Published in final edited form as:
J Appl Dev Psychol. 2007 ; 28(1): 40–55. doi:10.1016/j.appdev.2006.10.001.

Contextual risk and parenting as predictors of effortful control and social competence in preschool children

Liliana J. Lengua[*], **Elizabeth Honorado**, and **Nicole R. Bush**
University of Washington, United States

Abstract

Using a short-term longitudinal design (6 months), this study examined cumulative contextual risk as a predictor of effortful control (EC) and social competence in a community sample of children (*N* = 80, ages 33–40 months at time 1). Maternal parenting was examined as a mediator of contextual risk. EC was assessed using laboratory tasks, and parenting was assessed using observational ratings. Time 1 contextual risk was negatively related to time 2 EC after controlling for time 1 EC. Mothers' limit setting and scaffolding predicted higher time 2 EC and accounted for the effect of contextual risk. Time 1 EC, contextual risk, and parenting predicted time 2 social competence, and contextual risk had an indirect effect on social competence through parenting. Results suggest that contextual risk predicts smaller relative increases in EC and that parenting accounts for this effect. Knowledge of the factors that divert or promote effortful control can provide targets for intervention to enhance effortful control abilities and better adjustment.

Keywords

Effortful control; Contextual risk; Parenting; Social competence; Preschool; Self-regulation

1. Introduction

Understanding self-regulation processes is crucial for understanding children's adjustment (Posner & Rothbart, 2000), and self-regulation is a predictor of adaptive and maladaptive functioning (Rothbart, Ahadi, & Evans, 2000). Also, self-regulation differentiates resilient vs. non-resilient responses to cumulative risk (Lengua, 2002) and poverty (Buckner, Mezzacappa, & Beardslee, 2003). Given the importance of self-regulation to children's adaptation, it is critical to understand early influences on the development of self-regulation. Understanding of the factors that abate self-regulation abilities can facilitate the identification of children at risk for adjustment problems, and knowledge of the processes that promote self-regulation provides targets for interventions aimed at improving child adjustment.

Parenting has been shown to predict self-regulation (e.g., Kochanska, Murray, & Harlan, 2000; Olson, Bates, Sandy, & Schilling, 2002). However, little is known about broader contextual influences on self-regulation. Contextual risk might divert the development of self-regulation, resulting in problems in academic, social, and emotional adjustment (e.g., Blair, 2002). This study examined cumulative contextual risk as a predictor of effortful control and social competence across six months in a community sample of preschool

[*]Corresponding author. University of Washington, Department of Psychology, Box 351525, Seattle, WA, 98195. liliana@u.washington.edu (L.J. Lengua).

children. In addition, mothers' parenting behaviors were tested as mediators of the effects of cumulative risk.

Effortful control is a central aspect of self-regulation, referring to the attentional and inhibitory control mechanisms that facilitate inhibition of a dominant response to perform a subdominant response (Rothbart et al., 2000). Effortful control demonstrates a dramatic developmental increase between the ages of 3 and 6 years (Kochanska, Murray, Jacques, Koenig, & Vandegeest, 1996) and is related to children's social competence (e.g., Kochanska et al., 1996; Rothbart, Ahadi, & Hershey, 1994). Effortful control reflects the function of the anterior attentional system, an executive system located in the areas of the midfrontal lobe (Vogt, Finch, & Olson, 1992; Posner & Rothbart, 1994). Recognition of plasticity in neural activity and structure has lead to an increased focus on the role of experiences in shaping brain development (Posner & Rothbart, 2000). Davidson, Jackson and Kalin (2000) suggest that the period from 3- to 11-years of age is marked by pronounced plasticity in the prefrontal cortex. Therefore, it is important to account for contextual and socialization factors, such as contextual risk and parenting, that might influence these developing brain regions. Consequently, examination of contextual influences on effortful control during this developmental period can shed light on processes that promote or divert its development.

Little is known about contextual influences on effortful control, although a number of contextual risk factors have been shown to predict adverse outcomes for children. For example, risk factors such as poverty (e.g., Mistry, Biesanz, Taylor, Burchinal, & Cox, 2004), low parental education (e.g., Ritsher, Warner, Johnson, & Dohrenwend, 2001), single-parent household (e.g., Compas & Williams, 1990), household density (e.g., Evans, Saegert, & Harrid, 2001), and maternal depression (e.g., Shaw, Keenan, & Vondra, 1994) each have been shown to predict children's adjustment. In addition, being a member of an ethnic or racial minority group is thought to place children at increased risk for adjustment problems, not only as a result of a greater prevalence of other sociodemographic risk factors, but also as a result of experiences of discrimination and prejudice (e.g., Farkas, 2003; Spencer, 1990). Each of these contextual factors can result in more negative or stressful experiences for children or might engender more coercive family relationships that might lead to adjustment problems. Also, many of these risk factors tend to co-occur. For example, low family income is associated with higher levels of maternal depression, greater neighborhood risk (e.g., Duncan, Brooks-Gunn, & Klebenov, 1994), household density (Evans, 2003) and a host of other risk factors.

Given the co-occurrence of many contextual risk factors, a useful way to examine contextual risk is through a cumulative risk model. Cumulative risk is a count of the presence of stable demographic, psychosocial, and environmental risk factors (e.g., poverty, low parental education, single-parent household, household density, parental history of psychopathology, neighborhood risk, etc.). The examination of the number of such risk factors reflects the assumption that children's developmental outcomes are better predicted by combinations of risk factors than by individual factors alone. Research has demonstrated that cumulative risk predicts child outcomes equally well or better than consideration of any one factor (e.g., Deater-Deckard, Dodge, Bates, & Pettit, 1998; Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987). Cumulative risk studies allow for tests of ecological models in which demographic, psychosocial, and environmental risk factors are jointly considered in predicting children's developmental outcomes (Elder & Caspi, 1988; Sampson & Laub, 1994). They also model the effect that the co-occurrence of risk factors can have, where contextual risk factors tend to be concentrated among the poor (Evans, 2003).

Studies of cumulative risk consistently show a relation between the number of risk factors present and greater cognitive, social, and behavioral problems in children (e.g., Werner & Smith, 1982; Liaw & Brooks-Gunn, 1994). In the Rochester Longitudinal Study, a cumulative risk index significantly predicted lower social–emotional competence in children better than any single risk factor alone, and the effects could not be accounted for by any particular subset of the risk factors (Sameroff et al., 1987). Similarly, chronic and cumulative adversity was related to lower competence across academic, conduct and peer domains (Masten et al., 1999). In the present study, the risk factors that compose the cumulative risk score, including poverty, single-parent status, ethnic or racial minority status, household density, major life events, and moves, reflect chronic or disruptive risk factors that might pervasively affect the child's experience. These factors might impact child behaviors directly, as a result of children's direct experience of the risk factors, or indirectly through their association with other socialization and interpersonal experiences. In this study, it was hypothesized that a greater number of contextual risk factors present would reflect greater disruption in children's lives, diverting the development of effortful control.

Previous studies have demonstrated an association between cumulative risk and self-regulation. For example, 8- to 10-year old children growing up in poverty performed less well on a delay of gratification task than children in middle-income families. Cumulative risk, that is, the presence of substandard housing, noise, crowding, family turmoil, early childhood separation, and community violence, partially accounted for this effect (Evans & English, 2002). Similarly, cumulative risk was related to poorer delay of gratification in rural, school age children (Evans, 2003). In another study, chronic strains associated with poverty, including hunger, cold, and unsafe living conditions, were assessed in 8- to 17-year-olds and were associated with lower self-regulation (Buckner et al., 2003). One study demonstrated a longitudinal association between cumulative risk and self-regulation (Hart, Atkins, & Fegley, 2003). Self-regulation was assessed using parents' ratings, and children were classified either as resilient/well-regulated (e.g., obeys, shares, laughs/smiles), as overcontrolled (e.g., shy, cries), or as undercontrolled (e.g., upset, difficult to calm, demanding, fights, disobedient, fails to share). Cumulative risk predicted transitions from the well-regulated status at age 3- to 4-years to undercontrolled status two years later. These studies provide evidence of the association between contextual risk and self-regulation, broadly defined. However, the effects of contextual risk on effortful control, in particular, have not been examined in the preschool years when effortful control is developing markedly. In addition, these studies did not examine potential mechanisms of the effects of contextual risk. In this study, mothers' parenting was examined as a mediator of the relation between cumulative risk and effortful control and was expected to partially account for the effects of contextual risk.

Contextual risk might lead to more problematic forms of parenting, which in turn might shape developing effortful control. For example, Dumka, Roosa, and Jackson (1997) found that cumulative risk was related to more inconsistent discipline, and inconsistent discipline mediated the relation between cumulative risk and children's internalizing and externalizing problems. Also, emotionally responsive, competent parenting in the presence of cumulative risk predicted resilience (Wyman et al., 1999), and positive mother–child interactions led to improvements in cognitive and social–emotional functioning over time in children exposed to cumulative risk (Seifer, Sameroff, Baldwin, & Baldwin, 1992).

There is evidence that parenting predicts developing effortful control. Measures of adaptive, sensitive, or warm parenting have been shown to predict effortful control (Eisenberg, Zhou et al., 2003) and related constructs such as ego-control (Block & Block, 1980) and impulsivity (Olson, Bates, & Bayles, 1990). Maternal responsiveness when children were 22 months old predicted the development of effortful control from 22- to 33-months

(Kochanska et al., 2000). Conversely, negative maternal interactive style (Calkins, Smith, Gill, & Johnson, 1998) and restrictiveness (Olson et al., 2002) predicted lower self-regulation. Parenting during preschool has been shown to predict later adjustment, as well (Cole, Teti, & Zahn-Waxler, 2003). Also, maternal sensitivity and cognitive stimulation, together with ratings of the home environment, predicted children's sustained attention and impulsivity, which in turn, mediated the relation between context and adjustment (NICHD Early Child Care Research Network, 2003).

Parents who are warm and responsive provide children with a sense of security and help children manage their negative affect (Davies & Cummings, 1994), which may facilitate the development of effortful control. Also, parents who use reasoning, predictable control strategies, and who encourage autonomy provide their children opportunities to develop self-regulatory abilities (Grusec & Goodnow, 1994). In addition, parental scaffolding, that is the provision of support or direction contingent on the child's need for it, is related to emotion regulation (Katz, Wilson, & Gottman, 1999) and predicts executive abilities (Landry, Miller-Loncar, Smith, & Swank, 2002). Previous studies have either combined different dimensions of parenting or have not examined multiple, specific aspects of parenting to determine the specific mechanisms by which parenting might operate (Kochanska et al., 2000). For example, Kochanska's measure of responsiveness includes a dimension of acceptance, which might impact effortful control through its mitigation of negative affect, and support of autonomy, which might improve effortful control through children's sense of agency and mastery (Kochanska et al., 2000). Thus, parenting can be expected to mediate the relation between contextual risk and effortful control, and in this study, specific forms of parenting were examined to identify mechanisms of effect.

In turn, parenting and effortful control were expected to predict children's social competence. Effortful control has been shown to relate to various aspects of social competence. For example, children higher in effortful control show greater empathy (Rothbart et al., 1994), restraint (Kochanska et al., 2000), internalization of rules (Kochanska, 1997), and more socially appropriate behavior (Eisenberg, Fabes, Guthrie, & Reiser, 2000; Eisenberg, Valiente, et al., 2003). Also, attention regulation predicts social competence (e.g., Eisenberg, Fabes, Karbon, & Murphy, 1996), and the ability to shift attention between affective stimuli is related to prosocial behavior (Wilson, 2003). Conversely, lack of sustained attention and impulsivity predicted lower social competence (NICHD Early Child Care Research Network, 2003).

Parenting has also been shown to predict children's social competence. Parental warmth and expressivity have been shown to predict better empathy and social functioning in children (Zhou et al., 2002), whereas authoritarian parenting is associated with lower sociability-competence (Chen, Dong, & Zhou, 1997). A global measure of parenting resources for children that included parental structure, warmth and cohesiveness was found to predict greater social and behavioral competence in childhood and adolescence (Masten et al., 1999). Further, mothers' parenting behaviors and mother–child relationship quality have been shown to predict children's social competence indirectly through their promotion of child self-regulation (Brody & Flor, 1998; Brody, McBride, Kim, & Brown, 2002), as is proposed in the present study.

Using a short-term longitudinal design, this study examined cumulative risk as a predictor of effortful control in preschool children. Parenting was examined as a potential mechanism of the effect of cumulative risk and was expected to partially mediate the effect of cumulative risk. In turn, cumulative risk, parenting, and effortful control were examined as predictors of social competence. Behavioral measures of effortful control and parenting were used. Cumulative risk was expected to be negatively related to changes in effortful control across

6-months and to predict lower subsequent social competence. Multiple parenting dimensions were examined to identify specific mechanisms of the effects of cumulative risk on effortful control and social competence.

2. Method

2.1. Participants

Participants in this community sample of preschool children were recruited through children's preschool, co-op, and daycare classrooms. Schools and daycares were selected for recruitment to represent a variety of sociodemographic characteristics of the Seattle, WA urban area. Teachers distributed information forms to parents. Parents were asked to indicate their interest in participating and return the form to their children's classroom. One child in the target age range (33–40 months) per family was asked to participate, and if there was more than one child in the target age range, one child was randomly selected to participate. Children with developmental disabilities and families who were not fluent in English were excluded from the study to ensure adequate comprehension of the procedures. A female primary caregiver was required to participate, and participation by a male caregiver was optional.

At time 1 the sample consisted of 103 children who were 33 to 40 months old (*M*=36.6, *SD*=2.69 mos.). Ninety-eight families returned for a second assessment approximately 6 months after the first assessment (time 2 *M* child age=42.0, *SD*=2.84 mos.). Of those families who participated in both assessments, 18 were missing data: 4 were missing data on measures of effortful control at time 1 (usually as a result of failure of children to complete 2 or more tasks); 2 were missing data on measures of effortful control at time 2; 4 were missing data on the observational measures of parenting; and 8 were missing data on the mother report of social competence at time 2. Thus, a large portion of the missing data were missing due to problems in task administration or completion, video equipment failures, or incomplete responses on questionnaire, not due to participant attrition. Eighty families had complete data at both time points, and all analyses were based on an *N* of 80. Participants missing any data at either time point were compared to those missing no data on maternal education, family income, single-parent household status, child ethnicity, and the time 1 study predictors, including scores on the PPVT, effortful control, and observational measures of parenting. There were no significant differences between participants with complete data and those missing data.

The sample of 80 families included 54% male children, 8% African American children, 10% Asian American children, 71% European American/White children, and 11% children with multiple ethnic and/or racial backgrounds. Thus, 29% of the children were identified as belonging to a racial or ethnic minority group (compared to 22% in the population from which the sample was drawn). Average family annual income was $51,000–$70,000, ranging from less than $20,000 (16%) to over $100,000 (23%). Nineteen percent of the sample met the federal poverty cutoff compared to 8% in the population from which the sample was drawn. The modal level of mothers' educational attainment was some college or university graduate; and 76% of the families consisted of two-parent households.

2.2. Procedure

Procedures at both time points were nearly identical. Mothers and children came to research offices at the university for a 2-h session. After explaining the study and procedures, mother consent and child assent were obtained. Then children were administered a test of verbal ability and the effortful control tasks described below. Simultaneously, mothers completed questionnaire measures of demographics, cumulative risk, and social competence. Following

the effortful control tasks, mothers joined their children, and parenting was observed in all mothers in 3 contexts: restricted play, unrestricted play, and an instructional task described below. Only time 1 measures of parenting were used in this study so that the predictors would temporally precede the outcomes to strengthen conclusions about direction of effects.

2.3. Measures

Descriptive statistics for the measures included in this study are presented in Table 1. Verbal ability was included as a measure of general intelligence and was controlled in all analyses given evidence that general intelligence is moderately correlated with effortful control (e.g., Krikorian & Bartok, 1998). Verbal ability was assessed at time 1 using the Peabody PictureVocabulary Test—Revised (PPVT—R, Dunn&Dunn, 1981) in which children are asked, for each of a series of items, to select from a set of four pictures the one best illustrating the meaning of an orally presented word.

2.3.1. Cumulative risk—Cumulative risk reflected the presence of 9 demographic and psychosocial risk factors including the child being an ethnic or racial minority, poverty, household density, single-parent status, adolescent parent status, number of household moves in child's lifetime, negative life events, parental depression, and history of mental health or legal problems. For continuous measures, scores that were 1.5 *SD*s above the sample mean were considered 'high risk.' This rather high cutoff was used to ensure that families were indeed experiencing a high level of risk on the risk factor, considering that the sample represented a wide range on each factor.

The mother completed demographic questions. Child minority status was coded 0 for European American/White participants and 1 for participants who were racial or ethnic minorities, which accounted for 29% of the sample. Mothers reported on total household income from all sources, and the 2002 Federal Health and Human Services income-to-needs ratio guidelines were used to determine if a family fell beneath the poverty cutoff (1=in poverty, 0=not in poverty); 19% of the sample fell beneath the poverty level. Mothers reported on the number of individuals living in the family home and the total number of rooms in the home. Household density was calculated as the number of residents divided by the number of rooms in the home. Homes were considered high in density if the score was 1.5 *SD*s above the sample mean. The cutoff was 1.3 people per room, and 8% of the sample met criteria as having high household density. Mothers reported their marital status and were assigned single-parent status if they were never married, or currently separated or divorced and not living with a partner (or live-in partner was in the home for less than 1 year). Based on these criteria, 24% of the sample consisted of single parents. Mothers reported their age at the time of the study-child's birth, and 5% of the mothers were under the age of 20 when the study-child was born. Household instability was assessed as the number of moves in the study-child's lifetime. This was considered a risk factor if the family had moved >2 times in the previous 3 years; 12% of the families had moved 3 or more times.

Psychosocial risk factors included negative life events, maternal depression, and family history of mental health or legal problems. Negative life events were assessed using mother report on the 28-item General Life Events Schedule for Children (Sandler, Ramirez, & Reynolds, 1986). Mothers reported the number of events that occurred over the previous year. In previous studies, the number of negative events correlated with higher levels of internalizing and externalizing problems (Sandler, Reynolds, Kliewer, & Ramirez, 1992; Lengua & Long, 2002). The negative life events score was considered a risk factor if a family scored at or above 1.5 *SD*s above the sample mean. The cutoff was the occurrence of 7.9 or more major events, and 11% of the sample met this criterion. Mothers reported on their own depressive symptomatology over the previous month using the 20-item Center for

Epidemiological Studies-Depression Scale (CES-D, Radloff, 1977), a widely used self-report scale designed to measure depressive symptoms in the general population. Participants indicate the presence or absence (0=no, 1=yes) of each symptom, and the items are summed for a total score, with higher scores indicating higher levels of depression. An internal consistency of .89 has been reported, and α was .92 in this sample. This measure was included in the cumulative risk count with mothers scoring >1.5 *SD*s above the sample mean being considered high risk. The cutoff was a score of 31, and 9% of the sample met this criterion. Mothers reported on their own and their partners' history of the presence of (1) mental illness, (2) depression, (3) alcohol/drug problems, (4) legal problems or arrest in their lifetime. A family history of problems score was calculated as the mean number of problems present in both mothers and fathers (possible range of 0–4). In previous research, this scale related to child social competence and adjustment problems (Greenberg et al., 1999). This measure was included in the cumulative risk count with scores >1.5 *SD*s above the mean being considered high risk. The cutoff was a score of 2.69, and 9% of the sample met this criterion.

The total cumulative risk score was the sum of the 9 risk factors. Forty-five percent of the sample reported no risk factors; 27% reported 1 risk factor; 11% reported 2 risk factors; 5% reported 3 risk factors; 3% reported 4 risk factors; 8% reported 5 risk factors; and one family reported 7 risk factors. Although the cumulative risk score was not normally distributed, the skewness (1.56) and kurtosis (1.74) were within the acceptable range. As expected, cumulative risk scores were higher for families in poverty [M=4.05, SD=1.39, compared to non-poverty families M=0.59, SD=0.71, $t(78)$=15.41, p<.001], ethnic and racial minorities [M = 2.52, SD = 1.76, compared to non-minorities M=0.76, SD=1.30, $t(78)$=5.32, p<.001], and single-parent households [M=3.13, SD=1.80, compared to two-parent households M=0.66, SD=1.00, $t(78)$=8.47, p<.001]. However, poverty, ethnicity, and single-parent status were not confounded. Although a higher percentage of racial or ethnic minority children were impoverished compared to non-minority children [37% vs. 12%, $\chi^2(1, N=80)=7.62$, p<.01], not all impoverished families were racial or ethnic minorities. Also, a higher percentage of families in poverty were single-parent households compared to two-parent households [74% vs. 13%, $\chi^2(1, N=80)=30.85$, p<.001], although some two-parent families were living in poverty. Similarly, a higher percentage of racial or ethnic minority children resided in single-parent households compared to non-minority children, but this difference was not statistically significant [37% vs. 21%, $\chi^2(1)=2.51$, *ns*].

2.3.2. Effortful control—Effortful control was assessed using 5 laboratory tasks. Four Stroop-like tasks assessed inhibitory control, that is, the ability to inhibit a prepotent response to provide the correct response. *Bear–dragon* (Kochanska et al., 1996) is a simplified version of Simon Says in which a child is required to perform actions when a bear puppet gives the directive (5 trials), but not when it is given by a dragon puppet (5 trials). Children's actions were scored as performing no movement, a wrong movement, a partial movement, or a complete movement. For bear trials, in which children were to perform the directive, children received 0 for no movement, 1 for a wrong movement, 2 for a partial movement, and 3 for a correct, complete movement. For dragon trials, in which children were *not* to perform the directive, children received 3 for no movement, 2 for a wrong movement, 1 for a partial movement, and 0 for a complete movement. Total scores were the sum of the scores on the 5 dragon trials. The average scores at time 1 and time 2 were 6.29 (SD = 6.38) and 10.46 (SD=5.96), respectively.

Day–night (Gerstadt, Hong, & Diamond, 1994) is a Stroop-like task that requires the child to say "day" when shown a picture of moon and stars and "night" when shown a picture of the sun. Children's actions were scored as 1 for correctly providing the counter-intuitive response or 0 for incorrectly providing the related response. Total scores were the proportion

of correct responses out of 16 trials. The average total scores at time 1 and time 2 were .53 (*SD*=0.34) and .66 (*SD*=0.32), respectively.

Grass–snow (Carlson & Moses, 2001) requires children to respond by pointing instead of speaking as in the day–night task. This task requires the child to point to a green card when the experimenter says "snow" and to a white card when the experimenter says "grass." Children's actions were scored as 1 for correctly pointing to the counter-intuitive color card or 0 for incorrectly pointing to the related color card. Total scores were the proportion of correct responses out of 16 trials. The average total scores at time 1 and time 2 were .36 (*SD*=.34) and .55 (*SD*=.36), respectively.

Butterfly was a task developed for this project and is similar to a "go/no go" task in which the child is required to inhibit a prepotent response by selectively attending and responding to the target stimuli while ignoring or inhibiting responses to equally salient non-target stimuli (e.g., Casey et al., 1997). A series of 20 cards (10.16 × 12.70 cm) depicting cartoon versions of a variety of animals were presented to children at a rate of 1 card every 2 s. Six of the cards depicted a butterfly. Children were instructed to say "butterfly" or to point to the card when a butterfly was depicted but to say or do nothing for any other animal depicted. Children's responses were rated as a full response, partial/late response, or no response. On butterfly trials, a full response was scored 2, partial/late response was scored 1, and no response was scored 0. On other animal trials, a full response was scored 0, partial/late response was scored 1, and no response was scored 2. Total scores were the sum of scores on all 20 trials. The average total scores at time 1 and time 2 were 21.66 (*SD*=11.41) and 27.30 (*SD*=12.85), respectively.

Reliability of scoring of the tasks was assessed by an independent rescoring of 20% of the cases. Score reliabilities for the bear–dragon, day–night, grass–snow, and butterfly tasks were assessed using the intra-class correlation coefficient (ICC), which were .99, .94, .99 and .98, respectively.

Delay of gratification was also included as a component of effortful control. Delay of gratification was assessed using a gift delay task (Kochanska et al., 1996) in which the child is told that s/he will receive a present, but that the experimenter wants to wrap it. The child is instructed to face the opposite direction and not peek while the experimenter noisily wraps the gift. Children's peeking behavior (frequency, degree, latency to peek, latency to turn around) as well as difficulty with the delay (fidgeting, sighing, tensing) were rated. Reliability of ratings of children's delay behavior was assessed by independent recoding of 20% of the cases and was assessed using the intra-class correlation. The interrater reliabilities for number, latency, degree of peeks, latency to turn around, and difficulty waiting were .98, .44, .59, .86, and .66, respectively.

Consistent with previous research on effortful control, the 5 task scores were combined to create measure of effortful control (Kochanska et al., 1996; Carlson & Moses, 2001). An overall effortful control score was computed as the mean-weighted sum of the standardized bear–dragon, day–night, grass–snow, butterfly and delay of gratification task scores (i.e., the mean of the standardized scores available multiplied by 5, the number of possible component scores). Scores were considered missing if >50% of the component scores were missing. Correlations among the component scores are presented in Table 2 and indicate good correspondence among most of the measures. Internal consistency of the effortful control measure was .72 and .66 at times 1 and 2, respectively.

2.3.3. Parenting behaviors—Parenting was assessed using three laboratory interaction tasks in which all mothers and children engaged: Restricted Play, where mothers were

directed to only allow their children to play with a certain box of toys and not touch the desirable toys in view on the shelf; Unrestricted Free Play, where children could play with any toys in the room; and a challenging Lego-Building Task, where mothers were instructed to help their children build a Lego-figure from a picture by providing verbal directions but not physical assistance (adapted from Kerig & Lindahl, 2001). Interviewers administered the instructions to the mothers before each task, left the room, and returned after 5 min. Parenting behaviors were rated separately for each task. Parenting behaviors were coded from videotapes of the mother-child interactions by nine advanced undergraduates. Coders spent 9 weeks in training to achieve reliability, and coding was completed over a 9-week period during which all coders were supervised to monitor drift and reliability. Coders were trained on a system that was adapted from two existing, well-established coding systems: the System for Coding Interactions and Family Functioning (SCIFF: Lindahl & Malik, 2000) and the Parenting Style Ratings Manual (Cowan & Cowan, 1992; adapted coding system is available from the first author upon request). Parenting behaviors of interest were selected from each coding system and, if necessary, adapted for use with our 33–40 month old sample. Some ratings scales were altered slightly to make scales unidirectional. All codes were rated on 5-point Likert scales with 1 indicating the lowest level of behavior and 5 indicating the highest level of behavior on that scale.

Mothers were rated on six dimensions. “Positive Affect” captured the frequency and level of behavioral and verbal expressions of happiness, comfort and connection in the interaction, and warmth toward the child. “Negativity” assessed the overall negative tone or level of tension expressed by the mother and included verbal and non-verbal expressions of irritation or frustration with the child that were critical, rejecting or invalidating. “Interactiveness” assessed the quantity of verbal and non-verbal engagement with the child. “Limit Setting” included mothers’ clarity, consistency, and follow through with directives when child behavior during tasks required it. Necessary limit setting included protecting child’s safety, protecting property, and parent efforts to modulate child affect or behavior. Maternal “Responsiveness” to children’s expressions of negative affect, difficulty with the task, or general needs was also rated. Effective responsiveness referred to the parent’s ability to intervene in some way when the child needed it and disengage when child was functioning independently again in a way that helped the child regulate his/her emotional state. Finally, mothers’ “Respect for Autonomy” reflected whether they allowed and encouraged a range of autonomous behaviors, giving the child room to explore his/her surroundings, assert his/her needs and desires, take credit for accomplishments, and express ideas freely without criticism.

Reliability was assessed by independent recoding of 30% of the cases. Score reliabilities were assessed using single-measure ICC coefficient. The average ICCs across all three tasks for positive affect, interactiveness, limit setting, and respect for autonomy were .74 (range=.64–.81), .73 (.69–.80), .73 (.68–.77), and .60 (.59–.61), respectively. The parent–child interactions in this laboratory setting did not evoke frequent negative emotion for either children or their mothers, so ratings that were based on the occurrence of negative emotion (negativity and responsiveness) did not represent the full range of the scale. Because of the limited range for these codes, ICCs could not be calculated for some codes at the task level. Percent agreement was used to reflect reliability at the task level. The average (and range) percent agreement across raters for maternal responsiveness across all three tasks was 67% (57%–78%). The average percent agreement across raters for maternal negativity across all three tasks was 92% (84%–97%). Aggregate scores for negativity and responsiveness were calculated as the average rating across the tasks. The distribution of these aggregate scores more fully captured the range of the scale and ICCs were calculated for these aggregate scores. The ICC for responsiveness scores averaged across the three tasks was .82, and the ICC for negativity averaged across the three tasks was .63.

One goal of this study was to examine specific aspects of parenting that predict effortful control. For the most part, the parenting dimensions were moderately correlated suggesting that they assessed related but distinct behaviors. However, in two cases the dimensions were highly correlated and were combined. Positive affect and interactiveness were correlated .75 and were only moderately correlated with all other parenting dimensions (*r*'s<.45). They were combined into a measure of maternal warmth. Responsiveness and respect for autonomy were correlated .67 and were only moderately correlated with the other dimensions (*r*'s<.50). They were combined into a dimension called scaffolding. Scaffolding refers to intervention by parents, contingent on the child's need while decreasing support or directiveness to allow child autonomy, again, contingent on the child's need (Conner & Cross, 2003), and the combination of responsiveness and respect for autonomy reflected this concept. Thus, the parenting dimensions included in analyses were maternal warmth, scaffolding, limit setting and negative affect.

2.3.4. Social competence—Child social competence was assessed using parent report on the 34-item, preschool version of the Social Skills Rating Scale (SSRS, Gresham & Elliot, 1990) that assesses cooperation (e.g., puts away toys, helps with tasks), assertion (e.g., self-confident, introduces self), responsibility (e.g., questions unfair rules, asks to use others' property), and self-control (e.g., controls temper, attends to instructions). Although there is some conceptual overlap between effortful control and the self-control subscale, the self-control subscale was retained given that it is an important component of social skills, and effortful control and self-control were measured using distinct methods. The concurrent relation of effortful control to the social competence measure was identical with or without the self-control subscale included (*r*=.12), and effortful control was not more strongly related to the self-control subscale (*r*=.11) than to cooperation (*r*=.10), assertiveness (*r*=.05), or responsibility (*r*=.23). The SSRS was standardized on a large, national sample and provides norms. An internal consistency reliability of .90 has been reported for the total social competence scale, and validity has been established based on negative correlations with CBCL measures of problem behavior and associations with academic competence (Gresham & Elliot, 1990). In this study, α for the social competence scale was .87.

3. Results

3.1. Variable intercorrelations

Correlations among the study variables are presented in Table 3. Effortful control demonstrated moderate stability across the 6 months of the study. Interestingly, effortful control at time 1 was unrelated to concurrent assessments of cumulative risk or parenting behaviors. However, time 2 effortful control was significantly negatively related to cumulative risk and positively related to maternal limit setting and scaffolding measured at time 1. In addition, cumulative risk and maternal limit setting were significantly related to child social competence. Thus, cumulative risk and parenting were plausible predictors of effortful control and social competence. Moderate correlations among the predictors indicate that attention to potential problems of multicollinearity was warranted. Values of variance inflation factor (VIF) ranged from 1.12 to 2.06, which were all within an acceptable range.

3.2. Correlations of individual risk factors with parenting, effortful control and social competence

Correlations of the individual risk factors with the other study variables were examined to assess whether particular risk factors accounted for the relations between the cumulative contextual risk score and the other variables (see Table 4). A scattered pattern of significant associations emerged, with no particular risk factor appearing to fully account for the relations of contextual risk with effortful control, parenting, or social competence. Minority

status, poverty, single-parent status, household density, negative events, and maternal depression were each related to at least one of the parenting dimensions. Although only the number of moves was significantly related to lower time 1 effortful control, number of moves along with poverty and family history of problems were related to lower time 2 effortful control, with a trend towards a significant association between single-parent status and lower time 2 effortful control. Ethnic or racial minority status, single-parent status, negative events, maternal depression, and family history of problems were significantly correlated with lower social competence.

3.3. Tests of the conceptual model

Tests of the proposed associations were conducted using multiple regression analyses. First, cumulative risk was tested as a predictor of the four parenting variables. Second, cumulative risk and parenting were tested as predictors of time 2 effortful control after controlling for time 1 effortful control. Third, cumulative risk, parenting and effortful control were tested as predictors of time 2 social competence.

3.3.1. The relation of cumulative risk to parenting—As a first step in demonstrating the potential role of parenting as a mediator of the relation between cumulative risk and effortful control and social competence, the relation of cumulative risk to parenting was tested using four multiple regressions. Child age, sex and PPVT scores were included as covariates in the first step of all analyses to make the analyses comparable to the subsequent regression analyses in which effortful control and social competence were the dependent variables. After the covariates, cumulative risk was entered in the second step of the regression. The set of covariates accounted for significant proportions of variance in all of the parenting variables. However, only scores on the PPVT were significantly related to parenting, relating to higher warmth (β=.35, p<.01), limit setting (β=.41, p<.01), and scaffolding (β=.42, p<.01), and lower negative affect (β=−.33, p<.01). Cumulative risk was significantly related to higher levels of negative affect (β=.23, p<.05) and lower limit setting (β=−.27, p<.05) and scaffolding (β=−.28, p<.05). Cumulative risk was unrelated to warmth (β=−.02, *ns*). Thus, negative affect, limit setting, and scaffolding were plausible mediators of cumulative risk.

3.3.2. Cumulative risk and parenting as predictors of effortful control—Using multiple regression, cumulative risk and parenting were tested as predictors of time 2 effortful control controlling for time 1 effortful control (see Table 5). The purpose of this analysis was to test whether cumulative risk predicted time 2 effortful control after accounting for time 1 effortful control, and to test whether parenting accounted for the relation between cumulative risk and effortful control. The first aim was to determine whether cumulative risk was related to relative changes in effortful control. Child age, sex and PPVT scores were included as covariates in the first step. Next, time 1 effortful control was entered in step 2 of the regression, followed by cumulative risk entered in step 3. The covariates and time 1 effortful control accounted for significant proportions of variance in time 2 effortful control, as did cumulative risk. Cumulative risk was significantly negatively related to relative changes in effortful control. The magnitude of the effect was modest, but this would be expected given the moderate stability of effortful control and the relatively short time span between the time 1 and time 2 assessments.

The second aim of this analysis was to test whether parenting predicted effortful control above the effect of cumulative risk and accounted for the effect of cumulative risk. The set of four parenting variables was entered in the 4th step of the regression. Maternal limit setting and scaffolding emerged as significant predictors of relative increases in effortful control. Further, the effect of cumulative risk on effortful control was reduced and became

nonsignificant, suggesting that the set of parenting variables accounted for the effect of cumulative risk. Because limit setting and scaffolding were significantly related to effortful control and were predicted by cumulative risk, they were plausible mediators of the relation between cumulative risk and effortful control. The significance of the intervening effects of limit setting and scaffolding was tested using the distribution of the products test *P* (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). The regression coefficients for the effects of cumulative risk on parenting and parenting on effortful control were converted to *z* scores, which were then multiplied to provide an estimate of the indirect effect of cumulative risk on effortful control through parenting. The intervening or indirect effect of cumulative risk on effortful control through limit setting was $P=-4.49$, and the indirect effect of cumulative risk on effortful control through scaffolding was $P=-4.05$, both significant at $p<.05$.

3.3.3. Cumulative risk, parenting and effortful control as predictors of social competence—A similar regression analysis was conducted predicting child social competence at time 2. The aim of this analysis was to determine whether cumulative risk, parenting, and effortful control would predict children's time 2 social competence. Child age, sex and PPVT scores were included as covariates in the first step so that all results would be comparable. After the covariates, the time 1 measure of effortful control was entered in step 2, followed by cumulative risk entered in step 3, and the set of parenting variables entered in step 4. The covariates and time 1 effortful control accounted for significant proportions of variance in time 2 social competence, as did cumulative risk. Cumulative risk was significantly negatively related to time 2 levels of social competence. There was a trend toward a significant proportion of variance accounted for in time 2 social competence by the set of parenting variables. However, different parenting variables emerged as significant predictors of social competence than effortful control. Maternal warmth predicted higher levels of social competence. The relation between limit setting and social competence approached the level of significance with limit setting predicting more social competence. Scaffolding was significantly negatively related to social competence, which was the opposite direction of the relation between scaffolding and effortful control. The significance of the intervening effects of parenting was tested. Although warmth, limit setting, and scaffolding were plausible mediators of the relation between cumulative risk and social competence, given their significant association with social competence, only limit setting and scaffolding were related significantly to cumulative risk. Consequently, the indirect effect of cumulative risk on social competence through warmth was not significant ($P=-0.26$, *ns*). Although the association between limit setting and social competence only approached the level of significance, the indirect effect of cumulative risk on social competence through limit setting was significant ($P=-3.43$, $p<.05$), as was the indirect effect of cumulative risk on social competence through scaffolding ($P=3.27$, $p<.05$).

Finally, time 2 effortful control was tested as a predictor of time 2 social competence after controlling for time 1 effortful control by entering time 2 effortful control in the 5th step of the regression. This tests whether relative changes in effortful control predicted subsequent social competence above the effects of cumulative risk and parenting. The effect was nonsignificant.

4. Discussion

In this study we examined the effect of cumulative risk on relative changes in effortful control in preschool children and tested whether parenting accounted for this effect. In addition, effortful control, cumulative risk, and parenting were examined as predictors of social competence. Investigation of the effects of contextual and socialization factors on effortful control is important for understanding the factors that might divert or promote the

development of effortful control. It is also potentially useful in the identification of children at risk for later adjustment problems, as effortful control has been shown to be an important predictor of adjustment. The results of this study suggest that cumulative risk is negatively related to effortful control and that this effect is accounted for by mothers' parenting.

Cumulative risk was associated with lower relative increases in effortful control. The moderate stability of effortful control and the relatively short time between assessments may have contributed to the modest observed effect size. Nonetheless, this is suggestive of an adverse effect of cumulative risk on children's developing effortful control. Growth modeling that examines the effects of cumulative risk on growth trajectories of effortful control would provide a more appropriate test of whether contextual risk diverts normative development of effortful control. However, the three assessment points needed for such analyses were not available in this study.

This finding is consistent with evidence from previous studies that have examined the relation between contextual risk and self-regulation, all of which demonstrate a negative association (e.g., Evans & English, 2002; Buckner et al., 2003). However, only one of the previous studies was longitudinal and examined the effect of contextual risk on self-regulation in the preschool years when it demonstrates marked developmental increases (Hart et al., 2003). This is an important endeavor as early effortful control may be a critical basis for children's school readiness (Blair, 2002) and social-emotional adjustment (Rothbart et al., 2000).

Although it was important to show a relation between contextual risk and changes in effortful control, as we did in this study using a cumulative risk index, an important future direction is to understand the specific mechanisms of contextual risk. Some factors that constitute the cumulative risk index, such as poverty, might affect effortful control through the quality of the home environment or learning opportunities in the home (e.g., Elardo & Bradley, 1981; Dubow & Ippolito, 1994; Duncan et al., 1994). Other factors, such as single-parent status or parental psychopathology, might impact developing effortful control through parenting (e.g., Dumka et al., 1997). The relations of the individual risk factors to parenting and effortful control hint at some of these specific associations. In the future it will be important to examine the specific effects of individual risk factors tested simultaneously and potential mechanisms of those effects.

Along these lines, this study examined mothers' parenting as a mechanism of the effect of cumulative risk. A strength of this study was the simultaneous examination of distinct dimensions of parenting to clarify the aspects of parenting that might shape effortful control. Previous studies have combined aspects of parenting that might operate through reducing child negative affect and those that might operate through children's sense of agency and mastery (Kochanska et al., 2000). Yet another potential mechanism is the provision of clear and consistent guidelines about expected behaviors. The results of this study suggest that parenting does indeed predict children's effortful control above the effect of cumulative risk and accounts for the effect of cumulative risk. In particular, clear, consistent limit setting in the presence of noncompliance and scaffolding of children's behaviors, that is, responsiveness to negative affect together with facilitation of child autonomy, predicted relative increases in effortful control. Although previous studies have shown that sensitive, warm, and responsive parenting predict the development of self-regulation (Block & Block, 1980; Olson et al., 1990; Kochanska et al., 2000; Eisenberg, Zhou, et al., 2003) these maternal behaviors were not examined independently of other aspects of parenting such as limit setting and scaffolding. In addition, variables labeled as sensitivity might share aspects of limit setting and scaffolding as assessed in this study. Future examination of specific parenting behaviors that predict effortful control is needed.

It is interesting to note that children's verbal abilities, indexed by scores on the PPVT, significantly predicted increases in effortful control. This relation is consistent with the proposition that verbal regulation of behavior is a critical component of self-control and its development (Berk, 1992; Zelazo, 1999; Carlson, Mandell, & Williams, 2004). The relation remained significant when cumulative risk was accounted, but was reduced and became nonsignificant when the parenting variables were included in the regression. It is possible that the parenting variables, particularly scaffolding, also tapped maternal promotion of verbal self-regulation in children.

Further, children's social competence was predicted by initial levels of effortful control, cumulative risk, and parenting, highlighting the importance of these factors to children's adjustment. However, relative changes in effortful control did not predict social competence above cumulative risk and parenting, suggesting that a child's effortful control plays less of a role in their social competence than their contextual and socialization experiences. Alternatively, it might suggest that the overall level of effortful control, and not necessarily the rank order change across six months, is relevant in understanding children's social competence.

Interestingly, different parenting variables emerged as predictors of social competence than effortful control. Mothers' warmth was related to higher social competence but was unrelated to effortful control. A warm, positive relationship between mother and child might socialize positive interaction skills that generalize to other social interactions. Unexpectedly, scaffolding was negatively related to social competence, even though it was positively related to effortful control. Providing children with more freedom to express themselves and behave independently might lead to more challenges with noncompliance and disagreements in social situations. However, it would be important to follow this association later into childhood. Given the positive association between scaffolding and effortful control, it is possible that the direction of the relation with social competence might reverse over time. A previous study showed scaffolding was related to more positive peer relationships in school-age children (e.g., Leve & Fagot, 1997).

Although this study points to compelling associations among cumulative risk, parenting, effortful control, and social competence, the relatively small sample size resulted in limited power to detect modest effects. Also, although a longitudinal design was used, multiple assessments across a longer developmental span would be needed to more adequately examine the effects of cumulative risk and parenting on the development of effortful control, and the role of effortful control in children's social competence. In addition, the pattern of findings might differ if participants had been recruited to be at high-risk on one or more of the risk factors. However, the sample included a wide range on all of the risk factors, and such variability is desirable for estimates of correspondence between variables.

Further, the use of cumulative risk as an index of contextual risk has both advantages and disadvantages. The advantages of a cumulative risk index is that it accounts for numerous risk factors and models their co-occurrence (Evans, 2003). The greater number of contextual risk factors likely represents greater disruption in children's lives. However, in such an approach the effects of individual risk factors are not examined, and all risk factors are given equal weight. Although we examined the correlations of individual risk factors with other study variables, the sample size was insufficient to simultaneously test multiple individual risk factors as predictors of effortful control and social competence. In the future, the relations of specific risk factors, such as poverty, parental psychopathology, family structure, the quality of the home environment, and residential instability, to developing effortful control should be tested to provide a more clear picture of the risk factors that might shape children's effortful control and social competence. In addition, the equivalence

of predictors across ethnic and racial groups should be examined. A limitation of this study was the combination of diverse ethnic and racial minority groups into an overall indicator of minority status. This was necessary given the relatively small sample size and low representation of some ethnic or racial groups. Although minority status was included as an added risk factor in this study, in the future membership in different ethnic or racial minority groups might be treated as a moderator of the effects of other risk factors. Given the disproportionate rates of poverty and disadvantage among ethnic and racial minorities, and the differing experiences of children across ethnic and racial groups, it would be important to determine whether different risk factors emerge as predictors of effortful control across ethnic and racial groups. Despite these limitations, the use of behavioral measures of effortful control and parenting, with significant prediction across methods, strengthens confidence in the findings.

Effortful control appears to have broad ranging implications for adjustment, with implications for school readiness (Blair, 2002), emotion regulation (Kochanska et al., 2000), social competence and adjustment problems (Rothbart et al., 1994). Understanding the impact of cumulative risk on effortful control is important for understanding children's adjustment. Knowledge of the factors that divert or promote effortful control can provide targets for intervention to enhance effortful control abilities and promote better adjustment. Cumulative risk was related to lower levels of effortful control and may divert developmental increases in effortful control during the preschool years. Parenting appears to account for the effect of cumulative risk on effortful control in young children and presents a potential target of intervention. In turn, effortful control, cumulative risk and parenting predicted children's social competence. Thus, children in high-risk settings may be in particular jeopardy of developing adjustment difficulties related to the risk posed in their context, the potential for diminished parenting, and the effect of a high-risk context on effortful control.

Acknowledgments

Support for this research was provided by an award from the University of Washington Center for Mind, Brain and Learning through a gift from the Talaris Research Institute and the Apex Foundation, the family foundation of Bruce and Jolene McCaw. The authors acknowledge Stephanie Carlson and Andrew Meltzoff for their assistance with this project and wish to thank the families who participated in this study.

References

Berk, LE. Children's private speech: An overview of theory and the status of research. In: Diaz, RM.; Berk, LE., editors. Private speech: From social interaction to self-regulation. Hillsdale, NJ: Erlbaum; 1992. p. 17-53.

Blair C. School readiness: Integrating cognition and emotion in a neurobiological conceptualization of children's functioning at school entry. American Psychologist. 2002; 57:111–127. [PubMed: 11899554]

Block, JH.; Block, J. The role of ego-control and ego-resiliency in the organization of behavior. In: Collins, WA., editor. Minnesota symposia on child psychology. Vol. 13. Hillsdale, NJ: Erlbaum; 1980. p. 39-101.

Brody GH, Flor DL. Maternal resources, parenting practices, and child competence in rural, single-parent African American families. Child Development. 1998; 69:803–816. [PubMed: 9680686]

Brody GH, McBride MV, Kim S, Brown AC. Longitudinal pathways to competence and psychological adjustment among African American children living in rural single-parent households. Child Development. 2002; 73:1505–1516. [PubMed: 12361315]

Buckner JC, Mezzacappa E, Beardslee WR. Characteristics of resilient youths living in poverty: The role of self-regulatory processes. Development and Psychopathology. 2003; 15:139–162. [PubMed: 12848439]

Calkins SD, Smith CL, Gill KL, Johnson MC. Maternal interactive style across contexts: Relations to emotional, behavioral, and physiological regulation during toddlerhood. Social Development. 1998; 7:350–369.

Carlson SM, Mandell DJ, Williams L. Executive function and theory of mind: Stability and prediction from ages 2 to 3. Developmental Psychology. 2004; 40:1105–1122. [PubMed: 15535760]

Carlson SM, Moses LJ. Individual differences in inhibitory control and children's theory of mind. Child Development. 2001; 72:1032–1053. [PubMed: 11480933]

Casey BJ, Trainor RJ, Orendi JL, Schubert AB, Nystrom LE, Giedd JN, et al. A developmental functional MRI study of prefrontal activation during performance on a go-no-go task. Journal of Cognitive Neuroscience. 1997; 9:835–847.

Chen X, Dong Q, Zhou H. Authoritative and authoritarian parenting practices and social and school performance in Chinese children. International Journal of Behavioral Development. 1997; 21:855–873.

Cole PM, Teti LO, Zahn-Waxler C. Mutual emotion regulation and the stability of conduct problems between preschool and early school age. Development and Psychopathology. 2003; 15:1–18. [PubMed: 12848432]

Compas BE, Williams RA. Stress, coping and adjustment in mothers and young adolescents in single- and two-parent families. American Journal of Community Psychology. 1990; 18:525–545. [PubMed: 2075890]

Conner DB, Cross DR. Longitudinal analysis of the presence, efficacy and stability of maternal scaffolding during informal problem-solving interactions. British Journal of Developmental Psychology. 2003; 21:315–334.

Cowan, PA.; Cowan, CP. Parenting style ratings: School children and their families project. Berkeley: University of California; 1992.

Davidson RJ, Jackson DC, Kalin NH. Emotion, plasticity, context, and regulation: Perspectives from affective neuroscience. Psychological Bulletin. 2000; 126:890–909. [PubMed: 11107881]

Davies PT, Cummings EM. Martial conflict and child adjustment. An emotional security hypothesis. Psychological Bulletin. 1994; 116:387–411. [PubMed: 7809306]

Deater-Deckard K, Dodge KA, Bates JE, Pettit GS. Multiple risk factors in the development of externalizing behavior problems: Group and individual differences. Development and Psychopathology. 1998; 10:469–493. [PubMed: 9741678]

Dubow EF, Ippolito MR. Effects of poverty and quality of the home environment on changes in the academic and behavioral adjustment of elementary school age children. Journal of Clinical Child Psychology. 1994; 23:401–412.

Dumka LE, Roosa MW, Jackson KM. Risk, conflict, mothers' parenting, and children's adjustment in low-income, Mexican immigrant, and Mexican American families. Journal of Marriage and the Family. 1997; 59:309–323.

Duncan GJ, Brooks-Gunn J, Klebanov PK. Economic deprivation and early childhood development. Child Development. 1994; 65:296–318. [PubMed: 7516849]

Dunn, LM.; Dunn, LM. Peabody picture vocabulary test-revised. Second edition. Circle Pines, MN: American Guidance Service; 1981.

Eisenberg N, Fabes RA, Guthrie IK, Reiser M. Dispositional emotionality and regulation: Their role in predicting quality of social functioning. Journal of Personality and Social Psychology. 2000; 78:136–157. [PubMed: 10653511]

Eisenberg N, Fabes RA, Karbon M, Murphy BC. The relations of children's dispositional prosocial behavior to emotionality, regulation, and social functioning. Child Development. 1996; 67:974–992. [PubMed: 8706539]

Eisenberg N, Valiente C, Fabes RA, Smith CL, Reiser M, Shepard SA, et al. The relations of effortful control and ego control to children's resiliency and social functioning. Developmental Psychology. 2003; 39:761–776. [PubMed: 12859128]

Eisenberg N, Zhou Q, Losoya SH, Fabes RA, Shepard SA, Murphy BC, et al. The relations of parenting, effortful control, and ego control to children's emotional expressivity. Child Development. 2003; 74:875–895. [PubMed: 12795395]

Elardo R, Bradley RH. The Home Observation for Measurement of the Environment (HOME) scale: A review of research. Developmental Review. 1981; 1:113–145.

Elder GH, Caspi A. Economic stress in lives: Developmental perspectives. Journal of Social Issues. 1988; 44:25–45.

Evans GW. A multimethodological analysis of cumulative risk and allostatic load among rural children. Developmental Psychology. 2003; 39:924–933. [PubMed: 12952404]

Evans GW, English K. The environment of poverty: Multiple stressor exposure, psychophysiological stress, and socioemotional adjustment. Child Development. 2002; 73:1238–1248. [PubMed: 12146745]

Evans GW, Saegert S, Harrid R. Residential density and psychological health among children in low-income families. Environment and Behavior. 2001; 33:165–180.

Farkas G. Racial disparities and discrimination in education: What do we know, how do we know it, and what do we need to know? Teachers College Record. 2003; 105:1119–1146.

Gerstadt CL, Hong YJ, Diamond A. The relationship between cognition and action: Performance of children 3. 5–7 years old on a Stroop-like day–night test. Cognition. 1994; 53:129–153. [PubMed: 7805351]

Greenberg MT, Lengua LJ, Coie JD, Pinderhughes EE, Bierman K, Dodge KA, et al. Predicting developmental outcomes at school entry using a multiple-risk model: Four American communities. Developmental Psychology. 1999; 35:403–417. [PubMed: 10082011]

Gresham, FM.; Elliot, SN. Social skills rating system. Circle Pines, MN: American Guidance Service; 1990.

Grusec JE, Goodnow JJ. Impact of parental discipline methods on the child's internalization of values: A reconceptualization of current points of view. Developmental Psychology. 1994; 30:4–19.

Hart D, Atkins R, Fegley S. Personality and development in childhood: A person-centered approach. Monographs of the Society for Research in Child Development. 2003; 68(1, Serial No. 272)

Katz, LF.; Wilson, B.; Gottman, JM. Meta-emotion philosophy and family adjustment: Making an emotional connection. In: Cox, MJ.; Brooks-Gunn, J., editors. Conflict and cohesion in families: Causes and consequences The advances in family research series. Mahwah, NJ: Lawrence Erlbaum Associates; 1999. p. 131-165.

Kerig, PK.; Lindahl, KM. Family observational coding systems: Resources for systemic research. Mahwah, NJ: Lawrence Erlbaum Associates; 2001.

Kochanska G. Multiple pathways to conscience for children with different temperaments: From toddlerhood to age 5. Developmental Psychology. 1997; 33:228–240. [PubMed: 9147832]

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]

Kochanska G, Murray K, Jacques T, Koenig A, Vandegeest K. Inhibitory control in young children and its role in emerging internalization. Child Development. 1996; 67:490–507. [PubMed: 8625724]

Krikorian R, Bartok J. Developmental data for the Porteus Maze Test. Child Neuropsychologist. 1998; 12:305–310.

Landry SH, Miller-Loncar CL, Smith KE, Swank PR. The role of early parenting in children's development of executive processes. Developmental Neuropsychology. 2002; 21:15–41. [PubMed: 12058834]

Lengua LJ. The contribution of emotionality and self-regulation to the understanding of children's response to multiple risk. Child Development. 2002; 73:144–161. [PubMed: 14717249]

Lengua LJ, Long AC. The role of emotionality and self-regulation in the appraisal-coping process: Tests of direct and moderating effects. Journal of Applied Developmental Psychology. 2002; 23:471–493.

Leve LD, Fagot BI. Prediction of positive peer relations from observed parent–child interactions. Social Development. 1997; 6:254–269.

Liaw F, Brooks-Gunn J. Cumulative familial risks and low birth weight children's cognitive and behavioral development. Journal of Clinical Child Psychology. 1994; 23:360–372.

Lindahl, KM.; Malik, NM. Department of Psychology. Coral Gables, FL: University of Miami; 2000. System for coding interactions and family functioning (SCIFF): A coding system for family problem discussions.

MacKinnon DP, Lockwood CM, Hoffman JM, West SG, Sheets V. A comparison of methods to test mediation and other intervening variable effects. Psychological Methods. 2002; 7:83–104. [PubMed: 11928892]

Masten AS, Hubbard JJ, Gest SD, Tellegen A, Garmezy N, Ramirez M. Competence in the context of adversity: Pathways to resilience and maladaptation from childhood to late adolescence. Development and Psychopathology. 1999; 11:143–169. [PubMed: 10208360]

Mistry RS, Biesanz JC, Taylor LC, Burchinal M, Cox MJ. Family income and its relation to preschool children's adjustment for families in the NICHD study of early child care. Developmental Psychology. 2004; 40:727–745. [PubMed: 15355162]

NICHD Early Child Care Research Network. Do children's attention processes mediate the link between predictors and school readiness? Developmental Psychology. 2003; 39:581–593. [PubMed: 12760525]

Olson SL, Bates JE, Bayles K. Early antecedents of childhood impulsivity: The role of parent–child interactions, cognitive competence, and temperament. Journal of Abnormal Child Psychology. 1990; 18:317–334. [PubMed: 2376656]

Olson SL, Bates JE, Sandy JM, Schilling EM. Early developmental precursors of impulsive and inattentive behavior: From infancy to middle childhood. Journal of Child Psychology and Psychiatry. 2002; 43:435–447. [PubMed: 12030590]

Posner, MI.; Rothbart, MK. Attentional regulation: From mechanism to culture. In: Bertelson, P.; Eelen, P., editors. International perspectives on psychological science. Vol. 1. 1994. p. 41-55.Leading themes

Posner MI, Rothbart MK. Developing mechanisms of self-regulation. Development and Psychopathology. 2000; 12:427–441. [PubMed: 11014746]

Radloff LS. The CES-D Scale: A self-report depression scale for research in the general population. Applied Psychological Measurement. 1977; 1:385–401.

Ritsher J, Warner V, Johnson JG, Dohrenwend BP. Inter-generational longitudinal study of social class and depression: A test of social causation and social selection models. British Journal of Psychiatry. 2001; 178:84–90. [PubMed: 11136220]

Rothbart MK, Ahadi SA, Evans DE. Temperament and personality: Origins and outcomes. Journal of Personality and Social Psychology. 2000; 78:122–135. [PubMed: 10653510]

Rothbart MK, Ahadi SA, Hershey KL. Temperament and social behavior in childhood. Merrill Palmer Quarterly. 1994; 40:21–39.

Sameroff AJ, Seifer R, Barocas R, Zax M, Greenspan S. Intelligence quotient scores of 4-year-old children: Social–environmental risk factors. Pediatrics. 1987; 79:343–350. [PubMed: 3822634]

Sampson RJ, Laub JH. Urban poverty and the family context of delinquency: A new look at structure and process in a classic study. Child Development. 1994; 65:523–540. [PubMed: 8013238]

Sandler, N.; Ramirez, R.; Reynolds, KD. Life stress for children of divorce, bereaved, and asthmatic children. Paper presented at the annual meeting of the American Psychological Association; Washington, D.C.. 1986 August.

Sandler IN, Reynolds KD, Kliewer W, Ramirez R. Specificity of the relation between life events and psychological symptomatology. Journal of Clinical Child Psychology. 1992; 21:240–248.

Seifer R, Sameroff AJ, Baldwin CP, Baldwin AL. Child and family factors that ameliorate risk between 4 and 13 years of age. Journal of the American Academy of Child and Adolescent Psychiatry. 1992; 31:893–903. [PubMed: 1400123]

Shaw DS, Keenan K, Vondra J. Developmental precursors of externalizing behavior: Ages 1 to 3. Developmental Psychology. 1994; 30:355–364.

Spencer MB. Development of minority children: An introduction. Child Development. 1990; 61:267–269.

Vogt BA, Finch DM, Olson CR. Overview: Functional heterogeneity in cingulate cortex: The anterior executive and posterior evaluative regions. Cerebral Cortex. 1992; 2:435–443. [PubMed: 1477524]

Werner, EE.; Smith, RS. Vulnerable but invincible: A longitudinal study of resilient children and youth. New York: McGraw-Hill; 1982.

Wilson BJ. The role of attentional processes in children's prosocial behavior with peers: Attention shifting and emotion. Development and Psychopathology. 2003; 15:313–329. [PubMed: 12931830]

Wyman PA, Cowen EL, Work WC, Hoyt-Meyers L, Magnus KB, Fagan DB. Caregiving and developmental factors differentiating young at-risk urban children showing resilient vs. stress-affected outcomes: A replication and extension. Child Development. 1999; 70:645–659. [PubMed: 10368913]

Zhou Q, Eisenberg N, Losoya SH, Fabes RA, Reiser M, Guthrie IK, et al. The relations of parental warmth and positive expressiveness to children's empathy-related responding and social functioning: A longitudinal study. Child Development. 2002; 73:893–915. [PubMed: 12038559]

Zelazo, PD. Language, levels of consciousness, and the development of intentional action. In: Zelazo, PD.; Astington, JW.; Olson, DR., editors. Developing theories of intention: Social understanding and self-control. Mahwah, NJ: Erlbaum; 1999. p. 95-117.

Table 1

Descriptive statistics for study variables

	M	*SD*	Minimum	Maximum
Child age (months)	36.67	2.70	33.00	40.00
PPVT	103.54	18.36	55.00	142.00
Time 1 predictors				
Cumulative risk	1.20	1.61	0.00	7.00
Effortful control	0.00	5.87	−10.07	12.53
Warmth	11.73	2.34	5.50	15.00
Negative affect	3.20	0.56	3.00	6.00
Limit setting	14.24	1.02	9.00	15.00
Scaffolding	12.94	1.91	7.50	15.00
Time 2 outcomes				
Effortful control	0.00	5.43	−12.92	8.48
Social competence	49.43	8.69	29.00	66.00

Table 2

Correlations among effortful control tasks at time 1 and time 2

	Bear/dragon	Day/night	Grass/snow	Butterfly	Delay
Time 1					
Bear/dragon	–	.17	.28**	.43**	.28**
Day/night		–	.27*	.28*	.31**
Grass/snow			–	.51**	.39**
Butterfly				–	.46**
Delay					–
Time 2					
Bear/dragon	–	.18	.29**	.37**	.34**
Day/night		–	.25*	.26*	.18
Grass/snow			–	.37**	.30**
Butterfly				–	.34**
Delay					–

* $p<.05$.

** $p<.01$.

Table 3

Intercorrelations among study variables

	1	2	3	4	5	6	7	8	9	10	11
	AGE	**SEX**	**PPVT**	**CR**	**EC1**	**WARM**	**N A**	**LS**	**SCF**	**EC2**	**SOC**
Time 1 predictors											
1. Child age at T1	–	.11	.00	−.03	.19	.14	.07	.04	.08	.11	.13
2. Child sex		–	.04	−.05	−.14	−.11	−.13	−.01	−.06	−.17	.04
3. PPVT			–	−.28**	.17	.20*	−.34**	.31**	.35**	.35**	.10
4. Cumulative risk				–	−.13	−.13	.21*	−.26**	−.32**	−.26**	−.28*
5. Effortful control					–	−.07	−.05	.05	−.04	.47**	.14
6. Warmth						–	−.07	−.03	.51**	.04	.10
7. Negative affect							–	−.15	−.42**	−.17	−.05
8. Limit setting								–	.08	.27**	.27**
9. Scaffolding									–	.23*	.04
Time 2 outcomes											
10. Effortful control										–	.12
11. Soc. competence											–

Note. Child sex is coded 1=female, 2=male.

* $p<.05$.

** $p<.01$.

Table 4

Relations of individual risk factors to parenting, effortful control and social competence

	Child age	Child sex	PPVT	Warmth	Negative affect	Limit setting	Scaffolding	Effortful control T1	Effortful control T2	Social competence
Risk factors										
Ethnic/racial minority	−.10	−.09	−.13	−.12	−.01	−.24*	−.39**	.00	−.10	−.22*
Poverty	.05	−.17	−.33**	−.09	.23*	−.22**	−.26**	−.10	−.20*	−.16
Single parent	.09	−.05	−.33**	−.13	.29**	−.09	−.30**	−.02	−.19	−.25*
Household density	−.02	−.21*	−.25*	−.19	.30**	−.16	−.22*	−.03	.04	−.04
Negative events	−.17	.00	−.03	−.31**	−.02	−.16	−.20*	−.04	−.04	−.27**
Adolescent parent	.02	−.07	−.18	−.05	.10	−.12	−.18	−.13	−.07	−.13
Number of moves	.05	.17	−.16	.05	−.02	−.06	−.01	−.25*	−.23*	−.03
Maternal depression	−.01	−.03	.01	−.21*	.00	−.07	−.09	.01	−.10	−.21*
Family history of problems	.01	.11	−.08	−.05	.13	−.11	−.13	−.04	−.25*	−.30**

Note. Child sex was coded 1=female, 2=male.

* $p<.05$.

** $p<.01$.

Table 5

Cumulative risk and parenting as longitudinal predictors of effortful control and social competence

	Time 2 outcomes					
	Effortful control			Social competence		
	β at entry	ΔR^2	β last step	β at entry	ΔR^2	β last step
Step 1		.20**	–		.08*	–
Child age	.15		.06	.18*		.11
Child sex[a]	−.22*		−.15	.08		.03
Child PPVT	.36**		.18†	.19*		.12
Step 2		.12**	–		.03*	–
T1 effortful control	.36**		.40**	.17*		.16
Step 3		.03*	–		.07*	–
Cumulative risk	−.18*		−.07	−.27*		−.28*
Step 4		.06†			.09†	
Warmth	–		−.08	.24*		.24*
Negative Affect	–		.04	.03		.03
Limit Setting	–		.20*	.19†		.19†
Scaffolding	–		.23*	−.23*		−.22†
Step 5					.00	
T2 effortful control			n/a	–		−.04

† $p<.10$.

* $p<.05$.

** $p<.01$.

[a] Child sex is coded 1=female, 2=male.