Published in final edited form as:
Early Child Dev Care. 2012 October 1; 182(10): 1247–1263. doi:10.1080/03004430.2011.605522.

Specifying the Links Between Household Chaos and Preschool Children's Development

Anne Martin[a], **Rachel Razza**[b], and **Jeanne Brooks-Gunn**[a]

Anne Martin: arm53@columbia.edu; Rachel Razza: rrazza@syr.edu; Jeanne Brooks-Gunn: jb224@columbia.edu

[a]National Center for Children and Families, Teachers College, Columbia University, 525 West 120[th]Street, Box 39, New York, NY 10027

[b]Department of Child and Family Studies, Syracuse University, 426 Ostrom Avenue, Syracuse, NY 13244

Abstract

Household chaos has been linked to poorer cognitive, behavioral, and self-regulatory outcomes in young children, but the mechanisms responsible remain largely unknown. Using a diverse sample of families in Chicago, the present study tests for the independent contributions made by five indicators of household chaos: noise, crowding, family instability, lack of routine, and television usually on. Chaos was measured at age 2; outcomes measured at age 5 tap receptive vocabulary, attention and behavior problems, and effortful control. Results show that controlling for all other measures of chaos, children with a lack of routine scored lower on receptive vocabulary and delayed gratification, while children whose television was generally on scored higher on aggression and attention problems. The provision of learning materials mediated a small part of the association between television and receptive vocabulary. Family instability, crowding, and noise did not predict any outcomes once other measures of chaos were controlled.

Keywords

Chaos; early childhood development; home environment; television

Chaotic households are characterized by noise, crowding, and a lack of routine and order (Wachs and Evans, 2010). Chaos is also evidenced in family instability, indicators of which include residential moves and entrances and exits of household members. Although households with more chaos are disproportionately likely to be socioeconomically disadvantaged, chaos is associated with poorer developmental outcomes for all children, regardless of socioeconomic status (Deater-Deckard et al., 2009; Evans et al., 2005; Hart, Petrill, Deater-Deckard and Thompson, 2007). Specifically, children living in chaotic home environments have been found to exhibit poorer academic, socioemotional, and self-regulatory outcomes (for a review see Evans, 2006).

Despite accumulating evidence of the adverse impacts of household chaos on children, little is known about the specific pathways responsible. Many studies have examined only one dimension of chaos at a time (e.g., crowding; Evans et al., 2010) or have combined multiple dimensions into a composite measure (Matheny, Wachs, Ludwig and Phillips, 1995; Pike et al., 2006). These approaches leave unanswered questions about the individual contribution made by each dimension of chaos to child outcomes.

Corresponding Author: Anne Martin, arm53@columbia.edu, phone: (212) 678-3479, fax: (212) 678-3676.

The present study incorporates multiple measures of chaos in longitudinal models of preschool children's outcomes to allow for simultaneous tests of each dimension of chaos net of the others. Further, the child outcomes examined are diverse, representing measures of cognitive, behavioral, and self-regulatory development. We also test whether specific associations between individual measures of chaos and child outcomes are mediated by two parenting behaviors with which they are likely to covary – maternal warmth and provision of learning materials.

Household Chaos and Young Children's Development

Past studies have shown that toddlers and preschoolers who score higher on a composite measure of chaos score lower on cognition and achievement one year later (Hart et al., 2007; Pike et al., 2006). Studies have also demonstrated links between specific dimensions of chaos and young children's cognitive growth. For example, crowding in the home during infancy has been linked to poorer cognitive and communication skills (Evans et al., 2010; Wachs and Chan, 1986). Children who are chronically exposed to noise exhibit poorer reading and language skills than matched samples, perhaps because they learn to routinely screen out auditory stimuli, even those that are useful (Evans, 2006; Haines et al., 2001; Maxwell and Evans, 2000). Further, infants' language development is significantly enhanced by having synchrony between visual and auditory information (Hollich, Newman, and Jusczyk, 2005), something that is less likely in households with frequent background noise such as that produced by a television. In addition, early television exposure has been linked to short- and long-term attention problems (Christakis, Zimmerman, DiGiuseppe, and McCarty, 2004; Landhuis, Pouton, Welch, and Hancox, 2007).

Past research has also identified an association between household chaos, measured as a composite, and young children's behavioral development. For example, Pike et al. (2006) found that children's household chaos at age 3 predicted their behavior problems at age 4. Individual dimensions of chaos also have implications for young children's behavior. For example, measures of family instability, such as the number of moves or changes in mother's intimate partners, have predicted young children's internalizing (Ackerman et al., 1999) and externalizing behavior problems (Cooper, Osborne, Beck and McLanahan, 2008; Ziol-Guest and McKenna, 2009). Ackerman et al. (1999) proposed that family instability increases emotional distress because it leads children to perceive their familial relationships as emotionally insecure. Further, children exposed to noisy and crowded home environments may isolate themselves as a coping mechanism (Evans and Lepore, 1993), leading to loneliness and sadness (Merrell, 1995; Rubin and Rose-Krasnor, 1992). Sustained exposure to television during early childhood has been associated with anxiety/depression and aggression, perhaps because it results in shorter play episodes and less social behavior (Kirkorian et al., 2009; Mistry, Minkovitz, Strobino and Borzekowski, 2007; Schmidt et al., 2008).

To our knowledge, no studies have examined young children's ability to self-regulate in the context of household chaos. However, in a sample of 6-9-year-old children, the presence of family routines was associated with greater self-regulation (Brody and Flor, 1997). In a sample of 7-12-year-olds, household chaos was associated with lower effortful control (Valiente, Lemery-Chalfant and Reiser, 2007). It is reasonable to suspect that there are associations between chaos and self-regulation among young children because of the links reviewed earlier between chaos and externalizing behaviors and academic performance, both of which reflect self-regulation. Moreover, it has been suggested that children experiencing chaos may be less likely to learn effective coping mechanisms, such as self-soothing, because of the absence of predictable patterns of cause and effect (Evans, 2006).

The Role of Parenting Behaviors

In addition to the direct pathways from chaos to early behavior, self-regulation, and achievement, there may be indirect pathways mediated by parenting behaviors. Several studies show that parents who have chaotic households demonstrate less optimal parenting behaviors in other realms. For example, infants living in households that are more chaotic have parents who name fewer objects for them and respond less frequently to their distress and bids for attention (Matheny et al., 1995; Wachs and Camli, 1991; Wachs and Chan, 1986).

While the causal relation between household chaos and lower parental responsiveness remains unclear, there are convincing reasons why the former may lead to the latter (although the reverse may also be true). Disruptions and distractions in chaotic environments may inhibit parents' ability to attend to their children's cues. One study found that parents were less responsive to and attentive with their children in a lab setting when a television was on (Kirkorian et al., 2009). Parents in turbulent homes may have trouble interpreting their children's cues if a lack of continuity in interpersonal interactions deprives them of opportunities to learn about their child's habits and preferences.

It has also been found that in chaotic households, parents express less warmth and engage in harsher discipline (Coldwell, Pike, and Dunn, 2006; Dumas et al., 2005). Again, the causal pathway is unclear, but there are reasons to suspect that chaos influences parenting, even if parenting also influences chaos. Corapci and Wachs (2002) found that parents whose households were noisier scored lower on parental self-efficacy, a predictor of parenting competence (Fiese et al., 2002; Teti and Gelfand, 1991). Chaos may also be a source of stress for parents. Ample research links parental distress to harsh discipline and less supportive parenting, which are in turn linked to child behavior problems (Miner and Clarke-Stewart, 2008; Weiss, Dodge, Bates and Pettit, 1992).

The present analysis tests whether two parenting behaviors – warmth and provision of learning materials – mediate the associations found between our indicators of household chaos and preschool child outcomes. These behaviors correspond to the two key parenting constructs identified by Zaslow et al. (2006) in the developmental literature: affective responses and cognitive stimulation. If associations between chaos and outcomes persist even when these parenting behaviors are entered in the model, it will suggest that chaos exerts a direct effect on children's early development, separate and apart from its effects on these behaviors.

The Present Study

The aim of the present study is to elucidate the specific pathways from household chaos to young children's well-being by testing multiple dimensions of both chaos and child well-being simultaneously. Measures of chaos at age 2 include family instability, lack of routine, having the television generally on, crowding, and noise. Measures of children's well-being at age 5 include receptive vocabulary, aggression, anxiety/depression, attention problems, delayed gratification, and motor control. We also test whether any associations obtained between measures of chaos and later outcomes are mediated by parental warmth and the provision of learning materials. An advantage of the data set used for this analysis is its sociodemographic diversity. Studies of chaos should adequately represent disadvantaged children because they are more likely to reside in chaotic homes (Dumas et al., 2005; Evans et al., 2005). However, it is also useful to represent advantaged children, first because chaos is detrimental for them, too (Deater-Deckard et al., 2009; Dumas et al., 2005; Hart et al.,

2007), and second because greater variability in chaos should make it easier to detect associations with child outcomes.

To date, the study of household chaos has been driven more by empirical than theoretical concerns, and the explanatory mechanisms responsible for links with child outcomes remain poorly understood. We therefore considered these analyses largely exploratory in nature and offered only tentative hypotheses. Ackerman and Brown (2010) proposed that the physical dimensions of chaos may be more likely to affect cognitive development, while the psychological dimensions of chaos may be more likely to affect socioemotional development. We thus expected that noise, crowding, and generally having the television on would be most likely to affect receptive vocabulary and attention problems, while family instability and lack of routine would be most likely to affect aggression and anxiety/depression. Because delay of gratification and motor control tap self-regulation, a higher-order construct that influences both cognition and behavior, we suspected that it may be vulnerable to both physical and psychological disorder.

Method

Sample

The Project on Human Development in Chicago Neighborhoods (PHDCN) is a multilevel study of individuals and neighborhoods designed to examine human development in context. The present study relies exclusively on the individual-level Longitudinal Cohort Study, which tracked children in multiple age cohorts over three waves of data collection. Sampling was designed to ensure representation of all neighborhoods in Chicago. Neighborhood clusters ("NCs") were created out of groups of 2–3 census tracts that were relatively homogeneous with respect to racial/ethnic mix and socioeconomic status (Sampson et al., 1997). A stratified random sample of 80 NCs was selected. Within these NCs, children in 7 age groups (0, 3, 6, 9, 12, 15, and 18), or cohorts, were recruited from a randomly selected sample of 35,000 households.

We select the "0 cohort," so named because children had just been born or were due to be born shortly at the time of the first wave. To capture the children at toddler and preschool ages, we examined data from waves 2 and 3, when the children were 2.5 years and 5.0 years, on average, respectively. At both waves, data collectors visited families in their homes.

The 0 cohort consisted of 1,266 children at wave 1 (1994–1997). At wave 2 (1997–1999), there was an 83% retention rate, and at wave 3 (2000–2001), there was a 69% response rate. To be eligible for the present analysis, children had to be seen at both waves 2 and 3 and have non-missing values on the outcomes of interest ($n = 842$). Compared to the analytic sample, excluded children had lower household incomes, were slightly older, had younger mothers, had smaller families, had mothers who were less likely to be married, had less educated mothers, and had mothers who were more likely to be Hispanic or other race/ethnicity (not shown). Therefore the sample was generally more advantaged than the full sample at wave 1. Excluded children also scored higher than included children on three measures of chaos (instability, noise, and crowding). They also scored higher on aggression, anxiety, and attention problems, and lower on receptive vocabulary (not shown). Therefore the exclusion of ineligible children may have attenuated the associations between household chaos and child outcomes, resulting in conservative estimates. The number of children with valid values on each outcome varied slightly and is therefore noted in the tables.

The analytic sample was demographically diverse (Table 1). Approximately half (54%) of the children's mothers were married. Forty percent of mothers had less than high school degree, 13% had only a high school degree, and 47% had more than a high school degree.

Twenty percent of mothers were white, 31% were black, 44% were Hispanic, and 5% were another race/ethnicity. The mean annual income per household member was $6,364.

Measures

Chaos—There were five measures of chaos in wave 2. *Family instability* is the sum of three items that reflect change in primary caregiver, residence, and mother's marital status between waves 1 and 2. *Lack of routine* is the sum of three mother-reported items on family mealtime frequency, parental rules for child, and the extent to which those rules are enforced. *Television generally on* indicates whether the mother reported that a television is generally on somewhere in the home. *Crowding* is the sum of two binary items observed during the home visit that assess the amount of space relative to number of people and furniture. *Noise* is the sum of two observed items that indicated whether the home was noisy from noise inside or outside.

Cognitive outcomes—We examined two cognitive outcomes at wave 3: receptive vocabulary and attention. The Peabody Picture Vocabulary Test (PPVT-III; Dunn and Dunn, 1997) assessed the child's receptive vocabulary by asking him/her to point to one of four pictures that best depicted a word read aloud. This measure has good reliability and validity for children aged 3 to 6 years (Williams and Wang, 1997). Raw scores ($M = 43$, $SD = 27$) were used with controls for child age.

Mothers reported on 8 items drawn from the Child Behavior Checklist (CBCL; Achenbach, 1991) to describe their child's attention problems in the past 6 months ($\alpha = .67$). Sample items include "can't sit still, is restless, or hyperactive" and "daydreams or gets lost in his/her thoughts." Mothers indicated how well each item described their child's behavior (0 = not true, 1 = sometimes true, 2 = often true). Items were summed (range: 0–16, $M = 2.9$, $SD = 2.3$).

Behavioral outcomes—Two behavioral outcomes at wave 3 were examined: aggression and anxiety/depression. Mothers reported on 13 items drawn from the CBCL (Achenbach, 1991) to describe their child's aggressive behavior in the past 6 months ($\alpha = .84$). Sample items include "gets in many fights" and "screams a lot." Items were scored and summed as they were for the Attention scale (range: 0–26, $M = 6.6$, $SD = 4.6$).

Mothers completed the Anxious/Depressed scale from the CBCL to describe their child's anxiety and depression in the past 6 months. There were 14 items scored on the same metric as the Attention scale ($\alpha = .78$). Sample items include "worries" and "complains of loneliness." Items were summed (range: 0–28, $M = 3.5$, $SD = 3.5$).

Self-regulation outcomes—Self-regulation in early childhood is typically defined by effortful control, the ability to withhold a dominant or prepotent response in order to carry out a subdominant or less salient response (Rothbart and Bates, 2006). Two facets of effortful control at wave 3 were examined: delay of gratification and motor control. Trained data collectors administered the "gift wrap" task to assess delay of gratification (Kochanska, Murray and Harlan, 2000). The data collector told the child not to look while she wrapped a gift for him/her. The data collector stood behind the child's back and began a 60-second observation period while pretending to wrap the gift by crinkling the paper. The number of seconds that elapsed before the child peeked and the intensity of the peeking behavior (0 = child gets out of chair and goes over to tester, 5 = child does not try to peek) were both recorded. Because these two variables were highly correlated ($r = .79$), they were standardized and averaged to form a composite score.

Two measures of children's ability to slow motor activity were also administered. In the "walk-a-line" task (Kochanska et al., 2000), children were asked to walk the length of a six-foot-long line at normal speed, and then twice more at a very slow speed. The difference between the normal speed and each slow speed was computed and averaged. In the "circles" task (Kochanska et al., 2000), children were asked to draw a circle without lifting their crayon while staying inside the lines of two concentric circles printed on the page. Children were asked to draw at normal speed, then at fast speed, and then at slow speed. The difference between the fast and slow trial was computed. The walk-a-line and circles scores were highly correlated ($r = .50$) and were therefore standardized and averaged to form a composite score of motor control.

Parenting behaviors—Maternal warmth and learning materials were collected at wave 2 using items based on the HOME Inventory (Caldwell and Bradley, 1984). Maternal warmth ($M = 6.4$, $SD = 2.5$) was the sum of 9 observational binary items reflecting the mother's positive affect towards and praise of the child during the visit ($\alpha = .83$). Learning materials ($M = 8.8$, $SD = 3.1$) summed 11 binary items describing the presence of age-appropriate toys, books, and games that promoted learning ($\alpha = .76$).

Controls—Child age was drawn from age 3, when the outcomes were measured. Other child and family demographic characteristics were drawn from wave 1. Household income per capita was computed based on reported total household income and number of residents. Child sex, mother's age, whether mother married, and family size were based on maternal report. Maternal race/ethnicity was coded as white, black, Hispanic, or other. Mother's education was coded as less than high school degree, high school degree, or more than high school degree.

Missing Data

There was some item-missingness in the measures of chaos and covariates because of non-response or because observer-recorded items were not completed due to telephone rather than in-person administration. Multiple imputation was used on the assumption that data were missing at random (that is, their missingness could be modeled by observed characteristics; Allison, 2009). The ICE command in Stata (Royston, 2007) was used to conduct multiple imputation based on a regression switching protocol using chained equations. Although values for the outcome variables were used in imputation models for other missing variables, they themselves were not imputed per von Hippel (2007). Five imputed data sets were created. They were analyzed using the MIM prefix for regression analyses in Stata (Royston, 2007), which combines coefficients and standard errors across imputed data sets.

Results

Bivariate correlations between the measures of chaos and children's background characteristics are presented in Table 2. Correlations among the measures of chaos were small to modest (rs = .02 – .32), indicating, first, that they assessed distinct aspects of the home environment and second, that they could be entered jointly in a single multivariate model. The highest correlation among them was between crowding and noise ($r = .32$). Associations between indicators of chaos and background characteristics ran in the expected directions. In general, more chaos was associated with greater disadvantage. Indicators of chaos were also associated with parenting behaviors. Children with greater family instability, lack of routine, crowding, and noise also had mothers who scored lower on observed warmth and homes that had fewer learning materials. Having the television

generally on was the only measure of chaos not associated with warmth or learning materials.

Two regression models were run for each outcome. The first model included all five measures of chaos as well as the controls listed above. Then, for all indicators of chaos that significantly predicted an outcome, a second model was run to test for mediation which added the two measures of parenting behavior. The coefficient for the relevant indicator of chaos was then compared across the two models using post-estimation tests in Stata. When the difference was statistically significant, a formal test of mediation was performed using the sgmediation command in Stata. Robust standard errors were used to adjust for the non-independence of errors of children sampled from the same NC.

As shown in Table 3, family instability, crowding, and noise were not associated with any of the developmental outcomes in a model accounting for all other measures of household chaos and controls. Lack of routine was associated with receptive vocabulary and delay of gratification. Specifically, children who scored higher on lack of routine scored lower on receptive vocabulary (B = −1.88, $p < .05$) and delay of gratification (B = −0.09, $p < .05$). In addition, children whose household generally had the television on scored higher on aggression (B = 1.35, $p < .001$) and attention problems (B = 0.43, $p < .05$).

A second model with parenting behaviors was run for the four outcomes (receptive vocabulary, delay of gratification, aggression, attention problems) that were predicted at the $p < .05$ level by a measure of chaos (lack of routine for the first two outcomes and television generally on for the second two). For delay of gratification, aggression, and attention problems, the coefficient for the relevant measure of chaos in the second model (Table 4) did not differ from that in the first model (post-estimation tests not shown). Thus associations between those measures of chaos and the outcomes did not appear to be mediated by either measure of parenting. However, for receptive vocabulary, the coefficient for lack of routine was smaller and reduced to marginal significance in Model 2 (B = −1.64, $p < .10$). A Sobel test of mediation revealed that 7.9% of the association between lack of routine and receptive vocabulary was mediated by the provision of learning materials ($p < .001$). Specifically, children whose mothers had fewer routines scored lower on learning materials (B = −0.31, p < .001), and fewer learning materials predicted lower receptive vocabulary. Maternal warmth did not serve a similar mediating function.

Discussion

Past studies of household chaos have found that it predicts lower cognitive scores and greater conduct problems in children of toddler and preschool age (Hart et al., 2007; Pike et al., 2006). Other studies have shown links between specific dimensions of chaos such as family instability, crowding, and noise and young children's behavior problems and cognitive ability (Ackerman et al., 1999; Evans et al., 2010; Maxwell and Evans, 2000). The present study extends this body of knowledge by regressing a range of developmental indicators at child age 5 on five dimensions of early household chaos in a single model. This approach was intended to disentangle the developmental pathways from household chaos to child outcomes by testing the unique predictive power of each dimension of chaos in a model controlling for the other dimensions. We further tested whether two parenting behaviors known to predict early development – maternal warmth and the provision of learning materials – mediated associations between chaos and child outcomes.

Of the five dimensions of household chaos examined – family instability, lack of routines, television generally on, crowding, and noise – two were predictive of subsequent child outcomes: lack of routine and television generally on. Children who experienced a greater

lack of routine at child age 2.5 scored lower on receptive vocabulary (d = .07) and delayed gratification (d = .09) at age 5. While these effect sizes are small in absolute terms, they are nevertheless significant because these outcomes are integral to success in school, which this sample was about to enter (Blair and Razza, 2007; Lengua et al., 2008; Wise et al., 2007).

The association between routines and receptive vocabulary was in small part mediated by the provision of learning materials in the home. That is, children with a lack of routines had fewer learning materials, which in turn predicted lower vocabulary scores. It is possible that children with a lack of routines have fewer books because they engage less frequently in shared parent-child reading, a common component of bedtime routines (Mindell, Meltzer, Carskadon and Chervin, 2009), and a contributor to children's vocabulary growth (Raikes et al., 2006). It is also possible that parents lacking routines are not sufficiently organized to continually ensure that their children have learning materials that are appropriate for their developmental stage.

The association between a lack of routines and delayed gratification was not mediated by maternal warmth or learning materials in the home, suggesting the salience of routines in and of themselves for the development of early self-regulation. One previous study also found a link between family routines and children's self-regulation (Brody and Flor, 1997). That sample was slightly older than ours, and the measure of self-regulation not specific to delayed gratification. Nevertheless, taken together the two studies suggest a promising pathway for further study. The presence of family routines may contribute to young children's ability to self-regulate in several ways. First, routines may be assuring to young children because they illustrate lawfulness. A procedure that regularly unfolds the same way teaches children that events are predictable, and that there are rewards for waiting. A child experiencing a lack of routine may learn that opportunities for rewards are erratic, and that it is wiser to pursue rewards when they are available rather than wait for another opening to arise. Second, an unpredictable environment may cause a child to doubt her ability to influence her environment, and undermine her confidence in her caregivers to maintain her safety. As a consequence, she may maintain a chronically high state of arousal instead of learning to regulate her arousal according to situational needs.

Having the television generally on was positively associated with child aggression (d = .30) and attention problems (d = .18). This finding has widespread implications given that 40% of children aged 0–3 in the U.S. live in households where the television is always or almost always on (Rideout, Vandewater and Wartella, 2003). Associations between television and aggression and attention in our sample did not appear to be mediated by maternal warmth or the provision of learning materials. It is unclear whether the ill effects of having the television on are attributable to visual or auditory distraction, the content of what is being shown on television, or a combination thereof. The link to attention problems suggests that distraction might be at play. Lengthy exposure to television may socialize children to rapid changes in visual or auditory input, thus priming them for deficits in sustained attention. Moreover, television likely displaces interactions with parents or peers (Kirkorian et al., 2009) or other, more stimulating activities. For example, children whose households always have a television on are less likely than other children to read or play outside on a typical day (Rideout et al., 2003).

We did not find associations between noise and crowding and children's cognitive and behavioral outcomes. Previous studies finding such associations have generally used only a limited number of other indicators of chaos as controls, or none at all (Evans et al., 2010; Maxwell and Evans, 2000; Wachs and Camli, 1991). In addition to assessing multiple indicators of chaos simultaneously, our study had other methodological strengths. It was longitudinal, the sample was socioeconomically diverse, and the outcomes drew on multiple

informants. However, it would be premature to conclude that noise and crowding are immaterial for young children's development, especially because their effects might be strongest in the presence of the other forms of chaos held constant in our models.

A limitation of the current study is that we were unable to assess two features of television viewing in children's households: the types of programs that were typically on, and the degree to which the child actually watched those programs. Understanding the content of the programs and commercials to which children were exposed, and the degree of that exposure, might help explain why having the television generally on, but not noise in general, predicted aggression and attention problems. Other studies have found that non-educational and violent content predicts aggression and self-regulation problems in young children (Kirkorian, Wartella, and Anderson, 2008).

A second limitation is that our measure of lack of routine was thinner than those used in other studies, as PHDCN was not explicitly designed to answer the questions posed in this paper. Ideally, indicators of lack of routine would have covered irregular bedtimes and meal times, at a minimum. A richer measure of lack of routines might have produced stronger associations with child outcomes than those found here.

In sum, this study suggests that of the commonly studied indicators of household chaos, the two that were most pernicious for toddlers were having the television generally on and a lack of family routines. Many parents who keep the television generally on or lack family routines doubtlessly do so in the context of severe economic deprivation or social isolation, but those who do not might be amenable to intervention. Parents should be educated about the consequences of the home environment for their child's development, and given every opportunity to make informed decisions about their household management strategies.

References

Achenbach, T. Manual for the Child Behavior Checklist/4 – 18 and 1991 Profile. Burlington, VT: University of Vermont Department of Psychiatry; 1991.

Ackerman, BP.; Brown, ED. Physical and psychological turmoil in the home and cognitive development. In: Evans, GW.; Wachs, TD., editors. Chaos and its influence on children's development: An ecological perspective. Washington, DC: American Psychological Association; 2010. p. 35-47.

Ackerman BP, et al. Family instability and the problem behaviors of children from economically disadvantaged families. Developmental Psychology. 1999; 35:258–286. [PubMed: 9923480]

Allison, PD. Missing data. In: Millsap, RE.; Maydeu-Olivares, A., editors. The SAGE handbook of quantitative methods in psychology. Thousand Oaks, CA: Sage Publications, Inc; 2009. p. 72-89.

Blair C, Razza RA. Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. Child Development. 2007; 78:647–663. [PubMed: 17381795]

Brody GH, Flor DL. Maternal psychological functioning, family processes, and child adjustment in rural, single-parent, African American families. Developmental Psychology. 1997; 33:1000–1011. [PubMed: 9383622]

Caldwell, BM.; Bradley, RH. Home Observation for Measurement of the Environment. Little Rock: University of Arkansas; 1984.

Christakis DA, Zimmerman FJ, DiGiuseppe DL, McCarty CA. Early television exposure and subsequent attentional prolems in children. Pediatrics. 2004; 113:708–713. [PubMed: 15060216]

Coldwell J, Pike A, Dunn J. Household chaos – links with parenting and child behaviour. Journal of Child Psychology and Psychiatry. 2006; 47:1116–1122. [PubMed: 17076750]

Cooper, CE.; Osborne, CA.; Beck, AN.; McLanahan, S. Partnership Instability and Child Wellbeing During the Transition to Elementary School. Working Paper WP08-08-FF. 2008. Available at: http://crcw.princeton.edu/workingpapers/WP08-08-FF.pdf

Corapci F, Wachs TD. Does parental mood or efficacy mediate the influence of environmental chaos upon parenting behavior? Merrill-Palmer Quarterly. 2002; 48:182–201.

Deater-Deckard K, et al. Conduct problems, IQ, and household chaos: A longitudinal multi-informant study. Journal of Child Psychology and Psychiatry. 2009; 50:1301–1308. [PubMed: 19527431]

Dumas JE, et al. Home chaos: Sociodemographic, parenting, interactional, and child correlates. Journal of Clinical Child and Adolescent Psychology. 2005; 34:93–104. [PubMed: 15677284]

Dunn, LM.; Dunn, LM. Peabody Picture Vocabulary Test. 3. Bloomington, MN: Pearson Assessments; 1997.

Evans GW. Child development and the physical environment. Annual Review of Psychology. 2006; 57:423–451.

Evans GW, et al. The role of chaos in poverty and children's socioemotional adjustment. Psychological Science. 2005; 16:560–565. [PubMed: 16008790]

Evans GW, et al. Crowding and cognitive development: The mediating role of maternal responsiveness among 36-month-old children. Environment and Behavior. 2010; 42:135–148.

Evans GW, Lepore SJ. Household crowding and social support: A quasiexperimental analysis. Journal of Personality and Social Psychology. 1993; 65:308–316. [PubMed: 8366422]

Fiese BH, et al. A review of 50 years of research on naturally occurring family routines and rituals: Cause for celebration? Journal of Family Psychology. 2002; 16:381–390. [PubMed: 12561283]

Haines NM, et al. Chronic aircraft noise exposure, stress responses, mental health and cognitive performance in school children. Psychological Medicine. 2001; 31:265–277. [PubMed: 11232914]

Hart SA, Petrill SA, Deater Deckard K, Thompson LA. SES and CHAOS as environmental mediators of cognitive ability: A longitudinal genetic analysis. Intelligence. 2007; 35:233–242. [PubMed: 19319205]

Hollich G, Newman RS, Jusczyk PW. Infants' use of synchronized visual information to separate streams of speech. Child Development. 2005; 76:598–613. [PubMed: 15892781]

Kirkorian HL, Wartella E, Anderson DR. Media and young children's learning. The Future of Children. 2008; 18:39–61. [PubMed: 21338005]

Kirkorian HL, et al. The impact of background television on parent-child interaction. Child Development. 2009; 80:1350–1359. [PubMed: 19765004]

Kochanska G, Murray KT, Harlan ET. Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. Developmental Psychology. 2000; 36:220–232. [PubMed: 10749079]

Landhuis CE, Poulton R, Welch D, Hancox RJ. Does childhood television viewing lead to attention problems in adolescence? Results from a prospective longitudinal study. Pediatrics. 2007; 120:532–537. [PubMed: 17766526]

Lengua LJ, et al. Effortful control as a moderator of the relation between contextual risk factors and growth in adjustment problems. Development and Psychopathology. 2008; 20:509–528. [PubMed: 18423092]

Matheny AP Jr, Wachs TD, Ludwig JL, Phillips K. Bringing order out of chaos: Psychometric characteristics of the Confusion, Hubbub, and Order Scale. Journal of Applied Developmental Psychology. 1995; 16:429–444.

Maxwell LE, Evans GW. The effects of noise on pre-school children's pre-reading skills. Journal of Environmental Psychology. 2000; 20:91–97.

Merrell KW. An investigation of the relationship between social skills and internalizing problems in early childhood: Construct validity of the Preschool and Kindergarten Behavior Scales. Journal of Psychoeducational Assessment. 1995; 13:230–240.

Mindell JA, Meltzer LJ, Carskadon MA, Chervin RD. Developmental aspects of sleep hygiene: Findings from the 2004 National Sleep Foundation Sleep in America Poll. Sleep Medicine. 2009; 10:771–779. [PubMed: 19285450]

Miner JL, Clarke-Stewart KA. Trajectories of externalizing behavior from age 2 to age 9: Relations with gender, temperament, ethnicity, parenting, and rater. Developmental Psychology. 2008; 44:771–786. [PubMed: 18473643]

Mistry KB, Minkovitz CS, Strobino DM, Borzekowski DLG. Children's television exposure and behavioral and social outcomes at 5.5 years: Does timing of exposure matter? Pediatrics. 2007; 120:762–769. [PubMed: 17908763]

Pike A, et al. Environmental risk and young children's cognitive and behavioral development. International Journal of Behavioral Development. 2006; 30:55–66.

Raikes H, et al. Mother-child bookreading in low-income families: Correlates and outcomes during the first three years of life. Child Development. 2006; 77:924–953. [PubMed: 16942498]

Rideout, VJ.; Vandewater, EA.; Wartella, EA. Zero to Six: Electronic Media in the Lives of Infants, Toddlers, and Preschoolers. Menlo Park, CA: The Henry J. Kaiser Family Foundation; 2003.

Rothbart, MK.; Bates, JE. Temperament. In: Damon, W.; Eisenberg, N., editors. Handbook of child psychology: Vol. 3. Social, emotional, and personality development. 6. New York: Wiley; 2006. p. 99-166.

Rubin, KH.; Rose-Krasnor, L. Interpersonal problem solving and social competence in children. In: Van Hasselt, VB.; Hersen, M., editors. Handbook of social development: A lifespan perspective. New York: Plenum Press; 1992. p. 283-324.

Royston P. Multiple imputation of missing values: further update of ice, with an emphasis on interval censoring. The Stata Journal. 2007; 7:445–464.

Sampson RJ, Raudenbush SW, Earls F. Neighborhoods and violent crime: A multilevel study of collective efficacy. Science. 1997; 277:918–924. [PubMed: 9252316]

Schmidt MK, et al. The impact of background television on very young children. Child Development. 2008; 79:1137–1151. [PubMed: 18717911]

Teti DM, Gelfand DM. Behavioral competence among mothers of infants in the first year: The mediational role of maternal self-efficacy. Child Development. 1991; 62:918–929. [PubMed: 1756667]

Valiente C, Lemery-Chalfant K, Reiser M. Pathways to problem behaviors: Chaotic homes, parent and child effortful control, and parenting. Social Development. 2007; 16:249–267.

von Hippel PT. Regression with missing Ys: An improved strategy for analyzing multiply imputed data. Sociological Methodology. 2007; 37:83–117.

Wachs TD, Camli O. Do ecological or individual characteristics mediate the influence of the physical environment upon maternal behavior. Journal of Environmental Psychology. 1991; 11:249–264.

Wachs TD, Chan A. Specificity of environmental action, as seen in environmental correlates of infants' communication performance. Child Development. 1986; 57:1464–1474.

Wachs, TD.; Evans, GW. Chaos in context. In: Evans, GW.; Wachs, TD., editors. Chaos and its influence on children's development: An ecological perspective. Washington, DC: American Psychological Association; 2010. p. 3-13.

Weiss B, Dodge KA, Bates JE, Pettit GS. Some consequences of early harsh discipline: Child aggression and a maladaptive social information processing style. Child Development. 1992; 63:1321–1335. [PubMed: 1446555]

Williams, KT.; Wang, J. Technical references to the Peabody Picture Vocabulary Test. 3. Circle Pines, MN: American Guidance Service, Inc; 1997.

Wise JC, et al. The relationship among receptive and expressive vocabulary, listening comprehension, pre-reading skills, word identification skills, and reading comprehension by children with reading disabilities. Journal of Speech, Language, and Hearing Research. 2007; 50:1093–1109.

Zaslow MJ, et al. Longitudinal prediction of child outcomes from differing measures of parenting in a low-income sample. Developmental Psychology. 2006; 42:27–37. [PubMed: 16420116]

Ziol-Guest, K.; McKenna, C. Early childhood residential instability and school readiness: Evidence from the Fragile Families and Child Wellbeing Study. Working Paper 09-21-FF. 2009. Available online at: http://crcw.princeton.edu/workingpapers/WP09-21-FF.pdf

Table 1

Description of Sample

	M (SD)/%
Child age	5.0 (0.2)
Child male	53%
Mother's age	27.8 (0.3)
Income per capita	6,363.7 (216.4)
Mother married	54%
Mother < HS degree	40%
Mother HS degree	13%
Mother > HS degree	47%
Mother white	20%
Mother black	31%
Mother Hispanic	44%
Mother other race/ethnicity	5%
Family size	5.4 (0.1)

Note. Calculations are based on five multiply imputed data sets. $N = 842$.

Early Child Dev Care. Author manuscript; available in PMC 2012 October 01.

Table 2

Correlations among indicators of home chaos, controls for background characteristics, and parenting behaviors

	Chaos					Controls												Parenting	
	2.	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10.**	**11.**	**12.**	**13.**	**14.**	**15.**	**16.**	**17.**	**18.**	**19.**	**20.**
Chaos																			
1. Family instability	.13***	.02	.02	.06***	.11***	.01	−.22***	−.16***	−.24***	.05***	−.01	−.04**	−.09***	.06***	−.01	.05**	.07***	−.12***	−.05**
2. Lack of routine		.04*	.02	.03	−.08***	−.02	.03*	−.12***	.02	.15***	−.02	−.14***	−.16***	−.09***	.22***	−.02	.07***	−.07***	−.13***
3. TV generally on			.05**	.05**	−.06***	.01	.02	−.04**	−.13***	−.01	.08***	−.05**	−.01	.14***	−.11***	−.04**	.06***	−.03	−.01
4. Crowding				.32***	−.03	.00	−.06***	−.18***	−.16***	.14***	−.05***	−.11***	−.10***	.10***	−.03	.03*	.18***	−.17***	−.14***
5. Noise					−.01	.09	−.02	−.09***	−.16***	.08***	−.03	−.05	−.07***	.17***	−.10***	.01	.11***	−.09***	−.12***
Controls																			
6. Child age						−.04**	.04	−.08***	−.04*	.01***	−.06***	.04*	−.08	.01	.05***	.00	.02	−.06***	−.01
7. Child male							.02	.05***	.01	−.04**	.03*	.02	.11***	−.02	−.05***	−.04*	−.04*	−.06***	.02
8. Mother's age								.30***	.33***	−.18***	−.08***	.23***	.23***	−.11***	−.11***	.05**	−.12***	.02	.03*
9. Income per capita									.39***	−.41***	−.08***	.46***	.53***	−.17***	−.29***	.05**	−.48***	.07***	.18***
10. Mother married										−.17***	−.03*	.19***	.21***	−.40***	.18***	.08***	−.22***	.07***	.03
11. Mother < HS degree											−.32***	−.76***	−.27***	−.06***	.31***	−.10***	.26***	−.10***	−.18***
12. Mother HS degree												−.37***	.04**	.04*	−.00	.00	.07***	.03*	.01
13. Mother > HS degree													.29***	.03	−.30***	.09***	−.30***	.08***	.17***
14. Mother white														−.33***	−.44***	−.11***	−.28***	.04*	.15***
15. Mother black															−.60***	−.15***	.21***	.02	−.01
16. Mother Hispanic																−.20***	.06***	−.04**	−.11***
17. Mother other race/ethnicity																	−.08***	−.01	−.00
18. Family size																		−.04**	−.16***
Parenting behaviors																			
19. Maternal warmth																			−.05***
20. Learning materials																			

*$p < .05$;

** $p < .01$;

*** $p < .001$.

NIH-PA Author Manuscript
NIH-PA Author Manuscript

Table 3

Longitudinal associations between dimensions of household chaos and indicators of child well-being

	Receptive Vocabulary	Aggression	Anxiety/Depression	Attention Problems	Delayed Gratification	Motor Control
Family instability	0.43 (1.07)	−0.13 (0.30)	−0.39^{+} (0.20)	−0.14 (0.16)	0.01 (0.05)	−0.00 (0.04)
Lack of routine	−1.88* (0.84)	0.18 (0.19)	0.08 (0.18)	0.01 (0.12)	−0.09* (0.04)	0.01 (0.04)
Television generally on	0.90 (1.35)	1.35*** (0.34)	0.36 (0.24)	0.43* (0.18)	−0.01 (0.06)	−0.05 (0.07)
Crowding	0.25 (1.43)	0.58 (0.39)	0.28 (0.37)	0.27 (0.17)	0.02 (0.07)	−0.04 (0.05)
Noise	1.18 (1.31)	0.33 (0.46)	−0.31 (0.33)	−0.18 (0.21)	0.08 (0.08)	−0.01 (0.06)
N	837	823	823	823	833	837

Note. Table presents B (SE)s from OLS regression models. All models include the following controls: child age, child sex, maternal education, maternal age, maternal race/ethnicity, income per capita, maternal marital status, and family size.

Table 4

Addition of parenting behaviors to models of associations between household chaos and selected indicators of child well-being

	Receptive Vocabulary	Aggression	Attention Problems	Delayed Gratification
Family instability	0.66 (1.09)	−0.13 (0.30)	−0.15 (0.16)	0.02 (0.05)
Lack of routine	−1.64^{+} (0.83)	0.18 (0.19)	−0.00 (0.12)	−0.09* (0.04)
Television generally on	0.89 (1.36)	1.36*** (0.34)	0.43* (0.18)	−0.01 (0.06)
Crowding	0.63 (1.50)	0.58 (0.40)	0.25 (0.17)	0.03 (0.07)
Noise	1.49 (1.27)	0.33 (0.47)	−0.18 (0.21)	0.08 (0.09)
Maternal warmth	0.30 (0.30)	0.01 (0.08)	−0.00 (0.03)	0.02 (0.02)
Learning materials	0.76^{+} (0.37)	−0.01 (0.07)	−0.04 (0.04)	0.01 (0.02)
N	837	823	823	833

Note. Table presents B (SE)s from OLS regression models. All models include the following controls: child age, child sex, maternal education, maternal age, maternal race/ethnicity, income per capita, maternal marital status, and family size.