Effortful Control, Attention, and Aggressive Behavior in Preschoolers at Risk for Conduct Problems

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INTRODUCTION

Aggressive behavior in young children is multiply determined. Individual, family, and contextual factors have been implicated in the development of aggression. Children who have problems inhibiting behavior are at elevated risk for the development of aggressive behavior, as are children who are inattentive and impulsive.[1] Studies of the ability to voluntarily inhibit behavior, or Effortful Control (EC), have been carried out with normally developing low-risk children. In these studies, EC has been reliably measured with behavioral tasks and yields three distinct subcomponents: motor control, inhibition in response to a signal, and delay.[1] The relations among EC, attention, and the development of aggressive behavior remain poorly understood.

The present study assessed EC, attention, and aggressive behavior in young children at risk for the development of conduct problems. Study aims were to (1) evaluate the psychometric properties of the EC measure in a high-risk sample, and (2) examine the relations among the three components of EC, attention, and aggressive behavior. We hypothesized that of the three EC components, inhibition would be most strongly related to parent-reported aggression and that attention and inhibition would make independent contributions to the prediction of aggressive behavior.

METHOD

Participants. Participants were 37 of 99 children participating in a larger prevention trial. Inclusion criteria for the larger trial required that children be the younger siblings of youth adjudicated through the New York City Family Court. The vast majority of children were from low-income families. The subsample in the current study was above the age of 4 years at the assessment phase of interest and had com-

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TABLE 1. Descriptive statistics for EC, Attention, and Aggression scores

Variables	Total	Males	Females	Younger (4-5)	Older (6-7)
EC-Motor	–0.03 (0.89)	0.06 (0.96)	–0.13 (0.82)	–0.31 (0.85)	0.22 (0.88))
EC-Inhibition	0.00 (0.75)	–0.21 (0.67)	0.21(0.75)	–0.41 (0.83)	0.38 (0.30)
EC-Delay	0.00 (0.85)	–0.05 (0.93)	0.05 (0.80)	–0.03 (0.94)	0.03 (0.78)
K-CPT-Inattention	12.6 (10.2)	16.8 (11.9)	8.2 (5.6)	13.0 (12.8)	12.3 (7.3)
K-CPT-Impulsivity	48.1 (24.5)	47.1 (23.6)	49.3 (26.1)	56.2 (28.4)	40.5 (17.7)
CBCL-Aggression *t* score	54.1 (06.2)	53.5 (5.6)	55.8 (7.0)	54.6 (6.7)	54.7 (5.8)

Note: Values are means and standard deviations, in parentheses.

plete EC, attention, and aggression data. The sample included 19 males and 18 females, with a mean age of 71.8 months (SD = 8.9, range = 53–90). Twenty-seven were African-American and 10 were Latino.

Effortful Control. The Effortful Control Battery consists of a series of nine tasks requiring the child to control, inhibit, and delay responses (See TABLE 2 for examples.)[3] Scores were standardized and averaged across tasks and yielded Motor Control, Inhibition, and Delay subscales.

Attention. The Continuous Performance Test–Kiddie Version (K-CPT) is a computerized test that requires children to inhibit a prepotent response by pressing a space bar only at the appearance of target pictures.[4] Children received approximately 200 trials over 7 minutes. Percent errors of omission reflect inattention, and percent errors of commission reflect impulsivity.

Aggression. Aggression was assessed with the aggression subscale of the parent report version of the Child Behavior Checklist (CBCL) (e.g., fights, argues, teases, and bullies).[5] Raw scores were transformed to *t* scores based on age and gender-based norms.

RESULTS

TABLE 1 presents descriptive statistics for all variables: three subscales of EC, two measures of K-CPT attention, and aggression. Males showed greater inattention than females, $t(35) = 2.77$, $P < 0.05$, and older children showed greater EC Inhibition than younger children, $t(35) = 3.89$, $P < 0.01$.

The overall construct of EC and two of the three subscales (Motor Control and inhibition) yielded moderate to high internal consistencies. The internal consistency of the Delay subscale was low relative to the other scales and compared to findings from previous studies with low-risk children (TABLE 2).

Zero-order correlations among all variables showed that both the EC Inhibition and Motor Control subscales were negatively correlated with K-CPT impulsivity ($r = -0.41$ and -52, respectively; $P < 0.001$), but were unrelated to K-CPT inattention. EC inhibition was significantly negatively correlated with aggression ($r = -0.37$, $P < 0.01$). Of the two attention measures, only K-CPT impulsivity was marginally positively associated with aggression ($r = 0.25$, $P < 0.07$).

TABLE 2. Reliability statistics for subscales of effortful control

Subscale	β or *r*	Tasks from the EC Battery
Motor Control	*r* = .65	Walking a line slowly
		Tracing stars and circles slowly
Inhibition	β = .78	Simon Says
		Whispering on demand
		Taking turns while building a block tower
		Matching game with distracters
Delay	β = .38	Delay eating food
		Delay touching a toy
		Delay touching a wrapped present
Total Scale	β = .77	

Next, in a hierarchical multiple regression, age was entered in the first step and K-CPT impulsivity and EC Inhibition in the second step (stepwise forward method). Only EC Inhibition accounted for significant variance in aggression *t* scores*: r2* = .14, *Fch* = 5.85, *P* <0.05, and β = –0.48.

DISCUSSION

The overall psychometric properties of the EC battery were adequate when applied to this high-risk sample. There was strong internal consistency for the Total scale and for the Motor Control and Inhibition subscales of EC, although internal consistency was modest for the Delay subscale. The Inhibition and Motor Control subscales were negatively correlated with K-CPT impulsivity, but not with K-CPT inattention. EC Inhibition was significantly negatively associated with aggression.

The modest internal consistency for the Delay subscale might reflect less consolidation of this capacity in early school age and might account for low correlations between Delay and aggression. The fact that EC (Inhibition and Motor Control) was associated with K-CPT impulsivity but not K-CPT inattention suggests that these measures are overlapping and may be tapping into a similar construct of inhibition. This construct, and not inattention per se, might be related to parent-reported aggressive behavior.

Despite associations between EC Inhibition and K-CPT impulsivity, only EC Inhibition accounted for significant variance in aggression scores. Therefore, children who are aggressive may have specific deficits in the ability to *inhibit* behavior rather than in attending effectively to their environment. This finding requires replication with larger samples. If the finding is replicated, then intervention programs for children at risk for conduct problems might increase effectiveness by focusing on the promotion of inhibitory skills.

In conclusion, although limited by a small sample size, this study of children exposed to multiple risk factors for conduct problems provides suggestive evidence

of the multifaceted nature of EC and its distinct associations with aggressive behavior.

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