies examine relations between chaos and problem behavior or cognition over 1-2 years, while others probe associations six or more years later (Deater-Deckard et al., 2009; Shapero & Steinberg, 2013; Tucker et al., 2017). Adolescents' behavioral functioning is highly malleable and may be particularly sensitive to more temporally proximal experiences of household chaos. Thus, shorter temporal lags may be more psychologically relevant when explaining individual differences in adolescent behaviors. Adolescence can be characterized by frequent fluctuations in thinking, emotion, and behavior (Buchanan & Hughes, 2009). Even a yearly assessment of chaos may be too coarse of a measure to meaningfully capture children's experiences during this developmental period. While research tends to rely on annual reports, monthly assessments may be more effective at capturing variability in chaos without overburdening participants (for instance, the use of daily diaries). Thus, this study

characterizes the stability of household chaos on a smaller timescale, with multiple assessment within a year, to examine its more proximal relations with behavioral outcomes.

Third, prior studies primarily rely on caregiver reports of household chaos and fail to consider how adolescents perceive their home environments and subsequent implications of these perceptions on their behavior. Research primarily assesses household chaos using mostly a single caregiver's report (Dumas et al., 2005; Shamama-tus-Sabah et al., 2011; Taylor & Hart, 2014) with one study combining mother's and father's reports (Deater-Deckard et al., 2009). Only a small number of studies has asked adolescents to report on the chaos in their home environments (Chatterjee et al., 2020; Jaffee et al., 2012). These show moderate relations between adolescent and caregiver reports of chaos, thereby suggesting that caregivers and youth often perceive home environments differently. For example, Jaffee and colleagues (2012) find that correlations between youth and parent reports of household chaos, have contemporaneous correlations of $r = .53$ and $r = .55$ at two-time points. In another study, Human and colleagues (2016) find a smaller correlation of $r = .36$ between adolescent and parent reports of chaos. Therefore, this study examines concurrent caregiver and adolescent perceptions of chaos relation to problem behaviors.

Lastly, the current literature primarily relies on between-individual variability in household chaos as an identification strategy. This strategy raises concerns about endogeneity or omitted variable bias. In other words, households with high levels of chaos likely differ from those with lower levels of chaos across other dimensions as well. Failure to control for these differences in statistical models may bias relations between household chaos and adolescent development. One approach to addressing endogeneity concerns is to examine within-individual variability in household chaos over time. Thus, this study examines within-individual variability in order to estimate levels of behavior problems and academic engagement when reported household chaos is

higher or lower than average, with adolescents serving as their own comparison over time. This approach helps to reduce the threat of bias posed by time invariant characteristics of children and families that may give rise to spurious links between household chaos and adolescent development (Hoffman et al., 2003; Osborne, 2019). To further address omitted variable bias and strengthen causal inference, it is important to control for other characteristics of caregivers, such as caregiver stress and depression, and other dimensions of parenting, including monitoring adolescent behavior and the quality of the caregiver-adolescent relationship, that may be correlated with household chaos and problem behavior. An additional probe of caregiver qualities and parenting practices would clarify that the observed associations between chaos and problem behavior are not an artifact of correlated caregiver characteristics.

1.5 Research Aims

To overcome these past limitations, the current study examines whether between- and within-individual variability in household chaos is related to externalizing, internalizing and academic engagement problems when measured multiple times over nine months in a socioeconomically and racial/ethnically diverse sample of adolescents and caregivers. The research aims of this study are three-fold. First, we characterize the variability of adolescent and caregiver reports of household chaos over a 9-month time frame. In contrast to the current assumption that household chaos is stable year-to-year; we hypothesize significant inner-year variability in the report of chaos over time. Second, we examine associations among caregiver and adolescent reports of chaos over a 9-month period. We hypothesize a positive association between the reporters and propose there is unique variability in caregiver and adolescent perceptions. Third,

this investigation considers how adolescent and caregiver reports of household chaos relates to adolescent problem behaviors and academic engagement by examining both between- and within-individual variability in household chaos over time. We hypothesize higher reports of caregivers and adolescents' chaos associates with more externalizing and internalizing problems and less academic engagement. We anticipate that these links are stronger for adolescent's report, when compared to caregiver's report of chaos. Lastly, supplemental analyses will consider whether these relations are robust to the influences of other characteristics of caregivers that may be correlated with household chaos. We expect the effects of adolescent perceptions of household chaos will persist with the inclusion of additional caregiver characteristics.

2.0 Methods

2.1 Participants

This study draws data from the Family Income Dynamics Study (FInD) a 9-month longitudinal study of a large, racially and socioeconomically diverse cohort of youth and their caregivers in Pittsburgh, PA. Participants include 104 adolescents (55% female) and caregivers (92% female). Youth were between the ages of 14-16 at the time of the first assessment ($M = 14.9$, $SD = 0.83$). The study team used stratified sampling to select a sample that equally represented youth and caregivers from low-income (< 2x the federal poverty line) and middle-income (between 2x and 5x the federal poverty line) households. Families participated in a phone screen before enrolling in the study to be evaluated on these criteria. Caregivers varied when it came to their educational backgrounds. More specifically, when it came to the highest degree of educational attainment of the caregiver who completed the survey, 23% had obtained a high school diploma or less, 23% some college or associate degree, 54% bachelor's degree or more. Youth and their caregivers also were diverse regarding their racial background. Thirty-seven percent of youth identified as Black, 43% as White, and 20% as multi-racial or another racial group. Thirty-three percent of caregivers identified as Black, 61% as White, and 6% multi-racial or another racial group. Most caregivers were biological mothers 85%, with an additional 7% biological fathers, and, remaining 8% another caregiver (i.e., Adoptive, step-, or grand-parents).

2.2 Procedures

Beginning in November 2019, FInD recruited participants on a rolling basis (adolescents and caregivers) via community sampling, including research registries (e.g., Pitt+Me), Facebook, Craigslist and flyers posted in the community. Snowball recruiting methods helped reach participants and reduced race and socioeconomic status conflation. Study staff screened caregivers to collect information regarding race, income level, English proficiency, and adolescent disability. Adolescents with severe or pervasive conditions that would limit their ability to complete surveys independently were excluded (e.g., Pervasive Developmental Disorder (PDD), diagnosis of blindness or severely impaired hearing). Once screened, staff scheduled caregivers to come into the lab to complete their baseline visit which included the consent and completion of their first survey. Dyads were given a paper copy of the consent/assent and research study staff explained the study details and answered participant questions. Caregiver and adolescent were provided separate spaces to complete their baseline survey using an electronic tablet. COVID-19 pandemic protocols prohibiting in-person interactions with the study team required a modified baseline visit; caregivers provided consent, and adolescent assent via conference call and an online consent form. Participants then received their baseline surveys via email and were given 24-hours to complete the survey.

After the baseline visit, there were no differences in follow-up procedures for participants entering the study before or during the pandemic. Staff sent monthly follow-up surveys to all participants through Qualtrics, an online survey platform. Both caregiver and youth completed one follow-up survey each month for a period of 8 consecutive months. Participants were given from the 1st through the 5th of each month to complete their survey. Study staff sent customized reminder emails, texts, and phone calls based on participants' contact preferences a few days before surveys

launched and during the collection period. When participants did not complete their survey by the 5th of each month, extensions were granted case-by-case basis, giving participants an additional 1-3 days to respond. Recruitment of adolescents and caregivers ended in December 2020, with final surveys completed 8 months later in August 2021. Eighty-three percent of the total possible surveys were collected after March 2020, the onset of the pandemic in the U.S. Using these methods, longitudinal retention rates for this sample were 98% for caregivers and youth. Measures varied at their collection points, depending on the variable. Measures on survey were collected in two ways 1) at every wave i.e., baseline, 2, 3, 4, 5, 6, 7, 8, and 9. Or 2) at baseline, wave 2, 5, and 8. This was done to reduce participant burden by limiting the number of survey items. Measures collected at every wave were those expected to show meaningful month-to-month variability, whereas those collected less frequently were hypothesized to exhibit change on a longer timescale.

2.3 Measures

2.3.1 Household Chaos

The Confusion Hubbub and Order Scale was used to assess household chaos. It is a well validated measure capturing the most proximal manifestations of chaos including noise, overcrowding and lack of household routines (Matheny et al., 1995). It has been used with adolescents (Chatterjee et al., 2020; Human et al., 2016; Jaffee et al., 2012). The scale includes 15 items which measured noise (e.g., “It’s a real zoo in our home”), disorder (e.g., “We can usually find things when we need them”) and unpredictability (e.g., “No matter what our family plans, it usually doesn’t seem to work out”). Youth and caregivers were asked to indicate how much each

statement described their home environment using a Likert scale (0=Very much like your own home; 1=Somewhat like your own home; 2=A little bit like your own home; 3=Not at all like your own home). Items were reversed scored so that high scores indicated more chaos. Youth and caregiver reports of chaos exhibited strong reliability over time (youth $\alpha = 0.84 - 0.85$; caregiver $\alpha = 0.85 - 0.89$). Caregiver and youth report of chaos was collected at baseline and waves 2, 5, and 8.

2.3.2 Problem Behavior – Externalizing and Internalizing

The Strengths and Difficulties Questionnaire (R. Goodman, 1997) is a useful tool to measure problem behaviors. The SDQ has been used in several studies to measure prosocial behavior and psychopathology. It is suitable for use with children between the ages of 3-16 years old. It can be completed by a mix of reporters including caregivers, youth, and teachers. The measure included 25 items of positive and negative statements assessing five domains (emotion problems, conduct problems, hyperactivity-inattention, peer problems and prosocial behavior). For each item, participants are asked to “Mark a bubble” on a Likert scale (0 = “Not at all true, 1= “Somewhat true”, 2= “Certainty true”). Higher scores indicate an endorsement of problems or positive behavior for the prosocial subscale. The study created an externalizing composite using the average of the conduct problems (e.g., “Often fights with other youth or bullies them”) and hyperactivity-inattention (e.g., “Thinks things out before acting”) SDQ subscales. The internalizing composite variable used the average of the emotional problems (e.g., “I am often unhappy, down-hearted or tearful”) and peer problems (e.g., “Other children or young people pick on me or bully me”) SDQ subscales. Prior work supported combining these subscales into internalizing and externalizing problems (Bevilacqua et al., 2021; A. Goodman et al., 2010).

Reliability for the subscales was good (youth $\alpha = 0.72 - 0.81$; caregiver $\alpha = 0.81 - 0.85$). Adolescent-reports are the primary outcomes for this analysis because prior studies suggest that adolescents provide more reliable and valid reports of problem behaviors compared to their caregivers (Becker et al., 2004), who spend less time with adolescents as they age and are less aware of adolescent's internal states (Aebi et al., 2017). Caregiver and adolescents completed the SDQ measure at all waves.

2.3.3 Academic Engagement

Academic engagement was assessed using two subscales from Wang and Eccles (2012) school engagement scale. Eleven items captured behavioral and emotional engagement. Five items assessed behavioral engagement (e.g., "I put effort into learning") and 6 items assessed emotional engagement (e.g., "I feel good when I'm in school"). Youth were prompted to respond ("Thinking about school, how do these statements fit for you?") using a Likert scale (1=Not at all like me; 2=Not much like me; 3=Somewhat like me; 4=Mostly like me; 5=Very much like me). Negatively worded items were reversed scored (e.g., "I don't participate in class") so that high scores indicated more academic engagement. The individual items from the subscales were standardized then averaged to create a composite score. The reliability of this scale was $\alpha = 0.88$ to 0.91. Adolescents completed this scale at baseline, waves 2, 5, and 8.

2.3.4 Caregiver Characteristics

2.3.4.1 Perceived Stress.

Caregiver stress was measured with the Perceived Stress Scale, a widely used questionnaire that assesses stress in daily life (Cohen, 1988). Caregivers completed all ten items to assess how often they felt or thought about things over the past month (e.g., “In the past month, how often have you been upset because of something that happened unexpectedly?). Participants then responded using a 5-point Likert scale (0=Never; 1=Almost never; 2=Sometimes; 3=Fairly often; 4=Very often). Positively worded items were reverse scored (e.g., “In the past month, how often have you felt you were on top of things?”) so that higher scores indicated more stress. The reliability for this measure at each wave ranged from $\alpha = 0.84$ to $\alpha = 0.91$ for caregivers. Caregivers completed the measure at all waves.

2.3.4.2 Caregiver Depression.

Depression was measured using the Center for Epidemiological Studies-Depression (CES-D), a commonly used questionnaire that assessed depressive symptoms in a general population (Radloff, 1977). The set of 20 items asked participants to rank how they felt or behaved in the past week (e.g., “I was bothered by things that don’t usually bother me.”) and (e.g., “I could not get going.”). Participants rated how many days they felt this way on a scale (0=Rare or none of the time, less than one day; 1=Some or a little of the time, 1-2 days; 2=Occasionally or a moderate amount of time, 3-4 days; 3=Most or all of the time, 5-7 days). Positively worded items (e.g., “I felt just as good as other people.” and “I enjoyed life.”) were reverse scored so that higher scores indicated more depressive symptoms. The reliability of this scale at each wave ranged from $\alpha =$

0.91 to $\alpha = 0.92$. Caregivers were given this questionnaire at the baseline visit and waves 2, 5, and 8.

2.3.4.3 Caregiver Monitoring.

Caregiver monitoring was measured with 7 items. Three items were drawn from the Alabama Parenting Questionnaire (Elgar et al., 2007) and asked caregivers to rate three statements (e.g., “Your child fails to let you know where he/she is going”) on a Likert scale (1=Never; 2=Almost never; 3=Sometimes; 4=Often; 5=Always). Four items were developed based on existing work related to monitoring (Conger et al., 1994; Steinberg et al., 1992), with one item asking caregivers to rate how much they know about who their teens spends time with and a second question inquiring about how much they know about *how* their teen spends their free time. Responses include (1=I don’t try; 2=I try a little; 3=I try a lot). Finally, the last two items ask caregivers about how often they set rules related to who their teen spends time with and how they spend their free time. The response options for the last items (1=Never; 2=Sometimes; 3=Usually; 4=Always). The scales for the response options for items varied. All items were converted to z-scores and then averaged to create a composite score. The reliability for the composite measure ranged across waves $\alpha = 0.54$ to $\alpha = 0.73$. Caregivers were given this questionnaire at all waves.

2.3.4.4 Adolescent-Caregiver Relationship Quality.

Caregiver perception, of warmth and openness in their relationship with their adolescent, was assessed using items drawn from the Child-Parent Relationship Scale (Driscoll & Pianta, 2011; Pianta & Steinberg, 1992). Six items were included in this measure from the closeness subscale. Items included statements such as, “I share an affectionate, warm relationship with my child.” Participants then rated each statement on a Likert scale (1=Definitely does not apply; 2=Not

really; 3=Neutral, not sure; 4=Applies somewhat; 5=Definitely applies). The reliability of this measure ranged from $\alpha = 0.70$ to $\alpha = 0.84$. Caregivers completed this measure at all waves.

Adolescents completed the same questionnaire for a primary caregiver (*i.e., mother, father, grandmother, grandfather, another caregiver*) to reflect youth perceptions of closeness. Reliability for adolescent report of this this measure ranged from $\alpha = 0.88 - 0.92$. Adolescents completed this questionnaire at all waves.

2.3.5 Covariates

All analyses controlled for factors related to household chaos and adolescent report of externalizing, internalizing and academic engagement outcomes. Time invariant covariates included adolescent age measured at baseline, binary sex assigned at birth (0=female, 1=male), and race (Black, White, and Multi or other racial group coded as a series of dummy variables) the Black participants served as the reference group. Family household size ($M = 4.19$, $SD = 1.50$) is operationalized as the sum of adults and children living in the home reported by the caregiver at baseline. Monthly income was included as a time-varying covariate and was based on caregiver reports ($Mdn = 3411.00$), which were natural log-transformed to address the highly skewed nature of the income variable.

2.4 Analytic Plan

Study analyses were conducted in Stata/SE 17.0 (StataCorp, 2021). The study conducted Inter-Class Correlations (ICCs) for caregiver and youth report to address the first aim, which is to

characterize individual change in household chaos. Reports of household chaos were collected at four-time points over nine months by adolescents and caregivers. ICCs are used to assess the strength of a correlation within an individual over time; where scores closest to 1 indicate no variability or change. For example, if the reported ICC for youth or caregiver is close to 1, this would show support within year stability in household chaos. Therefore, ICCs provide a descriptive measure of the variability in caregiver and youth reports of chaos over a nine-month timeframe.

To address the second aim, which considered whether caregivers and adolescent reports of household chaos were related over time, the present study examined within- and between-individual associations (Curran & Bauer, 2011) between caregiver reports of chaos (CC) and adolescent perceptions of chaos (AC) using two-level mixed effects models that were estimated using full information maximum likelihood in Stata with the *mixed* command (StataCorp, 2021). Level 1 contained repeated measures of caregiver chaos over time (t) (i.e., baseline, wave 2, wave 3, ...), which were nested within an individual (i) at Level 2. The Level-1 model is shown in Equation 1.

$$\text{Level 1 Equation 1: } CC_{ti} = B_{0i} + B_{1i} AC_{ti} + B_{2i} X_{ti} + r_{ti}$$

In Equation 1 caregiver reports of chaos for individual i at time t (CC_{ti}) were modeled as a function of time-varying measures of adolescent chaos (AC_{ti}) and time-varying covariates (X_{ti}). All of the predictors at Level 1 were group-mean centered, also known as within-individual centering (Raudenbush & Bryk, 2002; Singer & Willett, 2003). Group-mean centering reduces bias from unobserved heterogeneity or unmeasured factors that vary across individuals over time. Between-individual associations of average caregiver chaos and average adolescent reports of chaos were

estimated at Level 2. Here variability in the Level 1 intercept was modeled using equations 2 through 4 below:

$$\text{Level 2 Equation 2: } B_{0i} = Y_{00} + Y_{01}AC_i + Y_{02}X_i + Y_{03}W_i + u_{0i}$$

$$\text{Equation 3: } B_{1i} = Y_{10}$$

$$\text{Equation 4: } B_{2i} = Y_{20}$$

Here variability in mean levels of caregiver chaos (B_{0i}) is explained with individual-level averages of adolescent chaos (AC_i) along with average levels of time-varying covariates (X_i) and time-invariant covariates (W_i). A random effect for the intercept was estimated at Level 2 (u_{0i}), and all other Level 1 coefficients were estimated as fixed at Level 2. Predictors were grand-mean centered in the Level 2 equations. The mixed effects modeling framework captures both between- and within- adolescent variability. The Level-1 coefficient on adolescent chaos considers whether within-individual changes in adolescent reports of chaos are related to changes in caregiver chaos. The Level 2 coefficients on adolescent chaos reflects whether adolescents whose parents report higher average levels tend to report more chaos in their home environment.

The third aim considered whether adolescent and caregiver reports of household chaos predicted adolescent reports of problem behaviors or academic engagement using this same two-level modeling framework. Externalizing, internalizing behavior and academic engagement were estimated in separate models. To investigate whether certain subdomains of externalizing or internalizing behaviors drive the association between household chaos and outcomes models were estimated separately for behavior problem subscales as well, including conduct problems, hyperactivity-inattention, emotional problems, and peer problems. In Equation 5, behavior problems and academic engagement for individual i at time t (BP_{it}) were estimated as a function of time-varying measures of adolescent chaos (AC_{it}), caregiver chaos (CC_{it}), and time- varying

covariates (X_{ti}). Like the prior model, all predictors at Level 1 were group-mean centered (Raudenbush & Bryk, 2002; Singer & Willett, 2003).

Level 1 Equation 5: $BP_{ti} = B_{0i} + B_{1i} AC_{ti} + B_{2i} CC_{ti} + B_{3i} X_{ti} + r_{ti}$

Between-individual associations of average behavior problems and average adolescent and caregiver reports of chaos were estimated at Level 2. Variability in the level 1 intercept was modeled using equation 6:

Level 2 Equation 6: $B_{0i} = Y_{00} + Y_{01} AC_i + Y_{02} CC_i + Y_{03} X_i + Y_{03} W_i + u_{0i}$

Changes in the mean level of behavior and academic engagement problems (B_{0i}) are explained with individual-level averages of adolescent chaos (AC_i), caregiver chaos (CC_i) time-varying covariates (X_i) and time-invariant covariates (W_i). A random effect for the intercept was estimated at Level 2 (u_{0i}) and all other Level 1 coefficients were estimated as fixed at Level 2. Predictors were grand-mean centered in the Level 2 equations.

2.5 Sensitivity Analysis

We also conducted sensitivity analyses to examine the robustness of our results to the inclusion of several constructs that tend to be related to either household chaos or our key adolescent outcomes. Research has established links between maternal mental health, including depression and stress and adolescent internalizing problems (S. H. Goodman, 2007; Henry et al., 2020), externalizing problems (Allen et al., 2010) and academic performance (Bechtiger et al., 2022). Similarly, caregiver monitoring (i.e., knowing the location of the adolescent, who they are with, or activities they are engaged in) is associated with reductions in adolescent externalizing

behaviors (Ahmadi et al., 2013; Barnes et al., 2006) and academic competence (Crouter et al., 1990). Lastly, caregiver-child relationship quality predicts adolescent behavior; adolescents who perceived a high-quality relationship with their caregiver had fewer behavior problems and increased positive beliefs about the future (Tucker et al., 2017). Therefore, additional models which include caregiver stress, depression, monitoring and adolescent-caregiver ratings of relationship quality, were included in our supplemental materials. This sensitivity analysis helps to strengthen the internal validity of our findings. In other words, there is greater certainty that household chaos and not another closely related construct is driving the connection with adolescent externalizing, internalizing problems or academic engagement.

3.0 Results

3.1 Stability of Household Chaos.

Analyses began by examining descriptive statistics for the study sample and correlations (see Table 1 for additional descriptive statistics and Table 2 for Level 1 and Level 2 correlations of all key variables). To address aim one, the study estimates the ICC of individual reports of household chaos over four-time points using 95% confidence intervals in Stata/SE 17.0. Estimates were based on a one-way random effects model. There was less consistency in ratings for adolescent reports of household chaos across four-time points, compared to caregiver report. In particular, for adolescent report the ICC was 0.69 with a 95% CI [0.61, 0.76]. For the caregiver report, the ICC was 0.83 with a 95% CI [0.78, 0.87], suggesting adolescents' perceptions of household chaos were more variable over the course of 9 months.

3.2 Adolescent Chaos Predicting Caregiver Chaos

Mixed effects models examined associations among within-year fluctuations of adolescent and caregiver reports of household chaos. Specifically, adolescent reports of household chaos were used to predict caregiver reports over time. The between dyad analysis explores whether adolescents who report higher average chaos also have caregivers who, report higher chaos on average. In comparison, within person analyses indicates whether changes in adolescents' reports of chaos at a given wave are associated with changes in caregiver report of chaos. The results of

the mixed effects models examining inner-year variability in adolescent and caregiver reports of household chaos can be found in Table 3. There was a significant association of between dyad differences in mean levels of youth reports of household chaos and caregiver reports, such that an increase in youth report is associated with an increase in caregiver reports of chaos ($B = 0.51, p < .001$). Several control variables were significant as well. In particular, more household income at the between-level was related to less chaos ($B = -0.30, p = .010$). There were additional between-level effects where larger households tended to rate chaos higher ($B = 0.13, p < .001$). Individual variability or within-level associations of adolescent reports of chaos were unrelated to caregiver reports of chaos, including when covariates were added to the model.

3.3 Household Chaos Predicting Externalizing Problems

Mixed effects models were estimated to address the third aim, which considers relations among externalizing problems and both adolescent and caregiver reports of household chaos. Then models were estimated for the conduct and hyperactive-inattention subscales. Results for externalizing behaviors can be found in Table 4. A one-unit increase in average levels of household chaos between individuals associated with an increase in externalizing problems ($B = 0.37, p < .001$). Additionally, the within-level associations showed that in waves where adolescents report higher than their average level of chaos there was an increase in externalizing problems ($B = 0.14, p < .001$). However, there were no significant between or within level associations for caregiver report of chaos. For covariates, only between-level associations for the adolescent race significantly related to adolescent externalizing problems. In particular, Black adolescents reported

more externalizing problems than White ($B = -0.13, p = 0.024$) and Multi-racial or another-race ($B = -0.14, p = 0.043$) adolescents.

Results for youth and caregiver reports of chaos in models run separately for conduct problems and hyperactivity-inattention subscales (see Table 4) are consistent with the findings for the aggregate measure of externalizing problems. In contrast to the main externalizing model, race was significantly related to hyperactive-inattention problems, such that adolescents identifying as White ($B = -0.18, p = .023$) and Multi or another race ($B = -0.23, p = .019$) reported fewer problems than adolescents identifying as Black.

3.4 Household Chaos Predicting Internalizing Problems

Mixed effects models used internalizing problems as the outcome are shown in Table 5. Here it can be seen that a one unit increase in average levels of adolescent-reported household chaos related to an increase in average levels of internalizing problems ($B = 0.29, p < .001$). However, the within-individual association of adolescent chaos was not significant ($B = 0.06, p = .100$). The between and within associations for caregiver reports of chaos were not linked to adolescent internalizing problems. None of the covariates included in the model were significantly predictive of internalizing problems.

Associations between adolescent and caregiver report of chaos found for the internalizing models replicated for both emotional problems and peer problems, as shown in Table 5. More specifically, the between-level association among adolescent chaos and emotional problems was significant ($B = 0.42, p < .001$). When examining between individual differences, associations

between chaos and peer problems were also significant ($B = 0.16, p = .013$). The within-individual effect of chaos was not significant.

Contrary to the main internalizing model, males scored lower on emotional problems, compared to females ($B = -.15, p = .040$). Unlike the emotional subscale models, at the between-level, adolescents from larger households reported lower levels of peer problems ($B = -0.04, p = .020$).

3.5 Household Chaos Predicting Academic Engagement

To test the third aim, the final model probes associations between adolescent and caregiver report of chaos and academic engagement (see Table 6). Adolescents reporting greater household chaos on average scored lower on academic engagement ($B = -0.17, p = .045$). There were no significant within level associations for adolescent report of household chaos. Similar to previous models between or within individual associations of caregiver report of household chaos and academic engagement was not significant. There were, however, differences in academic engagement related to adolescent sex, where male participants reported less academic engagement ($B = -0.26, p = .044$) compared to female participants.

3.6 Household Chaos Is Different From Caregiving Characteristics

Supplemental models controlling for caregiving characteristics such as monitoring, stress, depression, and relationship quality were run to test robustness of results. In models that examined

household chaos associations with externalizing and internalizing problems controlling for caregiver characteristics the results were similar with main models however, academic engagement was inconsistent (see Supplemental Tables 1-5). Adolescent report of household chaos at both the between and within level was associated with externalizing problems when controlling for each caregiving characteristic. Household chaos at the between level only, was linked with internalizing problems when controlling for each caregiving characteristic. Household chaos at the between level only was linked to academic engagement when controlling for caregiver monitoring, stress and depression. However, household chaos at the between level was no longer associated with academic engagement when controlling for caregiver and adolescent report of relationship quality. The results of the models for externalizing and internalizing problems was consistent whereas the results related to academic engagement were more mixed.

4.0 Discussion

Taking advantage of an intensive 9-month longitudinal design that drew data from adolescents and their caregivers, this study explored how household chaos related to adolescent externalizing and internalizing problems and academic engagement. Taking a developmental perspective, this study challenges assumptions of stability when it comes to chaos. In particular, caregivers and adolescents report variability in household chaos in 4 reports collected over 9-months. Caregivers reported more stability in household chaos when compared to adolescents, which is consistent with current conceptualizations in the literature. The models that examined between- and within-individual variability in adolescent and caregiver report of household chaos suggest that these measures have overlapping variability at both levels, but there is also significant uniqueness in these reports. In particular, at the between-individual level, adolescents who reported higher levels of household chaos had caregivers who reported more chaos. When it came to associations between household chaos, problem behaviors and academic engagement, adolescent report of chaos and externalizing problems existed at both the within- and between-person levels, while relations were evident only at the between-person level for internalizing problems and academic engagement. Surprisingly, caregiver-reports of household chaos did not relate to problem behaviors or academic engagement at the within- or between-person levels when adolescent reports were in the model.

4.1 Adolescents Report More Variability in Household Chaos Compared to Adult Caregivers

The first aim of this study is to characterize the stability of household chaos over a narrow temporal lag. Existing literature suggests household chaos is stable year-to-year (Deater-Deckard et al., 2009). The large inter-class correlation for within-year reports of chaos corroborate the assumption that household chaos is stable when measuring caregiver perceptions of chaos. However, comparing adolescent ratings to caregiver ratings, the prevailing assumption of stability may not be as applicable to adolescents' experiences. Over 9 months adolescents reported more inner-year variability in household chaos than their caregivers. A potential explanation for these findings centers on adolescents' emotional variability.

Adolescents experience more emotional variability than adults, meaning they feel more intense highs and lows than adults (Bailen et al., 2019; Maciejewski et al., 2015; McKone & Silk, 2022). Inasmuch that emotionality may relate to reports of household chaos, i.e. reports of chaos are colored by "high" and "low" feelings, adolescents may be more likely to report variation in household chaos depending on their mood. Reductions in emotional volatility that take place in adulthood may help explain the reduced variability in perceptions of chaos observed in adult caregivers' reports (Bailen et al., 2019; Maciejewski et al., 2015; McKone & Silk, 2022). This emotional volatility is consistent with prior literature showing that adolescence is a developmental period of heightened sensitivity to environmental stimuli (Somerville et al., 2010). This sensitivity could also explain why adolescent reports of chaos are more variable over nine months compared to caregivers. An interesting future extension of this study could directly test whether variability in perceptions of household chaos changes over the course of development and stabilizes in adulthood.

4.2 Adolescent and Caregiver Reports of Household Chaos are Related But Contribute Unique Perspectives

The second aim explores whether adolescent and caregiver reports of chaos are associated. Consistent with prior work (Human et al., 2016; Jaffee et al., 2012), adolescent and caregiver reports of household chaos are related. In other words, in families where caregivers report higher than average levels of household chaos, their adolescents tend to also report higher than average levels of chaos. It is important to note, however, that while adolescent and caregiver reports were linked, the unstandardized effect size of the association was ($B = 0.51$). Thus, adolescents clearly had unique perceptions of the chaos in their home environments compared to their caregivers.

Differences in adolescent and caregiver perceptions of the home environment could stem from differences in social processing patterns. As children age and enter adolescence, their social cognitive processes and abilities to understand complex and intimate relationships grow stronger (Blakemore & Mills, 2014). Social-cognitive processing can change based on caregiving practices; for example more harsh responses from caregivers is associated with changes in adolescent social cognitive processing (Bradshaw & Garbarino, 2004). Adolescents interpretation of social cues may influence perceptions of themselves (Blakemore & Mills, 2014), how they make sense of disruptions in the home environment and later behavioral responses. Since adolescents are actively engaged in developing social cognitive skills it may contribute to differences in caregiver-adolescent perceptions. To the extent that social cognition acts as a pathway through which adolescents' environments affect their behavior (Blakemore & Mills, 2014) understanding both adolescents' perceptions of the home environment and their cognitions related to their environments is vital to fully understanding how chaos influences behavioral functioning. This

study is an initial step in such work. Future studies should also measure social cognitions to explore their role as a mediator of links between chaos and behavior problems.

Interestingly, the association between adolescent and caregiver reports of chaos was not significant when looking within dyads. Stated differently, while levels of adolescent-reported chaos predicted caregiver reported chaos, *deviations* of adolescent's perceptions of chaos from their overall mean perception were unrelated to their caregiver's reports of chaos. This difference suggests that caregivers are not perceiving the same changes in their home environment that adolescents are observing. These findings highlight the importance of measuring adolescents' perceptions of their environments in studies aimed at understanding their wellbeing and development.

4.3 Household Chaos Has More Consistent Links with Externalizing than Internalizing Problems

Adolescent reports of household chaos related to externalizing problems in both the between and within parts of the models, while adolescent reports were only significantly associated with internalizing problems between-level. Additionally, the lack of a within-person association for internalizing is consistent with prior studies, which have shown more consistent relations between children's contexts and externalizing versus internalizing (see e.g., Costello, et al.,(2003); Dearing et al, (2006) looking at links between family income and behavior).

There are a few plausible explanations for the more consistent association between household chaos and externalizing verses internalizing problems. For example, household chaos may be a distressing context that impairs adolescents' executive functioning. Unpredictable

contexts have been shown to elicit greater stress responses, which harms executive functions (Dickerson & Kemeny, 2004). Household chaos is akin to a difficult to manage context. To the extent that this reduces executive functioning skills, this could explain its role in predicting externalizing compared to internalizing behaviors. Alternatively, socializing *outside* of the home context may influence emotions or peer problems more. Emotional skills development is influenced by engaging in a broader array of relationships, including many relationships outside of the home and in particular peer relationships. Adolescents often emulate emotion regulation strategies of their friends (Reindl et al., 2016). Similarly, adolescents are actively building social norms within their peer groups and will often adopt the norms of peers (J. L. Andrews et al., 2020; Henneberger et al., 2021). Accordingly, the oversized influence of peers on emotion regulation and socialization processes occurring outside the home may reduce the effects of household chaos on adolescents' internalizing behaviors.

4.4 Household Chaos is Poorly Linked to Academic Engagement

Continuing with the results of the third aim, there is some evidence that household chaos is linked to academic engagement. More household chaos was related to less academic engagement between families; thereby suggesting that the harmful associations extend to adolescents' experiences at school. However, the effect size was modest ($B = 0.51$) and there were no significant associations within-individuals. Although the association is modest it may be a viable avenue to explain the mixed associations with achievement and cognition (Hanscombe et al., 2011; Shamama-tus-Sabah et al., 2011). For this study the measure of engagement only included two domains, emotional and behavioral engagement. However, academic engagement is a

multidimensional construct that also includes cognition or the ability to self-regulate/self direct one's approach to learning (M.-T. Wang et al., 2011). As all three domains of engagement work in concert together, the exclusion of this domain in the present study may have led to underestimated associations (M.-T. Wang et al., 2011). One of the proposed mechanisms of household chaos's negative influence on academic engagement includes impaired ability to sustain attention (K. Andrews et al., 2021). It may be that household chaos has an influence on cognitive processes that rely on sustained attention, whereas emotional engagement could be sensitive to peer influence (that compared to emotional or behavior engagement).

Another important consideration is that several of our measures of academic engagement took place during the summer months. During this time, academic engagement is likely to have less salience for adolescents. Altogether 25% of the available data on academic engagement was reported during a summer month. This may have downwardly biased the estimates of academic engagement because reports during the summer months are retrospective, reflecting back on adolescents' experiences when they were in school, a month or two prior to the month of assessment. Alternatively, the underlying associations among chaos and academic engagement may differ compared to internalizing or externalizing problems. Differences in mean levels between families seem to be salient predictors of average levels of academic engagement; however, the school context may play a larger role in shaping academic engagement than the home environment. It may be that within-year variability in household chaos is buffered by the structure or level of routine in the school environment. Overall, household chaos may influence initial engagement but stability of the school context may be more important because engagement behaviors are exclusive to the school environment. However, the study's data was not designed to examine these alternative patterns.

4.5 Limitations and Future Directions

While the longitudinal nature of this study allowed the use of analytical strategies that strengthened internal validity of results, in particular exploiting within-person change to use individual reporters as their own comparison group, there are a few caveats to the results reported. First, although the study uses repeated measurements of key variables, this study was not experimental, so the study cannot draw causal inferences. Second the global pandemic has influenced disruptions to household chaos and levels of disorder in the home (Cassinat et al., 2021). Results may be underestimating the effects of household chaos for internalizing problems as adolescents engaged in peer relationships differently with increased online interactions (Larivière-Bastien et al., 2022). Due to the timing of data collection, the study was not sufficiently powered to probe pre- and post-pandemic associations before the pandemic onset. Third, the study did not capture processes that may be driving adolescents' changing perceptions of household chaos. For example, the analytic approach did not test moderators or mediations, such as emotional reactivity or assess adolescent executive functioning. Lastly, as noted, the measurement of academic engagement was inexact as adolescents reported on their academic engagement intermittently over the course of 9 months, with a quarter of the responses occurring during summer months. This may have also contributed to under-estimation of associations between household chaos and academic engagement. Future studies should examine household chaos and academic engagement over consecutive months during the school year in addition to household chaos to better examine these associations.

Although there are limitations, this study highlights the importance of considering adolescent perceptions of their contexts as caregiver reports may not capture the whole experience of adolescents. Additionally, these findings show that household chaos may not be stable during

adolescence and that within-year variability in chaos is an important consideration, particularly when it comes to externalizing problems. This investigation also shows that adolescent problem behaviors, especially externalizing problems, respond to changes in the home environment assessed over shorter time intervals. This may be because adolescence is a unique developmental stage and a sensitive period for growth and development (Blakemore & Mills, 2014; Somerville et al., 2010). This study was one of the few to examine household chaos relation to academic engagement as a possible avenue to explore the mixed associations with academic achievement and cognition. Future studies should consider alternative models of how household chaos changes over time, and develop experimental methods that reduce household chaos, and explore possible mediators such as executive functioning. This would further bolster our knowledge on associations between household chaos and adolescent behavior problems and academic engagement.

5.0 Tables

Table 1: Descriptive Statistics

Observation N (Level 1) = 934					
Dyad N (Level 2) = 104					
	Mean	S.D.	ICC	Min	Max
Adolescent Chaos	0.95	0.52	0.69	0	2.73
Caregiver Chaos	0.95	0.55	0.83	0	2.87
Adolescent Age	14.90	0.83		14	16
Adolescent Sex (% female)	55%				
Adolescent Race					
Asian	4%				
Black	37%				
Latinx	6%				
Multi- or another race	10%				
White	43%				
Caregiver Education					
High School	23%				
Associates or Some College	23%				
Bachelor's or Higher	54%				
Caregiver Marital Status					
Married	46%				
Monthly Income	\$ 4,214	\$ 3,106	0.44	\$0	\$20,192
Household Size	4.19	1.5		1	10

Table 2: Between and Within Correlation Matrix with sensitivity variables

Table 2

Between and Within Correlation Matrix with sensitivity variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Adolescent Chaos	1	0.04	-	-	-	0.02	-	0.28	0.25	0.19	0.18	0.15	0.12	-0.19	-0.01	0.07
2. Caregiver Chaos	0.52	1	-	-	-	-0.05	-	0.05	0.01	0.07	0.02	0.04	-0.02	-0.02	-0.02	-0.23
3. Age	0.02	-0.05	1	-	-	-	-	-	-	-	-	-	-	-	-	-
4. Sex	0.07	0.11	-0.13	1	-	-	-	-	-	-	-	-	-	-	-	-
5. Race	-0.20	-0.08	-0.03	-0.03	1	-	-	-	-	-	-	-	-	-	-	-
6. Monthly Income	0.00	-0.13	-0.15	-0.04	0.13	1	-	-0.04	-0.01	-0.05	0.00	0.00	0.00	0.04	0.02	-0.01
5. Household Size	0.20	0.46	-0.09	-0.12	-0.11	0.13	1	-	-	-	-	-	-	-	-	-
8. Externalizing	0.59	0.29	-0.03	0.17	-0.27	0.01	0.04	1	0.71	0.82	0.36	0.36	0.17	-0.20	-0.05	-0.12
9. Conduct	0.54	0.33	-0.07	0.19	-0.23	-0.08	0.09	0.83	1	0.18	0.36	0.31	0.23	-0.12	-0.02	-0.07
10. Hyperactive Inattention	0.52	0.21	0.01	0.13	-0.25	0.07	0.00	0.93	0.57	1	0.21	0.25	0.05	-0.19	-0.05	-0.11
11. Internalizing	0.46	0.24	0.11	-0.08	-0.06	-0.05	0.00	0.59	0.44	0.58	1	0.81	0.72	-0.13	-0.05	-0.04
12. Emotion	0.46	0.24	0.12	-0.14	-0.02	0.09	0.13	0.54	0.38	0.54	0.89	1	0.18	-0.09	-0.05	-0.08
13. Peer	0.27	0.14	0.04	0.05	-0.11	-0.23	-0.19	0.42	0.34	0.40	0.75	0.38	1	-0.11	-0.02	0.02
14. Academic Engagement	-0.35	-0.14	0.18	-0.24	0.15	-0.02	0.00	-0.66	-0.52	-0.64	-0.49	-0.42	-0.40	1	-	0.00
15. Caregiver Monitoring	-0.23	-0.05	0.02	-0.04	-0.27	-0.19	0.12	-0.11	-0.08	-0.12	-0.04	-0.08	0.02	0.06	1	0.16
16. Caregiver Relation-Qual	-0.23	-0.17	0.12	-0.24	0.04	0.03	0.05	-0.31	-0.30	-0.26	-0.18	-0.12	-0.20	0.22	0.42	1
17. Caregiver Depression	0.24	0.50	-0.01	0.29	-0.03	-0.32	0.04	0.24	0.23	0.20	0.25	0.18	0.24	-0.14	-0.03	-0.16
18. Adolescent Relation-Qual	-0.40	-0.02	-0.05	-0.12	0.16	0.02	0.06	-0.41	-0.34	-0.38	-0.31	-0.27	-0.26	0.25	0.14	0.46

Between

Table 3: Adolescent Chaos Predicting Caregiver Chaos

<i>Predictors</i>	Unadjusted			Adjusted		
	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>
<i>Between</i>						
Adolescent Chaos	0.59	0.09	<0.001	0.51	0.09	<0.001
Adolescent Age				-0.01	0.05	0.780
Adolescent Sex				0.14	0.08	0.057
Adolescent Race						
White				0.05	0.09	0.545
Multi or another race				0.10	0.11	0.340
Monthly Income				-0.30	0.12	0.010
Household Size				0.13	0.02	<0.001
<i>Within</i>						
Adolescent Chaos	0.03	0.05	0.482	0.04	0.05	0.392
Monthly Income				-0.02	0.03	0.462
Intercept	0.95	0.04	<0.001	0.50	0.70	0.476
N	104 famid			103 famid		
Observations	412			404		

Table 4: Chaos Predicting Externalizing Problems and Subscales

<i>Predictors</i>	Externalizing			Conduct			Hyperactive Inattention		
	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>
<i>Between</i>									
Adolescent Chaos	0.37	0.06	<0.001	0.30	0.06	<0.001	0.45	0.09	<0.001
Caregiver Chaos	0.00	0.06	0.976	0.04	0.06	0.550	-0.03	0.09	0.735
Adolescent Age	-0.03	0.03	0.288	-0.05	0.03	0.100	-0.01	0.04	0.832
Adolescent Sex	0.04	0.05	0.381	0.04	0.05	0.405	0.05	0.07	0.470
Adolescent Race									
White	-0.13	0.06	0.024	-0.07	0.05	0.155	-0.18	0.08	0.023
Multi or another race	-0.14	0.07	0.043	-0.05	0.07	0.418	-0.23	0.10	0.019
Monthly Income	0.04	0.08	0.629	-0.08	0.07	0.234	0.17	0.11	0.136
Household Size	-0.01	0.02	0.625	0.00	0.02	0.890	-0.02	0.03	0.428
<i>Within</i>									
Adolescent Chaos	0.14	0.03	<0.001	0.13	0.04	0.001	0.16	0.05	0.002
Caregiver Chaos	0.04	0.04	0.262	0.01	0.04	0.751	0.07	0.06	0.239
Monthly Income	-0.03	0.02	0.131	-0.03	0.03	0.204	-0.04	0.03	0.264
Intercept	1.12	0.46	0.014	0.99	0.42	0.019	1.11	0.65	0.085
N	103 famid			103 famid			103 famid		
Observations	404			404			404		

Table 5: Chaos Predicting Internalizing Problems and Subscales

<i>Predictors</i>	Internalizing			Emotion			Peer		
	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>
<i>Between</i>									
Adolescent Chaos	0.29	0.07	<0.001	0.42	0.09	<0.001	0.16	0.07	0.013
Caregiver Chaos	0.01	0.07	0.841	0.00	0.09	0.967	0.03	0.07	0.628
Adolescent Age	0.01	0.03	0.772	0.03	0.04	0.435	-0.02	0.03	0.561
Adolescent Sex	-0.09	0.05	0.078	-0.15	0.07	0.040	-0.03	0.05	0.524
Adolescent Race									
White	0.05	0.06	0.382	0.13	0.08	0.107	-0.03	0.06	0.585
Multi or another race	0.00	0.07	0.956	0.03	0.1	0.747	-0.03	0.07	0.720
Monthly Income	-0.03	0.08	0.745	0.09	0.11	0.42	-0.14	0.08	0.073
Household Size	-0.01	0.02	0.500	0.02	0.03	0.434	-0.04	0.02	0.020
<i>Within</i>									
Adolescent Chaos	0.06	0.04	0.100	0.06	0.05	0.233	0.06	0.04	0.207
Caregiver Chaos	0.01	0.04	0.831	0.05	0.06	0.396	-0.03	0.05	0.534
Monthly Income	-0.02	0.02	0.440	-0.02	0.03	0.64	-0.02	0.03	0.458
Intercept	0.54	0.49	0.264	0.08	0.66	0.907	1.02	0.47	0.028
N		103 famid			103 famid			103 famid	
Observations		404			404			404	

Table 6: Adolescent Chaos Predicting Academic Engagement

Academic Engagement			
<i>Predictors</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>
<i>Between</i>			
Adolescent Chaos	-0.50	0.22	0.021
Caregiver Chaos	0.28	0.22	0.192
Adolescent Age	0.05	0.10	0.621
Adolescent Sex	-0.34	0.17	0.045
Adolescent Race			
White	-0.02	0.19	0.913
Multi or another race	0.20	0.23	0.392
Monthly Income	-0.04	0.26	0.891
Household Size	-0.03	0.06	0.680
<i>Within</i>			
Adolescent Chaos	-0.18	0.27	0.509
Caregiver Chaos	-0.02	0.32	0.951
Monthly Income	-0.05	0.18	0.763
Intercept	2.75	1.54	0.074
N			103 famid
Observations			404

Appendix A Supplemental Tables

Table 7: Adolescent and Caregiver Chaos Controlling for Monitoring

<i>Predictors</i>	Externalizing			Internalizing			Academic Engagement		
	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>
<i>Between</i>									
Adolescent Chaos	0.37	0.07	<0.001	0.31	0.07	<0.001	-0.35	0.17	0.040
Caregiver Chaos	0.00	0.07	0.981	0.01	0.07	0.862	0.20	0.16	0.219
Caregiver Monitoring	-0.02	0.06	0.758	0.06	0.06	0.351	0.02	0.14	0.885
Adolescent Age	-0.03	0.03	0.29	0.01	0.03	0.801	0.04	0.08	0.641
Adolescent Sex	0.04	0.05	0.416	-0.09	0.05	0.100	-0.24	0.13	0.059
Adolescent Race									
White	-0.13	0.06	0.032	0.07	0.06	0.293	-0.01	0.15	0.949
Multi or another race	-0.15	0.08	0.053	0.02	0.08	0.763	0.15	0.18	0.412
Monthly Income	0.03	0.08	0.693	-0.01	0.08	0.885	-0.02	0.20	0.920
Household Size	-0.01	0.02	0.683	-0.01	0.02	0.491	-0.02	0.05	0.677
<i>Within</i>									
Adolescent Chaos	0.14	0.03	<0.001	0.06	0.04	0.101	-0.13	0.2	0.510
Caregiver Chaos	0.04	0.04	0.266	0.01	0.04	0.841	-0.02	0.23	0.944
Caregiver Monitoring	-0.01	0.03	0.741	-0.01	0.03	0.694	-0.01	0.16	0.930
Monthly Income	-0.03	0.02	0.143	-0.02	0.02	0.466	-0.04	0.13	0.780
Intercept	1.14	0.48	0.018	0.55	0.49	0.26	-0.36	1.17	0.760
N		103 famid			103 famid			103 famid	
Observations		404			404			404	

Table 8: Adolescent and Caregiver Chaos Controlling for Caregiver Relationship Quality

<i>Predictors</i>	Externalizing			Internalizing			Academic Engagement		
	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>
<i>Between</i>									
Adolescent Chaos	0.35	0.07	<0.001	0.28	0.07	<0.001	-0.32	0.16	0.055
Caregiver Chaos	-0.00	0.07	0.96	0.01	0.07	0.884	0.22	0.16	0.183
Caregiver Relationship Quality	-0.09	0.06	0.121	-0.04	0.06	0.498	0.21	0.14	0.132
Adolescent Age	-0.03	0.03	0.371	0.01	0.03	0.735	0.02	0.08	0.757
Adolescent Sex	0.03	0.05	0.620	-0.10	0.06	0.075	-0.20	0.13	0.120
Adolescent Race									
White	-0.13	0.06	0.026	0.05	0.06	0.431	-0.01	0.14	0.969
Multi or another race	-0.14	0.07	0.057	0.01	0.07	0.932	0.13	0.18	0.443
Monthly Income	0.04	0.08	0.660	-0.03	0.08	0.763	-0.03	0.20	0.893
Household Size	-0.01	0.02	0.783	-0.01	0.02	0.647	-0.03	0.05	0.556
<i>Within</i>									
Adolescent Chaos	0.15	0.03	<0.001	0.06	0.04	0.116	-0.13	0.20	0.518
Caregiver Chaos	0.03	0.04	0.423	0.01	0.04	0.744	0.00	0.24	0.985
Caregiver Relationship Quality	-0.04	0.03	0.230	0.02	0.03	0.624	0.04	0.17	0.830
Monthly Income	-0.03	0.02	0.148	-0.02	0.02	0.425	-0.03	0.13	0.815
Intercept	1.05 *	0.48	0.028	0.50	0.49	0.307	-0.16	1.16	0.889
N		103 famid			103 famid			103 famid	
Observations		404			404			404	

Table 9: Adolescent and Caregiver Chaos Controlling for Caregiver Stress

<i>Predictors</i>	Externalizing			Internalizing			Academic Engagement		
	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>
<i>Between</i>									
Adolescent Chaos	0.36	0.07	<0.001	0.26	0.07	<0.001	-0.36	0.17	0.033
Caregiver Chaos	-0.03	0.08	0.661	-0.06	0.08	0.449	0.22	0.18	0.230
Caregiver Stress	0.06	0.06	0.304	0.13	0.06	0.028	-0.02	0.14	0.903
Adolescent Age	-0.03	0.03	0.395	0.02	0.03	0.505	0.03	0.08	0.658
Adolescent Sex	0.04	0.05	0.503	-0.11	0.05	0.047	-0.24	0.13	0.067
Adolescent Race									
White	-0.14	0.06	0.022	0.03	0.06	0.667	-0.02	0.14	0.917
Multi or another race	-0.15	0.07	0.045	-0.01	0.07	0.896	0.15	0.18	0.414
Monthly Income	0.07	0.09	0.44	0.03	0.09	0.704	-0.04	0.21	0.837
Household Size	-0.01	0.02	0.752	-0.00	0.02	0.809	-0.02	0.05	0.689
<i>Within</i>									
Adolescent Chaos	0.14	0.03	<0.001	0.06	0.04	0.115	-0.14	0.2	0.488
Caregiver Chaos	0.04	0.04	0.359	0.03	0.04	0.483	0.05	0.24	0.836
Caregiver Stress	0.02	0.02	0.484	-0.05	0.02	0.038	-0.15	0.12	0.239
Monthly Income	-0.03	0.02	0.182	-0.03	0.02	0.253	-0.06	0.13	0.620
Intercept	1.04	0.48	0.032	0.35	0.49	0.472	-0.34	1.19	0.774
N		103 famid			103 famid			103 famid	
Observations		404			404			404	

Table 10: Adolescent and Caregiver Chaos Controlling for Caregiver Depression

<i>Predictors</i>	Externalizing			Internalizing			Academic Engagement		
	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>
<i>Between</i>									
Adolescent Chaos	0.37	0.07	<0.001	0.29	0.07	<0.001	-0.36	0.16	0.026
Caregiver Chaos	-0.04	0.08	0.565	-0.04	0.08	0.617	0.30	0.18	0.095
Caregiver Depression	0.09	0.06	0.174	0.10	0.06	0.127	-0.19	0.15	0.212
Adolescent Age	-0.03	0.03	0.302	0.01	0.03	0.779	0.03	0.08	0.657
Adolescent Sex	0.03	0.05	0.627	-0.11	0.05	0.044	-0.21	0.13	0.118
Adolescent Race									
White	-0.14	0.06	0.018	0.03	0.06	0.574	0.02	0.14	0.905
Multi or another race	-0.14	0.07	0.051	0.00	0.07	0.964	0.15	0.18	0.403
Monthly Income	0.07	0.09	0.403	0.01	0.09	0.884	-0.1	0.21	0.619
Household Size	-0.01	0.02	0.789	-0.01	0.02	0.747	-0.03	0.05	0.568
<i>Within</i>									
Adolescent Chaos	0.14	0.03	<0.001	0.05	0.04	0.132	-0.13	0.20	0.507
Caregiver Chaos	0.04	0.04	0.326	0.03	0.04	0.505	-0.01	0.24	0.976
Caregiver Depression	0.01	0.03	0.75	-0.06	0.04	0.105	-0.02	0.20	0.909
Monthly Income	-0.03	0.02	0.147	-0.02	0.02	0.393	-0.04	0.13	0.749
Intercept	1.12	0.48	0.019	0.53	0.48	0.271	-0.33	1.16	0.777
N		103 famid			103 famid			103 famid	
Observations		404			404			404	

Table 11: Adolescent and Caregiver Chaos Controlling for Adolescent Relationship Quality

<i>Predictors</i>	Externalizing			Internalizing			Academic Engagement		
	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>
<i>Between</i>									
Adolescent Chaos	0.32	0.07	<0.001	0.24	0.08	0.001	-0.25	0.18	0.162
Caregiver Chaos	0.03	0.07	0.707	0.03	0.07	0.626	0.15	0.17	0.360
Adolescent Relationship Quality	-0.06	0.04	0.092	-0.05	0.04	0.15	0.12	0.09	0.178
Adolescent Age	-0.03	0.03	0.264	0.01	0.03	0.829	0.04	0.08	0.607
Adolescent Sex	0.03	0.05	0.544	-0.10	0.05	0.062	-0.22	0.13	0.088
Adolescent Race									
White	-0.13	0.06	0.032	0.05	0.06	0.392	-0.02	0.14	0.906
Multi or another race	-0.13	0.07	0.071	0.01	0.07	0.864	0.12	0.18	0.489
Monthly Income	0.04	0.08	0.646	-0.03	0.08	0.764	-0.03	0.2	0.870
Household Size	-0.01	0.02	0.671	-0.01	0.02	0.618	-0.02	0.05	0.663
<i>Within</i>									
Adolescent Chaos	0.14	0.03	<0.001	0.06	0.04	0.107	-0.13	0.2	0.510
Caregiver Chaos	0.04	0.04	0.325	0.01	0.04	0.902	-0.01	0.23	0.965
Adolescent Relationship Quality	-0.04	0.02	0.033	-0.03	0.02	0.173	0.04	0.12	0.727
Monthly Income	-0.04	0.02	0.086	-0.02	0.02	0.363	-0.03	0.13	0.801
Intercept	1.16	0.47	0.015	0.56	0.48	0.246	-0.41	1.16	0.725
N		103 famid			103 famid			103 famid	
Observations		404			404			404	

Table 12: Unadjusted Models Chaos Predicting Problem Behavior and Academic Engagement

<i>Predictors</i>	Externalizing			Internalizing			Academic Engagement		
	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>	<i>Estimates</i>	<i>S.E.</i>	<i>p</i>
Between									
Adolescent Chaos	0.40	0.07	<0.001	0.30	0.07	<0.001	-0.39	0.16	0.011
Caregiver Chaos	-0.02	0.06	0.735	-0.03	0.06	0.659	0.16	0.14	0.255
Within									
Adolescent Chaos	0.17	0.03	<0.001	0.12	0.03	0.001	-0.16	0.18	0.368
Caregiver Chaos	0.03	0.04	0.364	0.01	0.04	0.844	0.00	0.23	0.998
Intercept	0.55	0.03	<0.001	0.61	0.03	<0.001	0.00	0.06	0.974
N	104 famid			104 famid			104 famid		
Observations	412			412			412		

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