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Effortful Control and Adaptive Functioning of Homeless Children: Variable- and Person-focused Analyses

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Abstract

Homeless children show significant developmental delays across major domains of adaptation, yet research on protective processes that may contribute to resilient adaptation in this highly disadvantaged group of children is extremely rare. This study examined the role of effortful control for adaption in 58 homeless children, ages 5-6, during their transition to school. Effortful control skills were assessed using children's performance on four standard executive functioning tasks. Adaptive functioning was assessed by teacher report of academic competence, peer competence, and internalizing and externalizing symptoms. Variable-focused and person-focused results indicate that effortful control may be an important marker of school readiness and resilience. Controlling for child IQ, parenting quality, and socio-demographic risks, effortful control emerged as the most significant predictor of all four salient developmental domains of adaptation as well as of resilient status of homeless children. Implications of these findings are discussed for future research and design of interventions.

Keywords

homeless children; effortful control; executive functioning; adaptation; risk; resilience

Twenty years of research on homeless children and families has produced a substantial body of literature showing that homeless children living in poverty are at very high risk for delays in multiple domains of adaptive functioning, including academic, social, emotional, and behavioral problems (Buckner, 2008; Buckner, Bassuk, Weinreb, & Brooks, 1999; Haber & Toro, 2004; Masten, 1992; Masten, Miliotis, Graham-Bermann, Ramirez, & Neemann, 1993; Rafferty & Shinn, 1991). In addition to the cumulative risks associated with poverty, such as traumatic life experiences, parental psychopathology, and lack of support systems (Luthar, 1999; McLoyd, Aikens, & Burton, 2006), homeless children face specific threats to development from residential instability and broken bonds with potentially positive sources of security and opportunity (Rafferty, Shinn, & Weitzman, 2004; Rog & Buckner, 2007). However, recent studies have demonstrated that homeless children are not a homogenous group (Huntington, Buckner, & Bassuk, 2008; Obradović et al., 2009). Evidence of positive adaptation in homeless children, even at very high levels of risk, suggests that there is significant variability in the promotive and protective factors influencing the lives of these children. Understanding the processes that support successful adaptation in children exposed

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to homelessness and its attendant risks are important for preventive intervention. And yet, research on positive processes that contribute to resilient adaption in this highly disadvantaged group of children is rare. The current study was designed to fill this gap by examining how effortful control abilities relate to multiple domains of adaptive functioning in 5 and 6 year-old homeless children during their transition to school.

Adaptive Functioning in Homeless Children

Homeless children fall at the high end of the risk continuum of children living in poverty, showing significant developmental delays across the major domains of adaptation. Studies of academic success have found that a large majority of homeless children show severe academic achievement delays and perform below grade level norms (Masten et al., 1997; Rubin et al., 1996; Zima, Wells, & Freeman, 1994). Masten et al. (1993) found that a significantly higher percentage of homeless children have clinical levels of social problems when compared to national norms. Moreover, homeless children show elevated levels of externalizing and internalizing behavior problems, often above clinical thresholds (Masten et al., 1997).

Further, many studies have shown that homeless children present a unique risk group that is distinct from the larger group of children living in poverty. When compared to economically disadvantaged children living at home, homeless children show lower levels of literacy and arithmetic skills (Rubin et al., 1996; Obradović et al., 2009), are more likely to report having no close friends (Masten et al., 1997), and are at higher risk for clinical levels of psychopathology (Masten et al., 1993; Rescorla, Parker, & Stolley, 1991; Vostanis, Gratten, Cumella, & Winchester, 1997). These differences often remain after controlling for important confounds, such as race, social class, and family composition (Rubin et al., 1996).

Nevertheless, housing status has been an inconsistent predictor of adaptation (Buckner, 2008). Homeless children tend to face higher levels of adversity exposure, and housing status per se might not be the most important marker of risk. For example, Buckner et al. (1999) found that housing status predicted internalizing symptoms but not externalizing symptoms, controlling for the significant contribution of age, ethnicity, maternal distress, stressful life events, and history of abuse. However, homeless children had significantly higher levels of stressful life events and history of sexual abuse. Similarly, Masten et al. (1993) reported that housing status did not predict overall symptom levels over and above parental distress, demographic risk, and negative life events, but homeless children on average were exposed to nearly twice as many negative life events. In a recent review of studies on homeless children, Buckner (2008) argued that inconsistencies in the literature may be largely due to historical, contextual, and policy-related factors. For example, he suggests that recent studies reveal fewer differences between homeless and low-income, housed children in part due to better social policies and services currently in place for homeless families that did not exist in 1980s. More importantly, Buckner (2008) advised that additional studies examining differences between homeless and housed children may not meaningfully advance our understanding of what can improve homeless children's adaption.

While homelessness presents a marker of high cumulative risk, there are hints of considerable variation in the adaptation of homeless children, with some children showing signs of positive development (Obradović et al., 2009). However, little is known about the protective factors that may account for resilient functioning among homeless children. In one of the few studies focused on protective factors, Masten and colleagues identified closeness of the parent-child relationship and parental involvement in education as significant predictors of homeless' children school success (Masten & Sesma, 1999; Miliotis, Sesma, & Masten, 1999). More research is needed to identify other protective

processes that contribute to the variability of adaption in homeless children and to differentiate subgroups of children who do well despite adversity.

As Buckner (2008) points out, the next generation of studies on homeless children needs to have clear implications for policy and intervention program designs. One key focus of this research should be early childhood, as developmental delays appear to emerge early and persist over time. In a recent study of achievement trajectories in a large urban school district, homeless and highly mobile students showed lower initial levels of achievement than low-income classmates who were more stably housed as early as second grade, controlling for sex, ethnicity, English language proficiency, and attendance (Obradović et al., 2009). Moreover, this gap persisted over three school years, underscoring the importance of examining factors that may prevent early school failures in homeless children. School entry may present a particularly vulnerable time for homeless children, as residential instability may jeopardize the consistency of their educational experiences and interfere with the formation of new peer groups.

Effortful Control and Adaptive Functioning

Scientists examining processes that promote successful development in high-risk children have emphasized the importance of investigating systems that (a) bridge multiple levels of analyses, (b) are implicated in the salient domains of adaptation, and (c) are amenable to change (Luthar, 2006; Masten & Obradović, 2006). One system that meets all three criteria is *effortful control*, a set of executive functions aimed at the intentional, internal manipulation of one's attention and behavior. Effortful control is frequently defined as the ability to inhibit a dominant response in order to execute a subdominant response (Rothbart & Bates, 1998). It includes skills such as inhibitory control, attention shifting, and attention focusing. Together, these abilities play an important role in achieving the developmental tasks of the school years: learning, forming friendships, and following the rules of classroom and society.

Effortful control has been linked to multiple domains of adaptive functioning. Recent studies show the significant influence of attention regulation and inhibitory control on early academic competence, such as reading and math achievement in preschoolers and kindergarteners (Blair & Razza, 2007; Howse, Lange, Farran, & Boyles, 2003; Senn, Espy, & Kaufmann, 2004). Effortful control has also been linked to social competence in community samples of 8 to 12 year-olds (Lengua, 2002; 2003) and preschool children (Lengua, Honorado, & Bush, 2007). Further, a robust relation has been documented between effortful control skills and externalizing behavior problems in preschoolers (Eisenberg et al., 1997; Kochanska & Knaack, 2003; Olson, Sameroff, Kerr, Lopez, & Wellman, 2005), and this relation persists even when the high longitudinal stability and concurrent intercorrelations of both constructs are taken into account (Valiente et al., 2003; Eisenberg et al., 2004). Initial levels as well as improvements in effortful control skills have been found to predict short-term changes in externalizing and internalizing behavior problems (Eisenberg et al., 2005; Riggs, Blair, & Greenberg, 2003). Together, these studies suggest that in community samples effortful control can be a powerful correlate and predictor of adaptation across the salient developmental domains of childhood. However, most of the research on effortful control and adaptive functioning has focused on Caucasian, middle-class samples (Eisenberg, Hofer, & Vaughan, 2007).

Development of effortful control is shaped by both biological and environmental factors (Eisenberg et al., 2003; NICHD Early Child Care Research Network, 2005; Rothbart, Sheese, & Posner, 2007; Tarullo, Obradović, & Gunnar, 2009). Recent studies suggest that risk and adversity exposure significantly undermine effortful control. Economically disadvantaged 5 to 7 year-olds performed significantly worse on attention regulation and

attention shifting tasks than their more affluent age-mates (Howse et al, 2003, Mezzacappa, 2004). In a community sample of preschoolers, indices of poverty, mobility, and family problems were related to lower performance on effortful control tasks, and a cumulative index of demographic and psychosocial risks negatively predicted 6-month change in effortful control (Lengua et al., 2007). Similarly, Li-Grining (2007) reported that socio-demographic and residential risks negatively predicted effortful control in low-income preschoolers.

Given that risk and adversity exposure undermine effortful control skills, it is surprising that few studies have examined how effortful control contributes to adaptive functioning in at-risk children. In the Head Start sample, Blair and colleagues found some evidence of relation between performance on effortful control tasks and teacher report of classroom behaviors (Blair, Granger, & Razza, 2005; Blair & Peters, 2003). In another study, effortful control tasks predicted math and literacy skills in kindergarten (Blair & Razza, 2007). Although these studies provide initial evidence that effortful control is important for the adaptation of economically disadvantaged children, the researchers did not control for family sources of risk and resources. Moreover, homeless children living in an emergency shelter tend to face higher levels of adversity than low-income housed children, which may further undermine the association between effortful control and adaptation.

One published study to date has examined self-regulation in children living in extreme poverty and exposed to high adversity, including homelessness. Buckner, Mezzacappa, and Beardslee (2003) showed that self-regulation differentiated groups of children who showed resilient and maladaptive adaptation and was also a significant predictor of a continuous measure of resilience, controlling for important confounds such as negative life events, chronic strains, abuse history, IQ, self-esteem, parental monitoring, and emotional support. While this study established the importance of studying self-regulation in highly disadvantaged children, the self-regulation construct combined ratings of effortful control skills with measures of reactivity, motivation, and emotion regulation; thus, the distinct contributions of specific elements were not evident. Moreover, children's ages varied considerably from 8 to 17 years, making it difficult to assess the effects of effortful control in early childhood, especially during the transition to school.

Current Study

The current study was designed to examine the variability of functioning within the homeless children population (rather than comparing it to low-income housed children) and to identify processes that promote their positive adaptation. It aims to extend the findings of Buckner and colleagues (2003) by testing the effect of effortful control skills, as measured by laboratory tasks, on various domains of adaptation during an important developmental transition period. At age 5 to 6, children show significant developmental improvements in effortful control, just as they begin to face new challenges in the school environment. As advocated by Buckner (2008), this study incorporated both variable- and person-focused analytic approaches. The first goal was to examine the separate relations between effortful control and four salient developmental domains of adaption. The second goal was to examine whether effortful control identifies a group of children who demonstrate resilience across all four domains of adaptation, as indexed by average or better functioning. In accordance with existing literature, effortful control was expected to relate to indices of academic achievement, peer competence, and internalizing and externalizing symptoms, and to differentiate resilient from maladaptive homeless children. All analyses were tested controlling for sex and age. In addition, the unique effects of effortful control were examined over and above child IQ, parenting quality, and family socio-demographic risks, three key correlates of adaptation among both low- and high-risk samples.

Methods

Participants and Procedures

Participants for this study were recruited from one of the largest homeless shelters in the upper Midwest. Children in this shelter represent approximately 40% of all children living in homeless shelters who enroll at any point during the school year in the urban public school district in which it is located. Families with children who were scheduled to enter kindergarten or first grade in the fall of 2006 were invited to participate in the study. Due to the nature of the assessments, families who did not speak English were not eligible for the study, and five families were excluded on this basis. As the study progressed, it became evident that the current census at the shelter had more eligible boys and more first graders; thus, if a family had two or more eligible children, females and kindergartners were recruited.

The sample consisted of 58 children (20 females, 38 male). The mean age of the children was 6.09 ($SD = 0.54$ range 4.97-7.23). The sample included 81.0% African-American, 1.7% American Indian, 3.4% Anglo-American, and 13.8% mixed-ethnicity children. The ethnic composition of this sample is very similar to previous studies of homeless children living in the same city (Masten et al., 1993; 1997). About 75% of children lived with a single caregiver; 90% of primary caregivers were mothers, 7% were fathers, and 3% were grandmothers. For simplicity, from this point forward primary caregivers are referred to as parents.

Although an effort was made to schedule sessions at least two days after the family's arrival at the shelter, in order to allow them to acclimate to the new environment, one family participated in the study before their second night at the shelter. The duration of homelessness is difficult to estimate, as many families live "doubled up" with their relatives or friends prior to arriving at the shelter, while others bounce between different emergency shelters. At the time of participation, the parent-reported length of families' current shelter stay ranged from 1 to 365 days ($Mdn = 9$ days; $M = 26$; $SD = 64$). Forty-three percent of parents reported being without their own housing (rented or owned by the parent or a partner) for less than a month, 22% for one to three months, 19% for three months to one year, 14% for more than a year, and one family never had their own housing. Moreover, 46.6% of parents reported being homeless at other times in their lives. Due to the nature of homelessness, it was not feasible to determine when these families ended being homeless.

Children and parents separately participated in a 90-minute session conducted on shelter premises. Children completed a series of standardized intelligence subtests and a battery of effortful control tasks, while parents were interviewed and administered various questionnaires. In the fall of 2006, 22 of the children entered kindergarten and 36 entered the first grade. Teachers of the 54 children who attended area schools were invited to complete a questionnaire about the child's adaptive functioning, and 100% of the teachers returned the questionnaire, representing 93% of the original sample. On average, teacher completed their assessments approximately four months after the testing session was conducted at the shelter ($Range: 20-229$ days; $M = 115$, $SD = 52$).

It is difficult to ascertain participation rates accurately for studies in emergency shelters, because the families continuously move in and out. At the outset, some families move out before they learn of the study and others move before they can be scheduled to participate. Based on participation rates during the middle week of each of the three full months when assessments were conducted, approximately 90% of families with eligible children participated in the study, suggesting a highly representative sample of families residing in this emergency shelter.

Measures

Effortful Control—Children's effortful control skills were assessed using a battery of four standard laboratory tasks that were selected based on their developmental appropriateness and ability to tap different aspects of effortful control (Carlson, 2005). In the *Simon Says task* (Strommen, 1973; Kochanska, Murray, & Coy, 1997) children were instructed to imitate the experimenter's behavior during commands prefaced by the words “Simon says,” while inhibiting imitations when commands were not prefaced with “Simon says.” After practice trials, children were administered a series of 20 counterbalanced trials (10 activation “Simon says” trials and 10 inhibition trials). Two trained coders, blind to children's performance on all other effortful control tasks as well as all other family or child data, coded the degree of transgression or movement during the 10 inhibition trials. Interrater reliability for inhibitory trials was calculated based on 25% of the sample (*weighted* $\kappa = .94$). There was no variability in activation scores as all children performed well on activation trials. In the *Peg-tapping task* (Diamond & Taylor, 1996), children were instructed to tap twice with a wooden dowel when the experimenter tapped once and to tap once when the experimenter tapped twice. After practice trials, the children were presented with 16 counterbalanced test trials. Performance on the Peg-tapping task was measured by the number of correct taps on a scale from 0 to 16 which were recorded during the task. In the computerized pointing *Stroop task* (Berger, Jones, Rothbart, & Posner, 2000), children were trained first to point to a picture matching an animal sound (e.g., congruent trials: point to the picture of a cat after hearing ‘meow’), and then to point to a picture not matching the animal sound (e.g., incongruent trials: point to the dog after hearing ‘meow’). After practice trials, children were presented with a series of 16 congruent trials followed by a series of 16 incongruent trials. Performance on incongruent Stroop trials was recorded by computer software on a 0 to 16 scale. Two children performed at or below chance on congruent trials, indicating that they did not understand the task, and their incongruent trials were not analyzed. During the *Dimensional Change Card Sort task* (DCCS; Zelazo, 2006), children were taught first to play the “color game,” placing all red cards in a box with a red rabbit and all blue cards in a box with a blue boat. After they learned this rule, they were asked to play the “shape game,” placing all cards with blue or red rabbits in the box with the red rabbit and all cards with blue or red boats in the box with the blue boat, which required them to inhibit the previously established pattern of sorting by color. DCCS consisted of 6 “color game” trials before the rule switch and 6 “shape game” trials after the rule switch. Performance was scored during the task on a scale from 0 to 6, reflecting the number of correctly sorted cards during the post-switch, “shape game” trials.

The number of correct trials on the Simon Says task, Peg-tapping task, and Stroop task were transformed into percentage scores to account for any missing data due to procedural irregularities (e.g., the child was off camera during one Simon Says trial). A composite index of effortful control skills (EC) was calculated by averaging standardized scores on the four effortful control tasks. The four effortful control tasks scores satisfied Patterson and Bank's (1986) criteria by showing high internal consistency as a scale ($\alpha = .75$), high item-total correlations ($r > .70, p < .001$), and loading on a single factor with all loadings over .70.

Adaptive Functioning—Four different domains of children's adaptive functioning were assessed using the teacher form of The MacArthur Health Behavioral Questionnaire (HBQ; Armstrong, Goldstein, & The MacArthur Working Group on Outcome Assessment, 2003). All the subscale and scale reliability statistics are presented for this sample. *Academic Competence* was assessed using the HBQ Academic Functioning Scale, which is an average of two subscales ($r = .33, p < .05$): (1) the eight-item School Engagement subscale ($\alpha = .87$) and (2) the five-item Academic Competence subscale ($\alpha = .96$). *Peer Competence* was

assessed using the HBQ Peer Relations Scale, which is an average of two subscales ($r = .63$, $p < .001$): (1) the eight-item Peer Acceptance/Rejection subscale ($\alpha = .94$) and (2) the three-item Bullied by Peers subscale ($\alpha = .80$). *Internalizing Behavioral Problems* were assessed using the HBQ Internalizing Symptoms Scale, which is an average of two subscales ($r = .70$, $p < .001$): (1) the six-item Depression subscale ($\alpha = .83$) and (2) the eight-item Overanxious subscale ($\alpha = .69$). *Externalizing Behavioral Problems* were assessed using the HBQ Externalizing Symptoms Scale, which is an average of four subscales ($\alpha = .89$): (1) the nine-item Oppositional Defiant subscale ($\alpha = .92$), (2) the eleven-item Conduct Problem subscale ($\alpha = .85$), (3) the four-item Overt Hostility subscale ($\alpha = .80$), and (4) the six-item Relational Aggression subscale ($\alpha = .83$).

Homeless children were classified as resilient if they scored all of the following: (1) 3 or higher on a 5-point academic functioning scale, which corresponds to average academic competence and some school engagement, (2) 3 or higher on a 4-point peer competence scale, which corresponds to somewhat likely to be accepted and not very likely to be rejected and bullied by peers, (3) lower than the clinical threshold for the depression subscale ($< .86$) and anxiety subscale ($< .91$), and (4) lower than the clinical threshold for the oppositional defiant subscale ($< .84$) and conduct problem subscale ($< .79$). Clinical thresholds were determined by Luby and colleagues (2002), who evaluated performance of parent-reported HBQ symptoms in identifying *DSM-IV* internalizing and externalizing symptoms in referred and non-referred 4 to 8 year-olds. Clinical thresholds derived by Luby et al. (2002) were employed over the more recent Lemery-Chalfant et al. (2007) thresholds because the latter study focused on children older than the current sample and did not provide subscale level data for internalizing symptoms. However, classifications based on the two set of thresholds overlap considerably (93% for externalizing symptoms).

Risk and Resources—A *Cumulative Risk Index* was created by summing five well-established socio-demographic risk factors ($M = 1.94$; $SD = 1.10$): single parent household (74%), maternal age at first birth younger than 18 years old (37%), 3 or more siblings living with the family (33%), primary caregiver's education less than a high school degree (26%), and no current income (27%). Continuous risk factors (i.e., maternal age) were dichotomized according to meaningful cutpoint standards commonly applied in risk studies (Sameroff, Seifer, Zax, & Barocas, 1987).

Children's *General Intellectual Functioning* (IQ) was measured using the Block Design, Matrix Reasoning, and Vocabulary subtests of the Wechsler Preschool and the Primary Scale of Intelligence-Third Edition (WPPSI-III; Wechsler, 2002). The raw scores on each subtest were transformed to age adjusted scaled scores. According to WPPSI-III standardization norms, each subset produces a scaled score with a mean of 10 and a standard deviation of 3. Scaled scores on the Block Design and the Matrix Reasoning subtests were first composited to create a non-verbal measure of IQ ($r = .38$, $p < .01$), which was then composited with the Vocabulary subscale scaled score ($r = .49$, $p < .001$) to yield a measure of IQ.

Parenting Quality (PQ) was scored by research assistants who completed five behavioral ratings immediately following a 90-minute structured interview with a parent, assessing how positively and warmly the parent spoke of the child, how hostile or rejecting the parent was in describing the child, closeness of parent and child, and the overall quality of the parent-child relationship ($\alpha = .89$). These behavioral ratings were based on overall impressions of the parent's behavior and tone during the interview as well as specific reports of parenting practices, joint activities, displays of affections, school involvement, and many aspects of the child's behavior. In addition, the parent interviewer observed parent and child interactions during the short consent procedure. Parent interviewers were blind to children's

performance on EC and IQ tests. Analogous rating scales showed high internal consistency, interrater agreement, and predictive validity in a previous study of homeless children (Miliotis et al., 1999).

Data Preparation Procedures

Missing data at the level of subscale scores (i.e., HBQ, IQ) and individual indices (i.e., effortful control tasks, PQ, risk) were handled using the recommended maximum likelihood estimation procedure for missing data, specifically the expectation-maximization (EM) algorithm (Schafer & Graham, 2002). Percentage of missing data was as follows: teacher report (6.9%) except for academic competence and depression subscales (8.6%), PQ (3.4%), Simon Says task (13.8%), Peg-tapping task (1.7%), and Stroop task (6.9%). All other variables had complete data.

Data was examined for significant outliers and deviations from a normal distribution. Only one variable value fell beyond 3 *SD* from the mean (i.e., one child had a standardized externalizing symptoms score of 3.27). Since review of the scatter plots revealed that no outliers were artificially inflating the relations between predictor and outcome variables, all data were included in the analyses. Lastly, evaluation of skewness, kurtosis, and normal p-p plots revealed no gross deviation from normal distribution of outcome variables.

Results

Descriptive Statistics

Table 1 presents range, mean, and standard deviation for all variables in the study. Effortful control tasks captured considerable variability of effortful control skills in homeless children. Only 26% of children passed the Simon Says task by correctly performing at least 80% of the inhibitory trials. On other hand, 72% and 67% of children correctly completed at least 80% of trials during the Peg-tapping and Stroop tasks, respectively. In addition, 76% of children passed the DCCS task by sorting at least 5 out of 6 post-switch cards correctly. Children showed significant delays on the IQ test, with average performance on all three subsets well below WPPSI-III scale score norms. On average, children showed higher levels of school engagement than academic competence. A large majority of students (78%) were rated as having unsatisfactory academic competence (< 3.0), and 36% of students were rated as having poor academic competence, well below grade level (< 2.0). On average, children showed higher levels of internalizing symptoms than externalizing symptoms.

Variable-Focused Analyses

Bivariate Correlations—Table 2 presents the correlations among all variables included in the study. Children's performance on effortful control tasks was significantly correlated with age and sex. Older children and girls demonstrated higher levels of effortful control skills. The effortful control composite (EC) was significantly related to three domains of adaptation: academic competence, peer competence, and externalizing behavior problems. Children with higher levels of EC showed higher levels of competence and lower levels of symptoms. In addition, EC was positively related to IQ and PQ, and negatively related to socio-demographic risk. Resources and risk were also related to adaptation domains in expected directions.

Linear Regression Analyses—Four separate hierarchical regression analyses were conducted to examine the association between EC and adaptive functioning (see Table 3). Age and sex were controlled in step 1. The effect of EC on adaptation domains was examined in step 2. Finally, the significance of EC effect over and above IQ, PQ, and the cumulative risk index was tested in step 3 by introducing the controls variables into the

model. Controlling for age and sex, EC significantly predicted teacher report of all four domains of adaptive functioning. EC uniquely explained 24% of variance in academic competence, 14% of variance in peer competence, 11% of variance in internalizing symptoms, and 33% of variance in externalizing symptoms. Moreover, EC remained a significant predictor of all four domains after controlling for the contribution of IQ, PQ, and risk. IQ also significantly predicted academic competence and internalizing symptoms and marginally predicted peer competence and externalizing symptoms. Children with lower IQ demonstrated lower competence and higher levels of symptoms. PQ was marginally related to internalizing symptoms, with higher parenting quality related to more symptoms. Risk did not predict adaptation over and above other variables in the model. In the final step, IQ, PQ, and risk explained an additional 14% of variance in academic competence, 7% of variance in peer competence, 10% of variance in internalizing symptoms, and 7% of variance in externalizing symptoms.

Person-Focused Analyses

Resilient Group Compared to Maladaptive Group—Based on the thresholds described in the methods section, 36% of children showed maladaptive levels of academic functioning, whereas 29% showed maladaptive levels of peer competence. In terms of psychopathology, 19% and 24% of children showed clinical levels of internalizing and externalizing symptoms, respectively, with 9% having comorbid symptoms. Specifically, 16% and 14% of children showed clinical levels of depression and anxiety symptoms, respectively, whereas 10% and 22% of children showed clinical levels of conduct problems and oppositional defiant disorder, respectively. In sum, 34 children (59%) showed maladaptive adaptation in at least one domain, with 36% showing maladaptation in more than one domain. In contrast, 24 children (41%) demonstrated average levels of academic functioning and peer competence and had no clinical levels of psychopathology, and thus were identified as resilient. Table 4 presents means and standard deviations for resilient and non-resilient children across four domains that were used as defining criteria, as well as for EC, IQ, PQ and risk variables. As expected, resilient children showed higher levels of competence and lower levels of psychopathology. Although the two groups did not significantly differ in socio-demographic risk or PQ, resilient children also showed higher levels of IQ and EC.

Logistic Regression Analysis—Logistic multiple regression analysis was conducted to identify factors that distinguish resilient homeless children from non-resilient homeless children as defined by the criteria described in the methods section. The same variables that were used in linear regression analyses to predict continuous indices of adaptation domains were used in logistic regression to predict categorical measure of resilience. Odds ratios and confidence intervals are listed in Table 5. Age and EC emerged as the only significant predictors of resilience. With each increase of 1 *SD* in EC skills in this sample of children who were homeless, children were 5.4 times more likely to be identified as resilient.

Discussion

This study identifies effortful control skills as an important potential indicator of adaptation and school readiness among children who are homeless. Performance on effortful control tasks was significantly related to school adjustment across four of the most salient childhood domains of adaptation, as judged by the teacher, an independent observer of the child's functioning. Children's effortful control emerged as a unique predictor of early academic success, which can have long lasting effects on future adaptation (Masten et al., 2005). Interestingly, even though parenting quality was significantly related to academic competence, it did not emerge as a significant predictor children's academic functioning

once the effect of effortful control was accounted for. Moreover, effortful control in this sample of homeless children showed a unique relation to academic achievement that was independent of general intellectual abilities, despite the significant correlation between effortful control and IQ.

Effortful control also predicted peer competence, internalizing symptoms and externalizing symptoms independent of intelligence. In a school setting, the ability to focus attention on relevant stimuli and inhibit unconstructive behaviors, together with problem-solving and verbal skills, may be particularly relevant for homeless children's early experience with peers and their rule-abiding conduct. Homeless children with lower effortful control and lower cognitive skills seem to be at greater risk for social, emotional, and behavior problems within the school context than homeless children who demonstrate high levels of effortful control and intelligence.

Children's effortful control performance explained considerable variability in adaptive functioning. Although these effects are consistent with the handful of studies conducted with economically disadvantaged groups (Blair et al., 2005; Howse et al., 2003), the magnitude of these effects is larger than previously found and is evident across academic, social, and behavioral indices of adaptation in the same population. Person-focused analysis also revealed that the level of effortful control skills differentiated children who were resilient across *all* four domains by demonstrating adequate competence and lack of considerable psychopathology from those who showed major delays or problems in at least one domain of functioning. Effortful control emerged as the only significant predictor of resilient status controlling for the two most established protective factors in the resilience literature: IQ and parenting quality (Masten & Obradović, 2006). Thus, it appears that effortful control plays an important role in the adaptation of homeless children, whose chaotic, stressful, and unstable lives place them at greater risk for developmental delays than other economically disadvantaged children. Effortful control may represent a good marker of how homeless children are doing in terms of overall developmental expectations that society holds for children entering primary school and may provide an ecologically valid indication of children's capacity for functioning in the structured school setting.

Even though homeless children occupy the high end of the socio-demographic risk continuum, the cumulative risk index was negatively related to effortful control skills. Moreover, homeless children in this study demonstrated lower levels of effortful control than children from predominantly middle-class samples, performing worse than age-mates, or at the level of younger children, on tasks for which comparison could be made with other studies. The percentage of 5 to 6 year-old homeless children who passed DCCS in this study was equivalent to the percentage of older 4 year-olds from a primarily middle-class sample that passed the same task in a different study (Carlson, 2005). Similarly, while less than a third of 5- to 6-year-old homeless children in this study passed the Simon Says task, nearly half of middle-class 5-year-olds passed the same task in a different study (Carlson, 2005). Thus, it will be important to further examine which aspects of homeless children's lives tend to undermine development of effortful control skills.

Similarly, future studies should identify specific processes in the lives of homeless children that may promote development of effortful control, a process influenced by various environmental factors in normative populations. One such factor may be parenting quality. The current study indicates that parenting quality was related to all four effortful control tasks. This finding is consistent with a recent study showing that higher levels of parental limit setting and scaffolding predicted an increase in effortful control in a community sample of preschoolers and mediated the effect of cumulative risk on effortful control (Lengua et al., 2007). However, another recent study found that mother-child connectedness

did not predict effortful control over and above indices of risk in low-income preschoolers (Li-Grining, 2007), and more research is needed to identify which particular aspects of parenting may influence the development of effortful control in at-risk children.

Finally, this study demonstrated that effortful control skills can be measured in a highly disadvantaged population of homeless children in an emergency shelter using a battery of standard behavioral tasks developed primarily with mainstream, middle-class samples. All effortful control tasks were positively associated with age, supporting the notion that effortful control abilities show age-related improvements in 5 to 6 year-olds (Carlson, 2005; Greenberg, Riggs, & Blair, 2006). Moreover, effortful control tasks were positively related to standardized measures of children's IQ, providing additional validity given that effortful control skills are also important for good performance on the IQ test. Valid measurement of effortful control in homeless children is an important prerequisite for future studies of effortful control training and interventions.

Implications

Identifying protective processes that contribute to variability of adaptation in homeless children is a crucial step toward designing successful prevention and intervention programs (Buckner, 2008). This study indicates that laboratory measures of children's effortful control skills can be used as early markers of homeless children's adaptive functioning during the transition to school. Since effortful control has also been found to promote academic gains (Howse et al., 2003), it may be an important predictor of future academic trajectories, particularly for homeless children who show very early substantial achievement delays (Obradović et al., 2009; Rubin et al., 1996; Zima et al., 1994).

Moreover, the current findings have important implications for fostering resilience in homeless children, as recent studies demonstrate considerable plasticity of effortful control in response to various interventions. Effortful control skills in community samples have been improved with training programs and specialized classroom curricula. Children enrolled in a preschool program with curriculum specifically designed to improve cognitive control performed significantly better on effortful control tasks than children exposed to a literacy-based curriculum (Diamond, Barnett, Thomas, & Munro, 2007). In addition, participation in a training program designed to enhance effortful control skills in 4 and 6 year-olds was associated with improved performance on intelligence tests and more mature brain activation during subsequent performance on an effortful control task (Rueda, Rothbart, McCandliss, Saccomanno, & Posner, 2005). Further, the effect of a preventive intervention known as Promoting Alternative Thinking Strategies on levels of externalizing and internalizing symptoms at a 1-year follow-up has been linked to improved inhibitory control (Riggs, Greenberg, Kusche, & Pentz, 2006). The consequences of such training interventions could be far-reaching, due to the significant effects that effortful control appears to have on early cognitive and socio-emotional development. Homeless children, who are at greater risk for developmental delays and problems than other economically disadvantaged children, may particularly benefit from programs designed to foster better effortful control, as low levels of effortful control skills have been shown to undermine their successful achievement of core age-salient developmental tasks.

Limitations

Many challenges surround the study of homeless children living in emergency shelter. First, this study is based on a modest sample of 58 children. The lack of power due to the small sample size needs to be considered when interpreting the results. Nonetheless, the large effect sizes underscore the possible significance of the results, while marginal findings may be informative to future, larger studies. Second, while about 90% of eligible children from

the largest family homeless shelter in the area participated in this study, it is difficult to know how representative this sample is of the larger homeless population, particularly in rural areas. Third, the assessments were conducted in homeless shelter facilities, which were adequately transformed to meet the needs of assessment procedures (i.e., children were tested in a library at the end of a quiet hallway). However, the level of noise and disruption outside the assessment space was slightly higher than in a regular research lab. On the negative side this set-up may have contributed to eliciting lower levels of effortful control, but on the positive side it also probably increased the ecological validity of the measure. Fourth, although the strength of this study incorporates many assessment methods and informants, the measure of parenting quality is based solely on the interviewer's clinical judgment of the parent's relationship with the child based on information provided by the parent and observations of their interaction incidental to the consenting process. Future studies of homeless children should incorporate systematic observational measures of parent-child interactions. Fifth, clinical thresholds are only approximations of clinical symptom level, as they are based on studies using parent report. Sixth, the measures of effortful control may reflect concurrent instability and stress rather than children's absolute level of skills. While this distinction may not be relevant for children exposed to chronic adversity, future longitudinal studies need to examine how effortful control waxes and wanes with exposure to adversity. Finally, the correlational nature of this study prevents researchers from drawing causal conclusions regarding associations between effortful control and adaptation. It is quite possible that these children had developmental problems before they began school, along with lower effortful control. However, given the significance of effortful control skills for salient domains of adaptation as well as its plasticity in response to simple training procedures, effortful control may present a better target for intervention efforts than specific competence domains.

Conclusions

The current showed that effortful control skills may promote resilience processes in homeless children during their transition to school, as performance of effortful control tasks predicted achievement of early childhood salient developmental tasks over and above other important risk and protective factors. With recent studies demonstrating plasticity of effortful control skills in community samples, it is imperative to investigate the malleability of these skills in homeless children. The transition to the school environment provides an important window of opportunity for preventing early achievement delays and behavioral problems in homeless children. It also represents a time when effortful control skills develop rapidly due to biological maturational processes. By encouraging healthy development of effortful control, programs may help homeless children engage in school, learn basic reading and math skills, form friendships, and inhibit aggressive behavior. The consequences of such training could be substantial, but more research will be needed, including randomized experiments with longitudinal follow-ups, in order to rigorously test the possibilities of strategic intervention to promote success in school through the improvement of effortful control skills.

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Table 1

Descriptive Statistics

	Min	Max	M	SD
Simon says task	0.00	100.00	42.99	36.50
Peg-tapping task	6.25	100.00	80.29	24.53
Stroop task	25.00	100.00	83.74	16.75
DCCS task	0.00	6.00	4.62	2.46
IQ – BD subtest	2.00	12.00	5.97	2.38
IQ – MR subtest	3.00	16.00	7.86	2.24
IQ – V subtest	3.00	14.00	7.83	1.96
Parenting Quality	2.00	5.00	4.04	0.84
Cumulative Risk Index	0.00	5.00	1.95	1.10
Academic Functioning	1.63	4.60	3.20	0.66
School Engagement	2.25	5.00	4.16	0.74
Academic Competence	1.00	4.20	2.24	0.88
Peer Competence	1.38	4.00	3.28	0.63
Peer Acceptance/Rejection	1.13	4.00	3.07	0.77
Bullied by Peers (reversed)	1.00	4.00	3.49	0.63
Internalizing Symptoms	0.00	1.49	0.52	0.37
Depression	0.00	1.83	0.50	0.45
Anxiety	0.00	1.25	0.53	0.35
Externalizing Symptoms	0.00	1.49	0.35	0.35
Oppositional Defiant	0.00	1.78	0.44	0.47
Relational Aggression	0.00	1.17	0.29	0.33
Conduct Problems	0.00	1.50	0.30	0.32
Overt Hostility	0.00	2.00	0.39	0.46

Notes. $N = 58$; BD: Block design; DCCS: Dimensional Change Card Sort; MR: Matrix Reasoning; V: Vocabulary.

Bivariate Correlations

Table 2

	1	2	3	4	5	6	7	8	9	10	11	12	13
	Age	Sex	SS	PEG	Stroop	DCCS	EC	IQ	PQ	Risk	ACA	PEER	INT
1	Age	----											
2	Sex	----											
3	SS	.54 ***	----										
4	PEG	.39 **	.46 ***	----									
5	Stroop	.34 **	.52 ***	.38 **	----								
6	DCCS	.42 ***	.37 **	.39 **	.47 ***	----							
7	EC	.56 ***	.78 ***	.74 ***	.78 ***	.74 ***	----						
8	IQ	.40 **	.32 *	.33 *	.51 ***	.55 ***	.56 ***	----					
9	PQ	.26 *	.42 **	.33 *	.38 **	.27 *	.46 ***	.40 **	----				
10	Risk	-.26 †	-.18	-.23 †	-.29 *	-.18	-.29 *	-.31 *	-.23 †	----			
11	ACA	.08	.24 †	.26 *	.40 ***	.40 ***	.43 ***	.42 ***	.40 ***	-.29 *	----		
12	PEER	.02	.11	.26 *	.34 **	.25 †	.32 *	.30 *	.16	.06	.32 *	----	
13	MT	.16	-.09	-.08	-.16	-.15	-.16	-.21	.09	.01	-.29 *	-.19	----
14	EXT	-.06	-.28 *	-.37 **	-.46 ***	-.34 **	-.48 ***	-.36 **	-.18	.26 *	-.47 ***	-.44 ***	.47 ***

Notes.

N = 58; ACA: Academic Competence; DCCS: Dimensional Change Card Sort; EC: Effortful Control; EXT: Externalizing Behaviors; INT: Internalizing Behaviors; PEER: Peer Competence; PEG: Peg-tapping task; PQ: Parenting Quality; Risk: Cumulative Risk Index SS: Simon Says task.

† $p < .10$;

* $p < .05$;

** $p < .01$;

*** $p < .001$;

Table 3

Linear Regressions: Predictors of Adaptive Functioning in Homeless Children

	Academic			Peer			Internalizing			Externalizing		
	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2
<i>Step 1</i>		.01				.00		.03				.00
Age	.08		.02		.16				-.06			
Sex	.00		.04		.04				.02			
<i>Step 2</i>		.24***		.14**		.11*		.33***				
Age	-.26†		-.24		.39*		.34*					
Sex	-.16		-.08		.15		.21†					
EC	.62***		.47**		-.41*		-.73***					
<i>Step 3</i>		.14*		.07		.10†		.07				
Age	-.34*		-.26†		.44**		.40**					
Sex	-.26*		-.15		.22		.27*					
EC	.38*		.40*		-.38*		-.63***					
IQ	.32*		.29†		-.36*		-.26†					
PQ	.20		.01		.24†		.09					
Risk	-.13		.19		-.03		.14					
Adjusted R^2		.32***		.12*		.15*		.33***				
Total R^2		.39***		.21*		.24*		.40***				

Notes.

$N = 58$; ACA: Academic Competence; EC: Effortful Control; EXT: Externalizing Behaviors; INT: Internalizing Behaviors; PEER: Peer Competence; PQ: Parenting Quality; Risk: Cumulative Risk Index.

† $p < .10$;

* $p < .05$;

** $p < .01$;

*** $p < .001$;

Table 4

Differences Between Resilient and Non-resilient Homeless Children

	Resilient N = 24		Non-resilient N = 34		F-test
	M	SD	M	SD	
ACA	3.68	0.43	2.86	0.58	34.84 ***
PEER	3.69	0.21	2.99	0.67	24.71 ***
INT	0.30	0.18	0.67	0.39	18.27 ***
EXT	0.12	0.14	0.52	0.36	26.74 ***
EC	0.46	0.60	-0.33	1.10	10.06 **
IQ	7.93	1.45	6.98	1.72	4.81 *
PQ	4.24	0.77	3.90	0.87	2.37
Risk	1.83	0.96	2.03	1.19	0.44

Notes.

N = 58; ACA: Academic Competence; EC: Effortful Control; EXT: Externalizing Behaviors; INT: Internalizing Behaviors; PEER: Peer Competence; PQ: Parenting Quality; Risk: Cumulative Risk Index.

* $p < .05$;

** $p < .01$;

*** $p < .001$;

Table 5

Logistic Regression: Predictors of Resilience in Homeless Children

	Exp(B)	95% CI
Age	.12 *	(.02, .65)
Sex	1.85	(.42, 8.24)
EC	5.40 **	(1.68, 17.35)
IQ	1.85	(.74, 4.58)
PQ	.90	(.43, 1.87)
Risk	1.02	(.52, 2.00)

*Notes.**N* = 58; EC: Effortful Control; PQ: Parenting Quality; Risk: Cumulative Risk Index.*
p < .05;**
p < .01;