Children’s Temperamental Effortful Control and the Development of Working Memory in Preschool: The Moderating Role of Parenting

Miriam M. Martinez, M.A., Jennifer Mize Nelson, Ph.D., Tiffany D. Sheffield, M.A., Caron A. C. Clark, Ph.D., Gustavo Carlo, Ph.D., and Kimberly Andrews Espy, Ph.D.
Office of Research and Department of Psychology, University of Nebraska-Lincoln

INTRODUCTION
The development of working memory has been associated with important academic outcomes, including reading comprehension, math abilities, and overall problems solving (Swanson et al., 2008).

Despite the recognized influence of parenting on different aspect of early child development, limited research has examined the influence of parenting behaviors on the development of working memory (Bernier, et al., 2010).

Scholars increasingly recognize that parenting and child temperament interact in complex ways leading to different child outcomes (e.g., Kochanska, et al., 2007). Parenting may interact with child temperament in shaping the early development of working memory.

PURPOSE
The purpose of the present study was to examine the moderating role of parenting practices (i.e., nurturance, inconsistenc y, follow through, and organization) in the association between temperamental effortful control at age 3 years, 9 months and children’s working memory at 5 years, 3 months.

METHOD
Participants were 261 dyads of typically developing children and their mothers (56.6% girls, 26.7% ethnicity minority) from two Midwestern sites.

Each dyad participated in two lab visits when the child was 3 years, 9 months (T1), and 5 years, 3 months (T2).

Parenting Dimensions Inventory – Short Version (PDES; Power, 2002).

Mothers provided ratings of their parenting at T1. Subscales include: Nurturance, Inconsistency, Follow Through, and Organization.

Child Behavior Questionnaire (CBQ; Rothbart et al., 2001). Mothers rated their children’s temperament-based behaviors at T1. The effortful control subscale served as our measure of temperamental effortful control.

Brief Intellectual Ability (BIA; Woodcock et al., 2001). Children were administered the BIA at T1 to assess overall intelligence.

Working Memory tasks were administered to children at T2.

• Nine Boxes (Diamond, 1997). Figures are placed inside nine different boxes on a tray and child is instructed to find each one of the characters. Before each trial, the examiner changes the location of the boxes out of the child’s sight. DV: Longest run of consecutive correct responses.

• Delayed Alternation (Goldman, 1971). Out of child’s sight, a reward is hidden increasing sequences of animal names on colored touch-screen buttons. DV: Total number of correct sequences.

• Nebraska Barnyard (Hughes, 2008). The child reproduces progressively increasing sequences of animal names on colored touch-screen buttons. DV: Total number of correct sequences.

• Task scores were converted to z-scores prior to averaging across to create working memory aggregate variable.

RESULTS
Longitudinal hierarchical regression analyses were used to test whether parenting at T1 moderated the association between children’s temperamental effortful control at T1 and working memory at T2. Four separate models were estimated, one for each of the parenting dimensions. BIA scores, temperamental effortful control, and parenting dimensions were entered in the first step. The interaction between temperamental effortful control and parenting was entered second.

Of all the parenting dimensions, only Maternal Inconsistency significantly interacted with temperamental effortful control to predict working memory.

Children with lower levels of temperamental effortful control at T1 varied in their performance on the working memory tasks at T2 as a function of maternal inconsistency.

Specifically, as shown in Figure 1, among those children displaying lower temperamental effortful control, those whose mothers were more consistent performed significantly better on the working memory tasks compared to those with less consistent mothers.

<table>
<thead>
<tr>
<th>Model</th>
<th>BIA</th>
<th>Effortful Control</th>
<th>Nurturance</th>
<th>Interaction</th>
<th>AR²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>.32***</td>
<td>.32***</td>
<td>.09</td>
<td>.03</td>
<td>.04</td>
</tr>
<tr>
<td>Model 2</td>
<td>.32***</td>
<td>.30***</td>
<td>.09</td>
<td>-.08</td>
<td>-.16**</td>
</tr>
<tr>
<td>Model 3</td>
<td>.31***</td>
<td>.32***</td>
<td>.10</td>
<td>-.08</td>
<td>.06</td>
</tr>
<tr>
<td>Model 4</td>
<td>.32***</td>
<td>.32***</td>
<td>.09</td>
<td>.04</td>
<td>.01</td>
</tr>
</tbody>
</table>

CONCLUSIONS
The present findings suggest that consistent parenting during the preschool years may function as a protective factor for the development of working memory, particularly among children displaying lower temperamental effortful control.

Findings point to the importance of the “goodness of fit” between parenting practices and child characteristics, in that children with poorer temperamental effortful control particularly benefited from more consistent mothers.

The study findings have important implications for prevention and intervention efforts. For instance, adding parent training to improve parental consistency skills may be beneficial in fostering the early development of working memory of children with low effortful control.

REFERENCES


ACKNOWLEDGEMENTS
Supported by NIH grant U-51 HD06768 awarded to Kimberly Espy. We thank the participating families and the Developmental Cognitive Neuroscience Laboratory staff who made this research possible. Correspondence address: Miriam Martinez-Marin, 361 Building, Room 140, University of Nebraska-Lincoln, Lincoln, NE 68588-0206, miriammar@unl.edu