8-2019

Exploring the Moderating Effect of Maternal Scaffolding on The Temperament - Language Development Relationship

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A thesis

presented to

the faculty of the Department of Psychology

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Master of Arts in Psychology

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by

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August 2019

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Keywords: Temperament, maternal scaffolding, language development

ABSTRACT

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Many studies have examined the relationship between a child's temperament and its effect on his or her early language development. However, few studies have investigated the detrimental effects a child's negative affectivity may have on their language development and potential ways these effects may be limited through parental behaviors. The current study aimed to investigate if physical or verbal maternal scaffolding behaviors moderated the effect negative affect has on language development. Although it was expected that maternal encouragement of physical activity would play a moderating role in the relationship between temperament and language development, no such relationship was found. One explanation for these findings is the operationalization of maternal scaffolding behaviors in the present study; previous studies have also included instances of emotional and motivational scaffolding. Future efforts should aim to incorporate a broader range of potential scaffolding behaviors in their coding protocols.

ACKNOWLEDGEMENTS

I would first like to express the deepest appreciation to my advisor and chair, Dr. Wallace Dixon, Jr., for his time, patience, and support. Without his guidance, the completion of this project, nor my success in this program, would not have been possible.

I would also like to thank my committee members, Dr. Alyson Chroust and Dr. Eric Sellers, for their time and valuable feedback as well as all of the members of The Program for the Study of Infancy for all of their help with data coding. Their dedication is remarkable and is a constant source of motivation.

Lastly, I would like to thank my friends and family for their endless support. I am especially grateful for my parents who always seem to know the right things to say. Thank you for keeping me smiling, even on the days when I think I can't.

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CHAPTER 1

INTRODUCTION

The relationship between temperament and language development has been of considerable interest within developmental psychology. Many studies have looked at this relationship in early childhood, particularly within infancy and toddlerhood (e.g., Dixon & Shore, 1997; Dixon & Smith, 2000; Laake & Bridgett, 2014; Slomkowski, Nelson, Dunn, & Plomin, 1992). The general finding has been that children who have "temperamental easiness" tend to develop language more efficiently (Salley & Dixon, 2007, p. 1). For example, it is a common finding that children high in positive affectivity tend to outscore their counterparts low in positive affectivity on language measures (e.g., Dixon & Smith, 2000; Pérez-Pereira et al., 2016; Moreno & Robinson, 2005; Slomkowski et al., 1992; but see Bloom & Capatides, 1987 and Wolfe & Bell, 2007 for conflicting results).

However, the fact that children's temperament profiles predict their language outcomes does not clarify the nature of the relationship, including the direction of effect. In terms of a temperament-to-language direction of effect, temperament may influence language development both directly and indirectly (Rieser-Danner, 2003). From a direct link perspective, children with greater cognitive/attentional resources may be better able to identify, attend to, and store word-referent relationships encountered in their linguistic environments. From an indirect perspective, individual differences in temperament may influence, for example, children's engagement in joint attention with a social partner, and, thus, their ability to use social cues in the service of word-learning. Indeed, research has long identified infants' initiation of and responsiveness to joint attentional bids as an important predictor of language acquisition (e.g., Dunham, Dunham, & Curwin, 1993; Tomasello & Farrar, 1986). However, children's temperament may impact their

proclivity for engaging in joint attention (Salley & Dixon, 2007; Todd & Dixon, 2010; Vaughn van Hecke, 2007**)**. Salley and Dixon (2007) found that at 21 months higher measures of negative affectivity, that is, an increased tendency to experience and display negative emotions (e.g., anger, frustration, sadness, and anxiety), predicted lower levels of joint attentional bids. Similar findings have been observed in younger babies (Morales et al., 2000).

Whether the relationship between temperament and language is direct or indirect, children's attentional capacities have been repeatedly correlated with precocious language development. However, other dimensions of children's temperament are thought to impact the availability of children's attentional resources (Bloom, Beckwith, & Capatides, 1988; Rothbart & Bates, 2006). Negative affectivity, for example, may detract from available attentional resources as children are presumed to use some of the latter to regulate some of the former. This possibility is supported by findings that children rated high in attentional capacity have been found to be linguistically advanced, whereas children rated high in negative affectivity have been shown to be linguistically delayed (e.g., Tomasello & Farrar, 1986). Positive affectivity may not detract from children's attentional resources in the same way, as children with higher positive affect also tend to exhibit language precocity (e.g., Salley & Dixon, 2007).

To the extent that negative affectivity might play a causal role in impeding language development through its impact on the availability of attentional resources in word-learning settings, the goal of the present study is to explore whether maternal scaffolding might moderate this relationship by promoting children's attentional resources, and, therefore, their capacity for self-regulation; especially as it pertains to the regulation of negative affectivity. The overarching rationale for this hypothesis is that through scaffolding, mothers may increase the availability of children's attentional resources in the service of learning word-referent mappings. However, the

impact of maternal scaffolding may also happen both directly and indirectly. In terms of a direct impact, scaffolding may mobilize children's cognitive/attentional resources, and, correspondingly, their abilities to attend to object-word mappings. Indirectly, maternal scaffolding may promote children's inclination to engage in joint attention and thus increase the quantity and quality of their language exposure. The purpose of the proposed investigation is to explore the impact of maternal scaffolding on the direct relationship between children's temperament and their language proclivity.

Defining Temperament

Self-regulation is a core component of Rothbart's temperament model (Putnam & Stifter, 2008; Rothbart & Derryberry, 1981). Indeed, in a now classic definition, Rothbart and Derryberry (1981) characterize temperament as "constitutionally based individual differences in reactivity and self-regulation" (p. 37) and characterize self-regulation as a type of effortful control (Rothbart, 2001). Effortful control can be described as children's ability to manage their attention and inhibit or activate behavior as needed (Rothbart & Bates, 2006) and is essential for children's development because having the ability to self-regulate allows children to learn how to behave in ways that are socially desirable (e.g., Eisenberg, Fabes, Guthrie, & Reiser, 2000; Eisenberg, Spinrad, & Eggum, 2010; Kochanska & Knaack, 2003).

According to this definition, effortful control can be seen both in a child who focuses on a task even in the presence of distractions, as well as in a child who inhibits a natural reaction, such as crying in a stressful situation. Effortful control is also presumed to inhibit other dimensions of temperament to accelerate developmental outcomes by inhibiting dominant but ineffective responses, while activating subdominant but more useful responses (Rothbart & Bates, 2006). As it pertains to language development, for example, children temperamentally

predisposed toward high negative affectivity and low effortful control may have difficulty engaging in behaviors that promote language development. These children could, for example, become upset or anxious in a new environment or in the presence of new objects when asked to learn novel object labels. In contrast, children predisposed toward low negative affectivity and high effortful control may more easily engage in behaviors that serve language development, such as when they look to a parent or caregiver for guidance (e.g., regarding word labels) in an unfamiliar situation. It stands to reason, then, that the parenting practices that promote the development of effortful control would be of interest when studying children with high negative affectivity. Promoting effortful control in these children could promote their language acquisition.

Although there are numerous perspectives on temperament, Rothbart's (2001) theoretical model is arguably one of the most popular in contemporary research. Her model characterizes temperament as deriving from neurobiological underpinnings, as opposed to models which have characterized temperament as reflecting dimensions of "behavioral style" (e.g. Fullard, McDevitt, & Carey, 1984; Thomas & Chess, 1977). Although effortful control is believed to have a biological substrate (Rothbart, 2001), theorists believe that it can still be shaped by children's physical and social experiences (e.g., Goldsmith, Pollak, & Davidson, 2008), especially through interactions with parents (Katz, Wilson, & Gottman, 1999; Gottman, Katz, & Hooven, 2008). The purpose of the present proposal is to explore whether maternal scaffolding might be especially relevant for promoting children's effortful control during dyadic interchanges involving scaffolding.

Scaffolding

The term scaffolding originates from research by Wood, Bruner, and Ross (1976) but was originally conceived in Vygotsky's sociocultural theory of child development (1978). Theoretically, scaffolding provides the support necessary for children to accomplish goals that would otherwise exceed their current abilities. As parents scaffold and help guide the development of new skills, children begin to gain autonomy and become better equipped to solve problems independently (Eisenberg et al., 2010; Rogoff, 1990). For example, a mother who has demonstrated how to tie a shoe may encourage her child to try the task while giving him cognitive support via developmentally-appropriate steps or by providing hints as to what the next step should be. She may start by saying that the first step is to pull the laces tightly and, once her child completes this step, may go on to say that the next step is to cross the laces, and so on. The mother may motivate her child via praise or encouragement to complete the task if he becomes frustrated.

Maternal scaffolding is a powerful tool for promoting developmental success. For example, it has been shown to improve outcomes for children at risk for behavioral problems (e.g., Erickson et al., 2013; Landry, Miller-Loncar, Smith, & Swank, 2002). The underlying mechanism for these kinds of findings may be that maternal scaffolding promotes the exercise of effortful control in young children (e.g., Lengua, Honorado, & Bush, 2007), particularly in the context of emotion regulation. Diener and Mangelsdorf (1999), for example, exposed 18- and 24-month old children to laboratory "episodes" designed to elicit anger, fear, or positive affect (two episodes each). For the first half of each episode, mothers were not allowed to initiate interactions with their children or intervene if their children became distressed when presented with frightening or frustrating stimuli. In the last half of each episode, mothers were permitted to

initiate interactions and intervene. Findings indicated that children expressed more positive affect than negative affect and displayed increased social referencing when the mothers were allowed to interact, raising the possibility that children's self-regulatory skills improved with supportive caregiving.

Scaffolding is often viewed in terms of physically assisting children, but it can also be conceptualized as a form of verbal assistance. Fagot and Gauvain (1997) suggest that parents who verbally assist children who are trying to understand a difficult task may help them complete the task without becoming overly frustrated, emotionally dysregulated, or inattentive. As with physical scaffolding, verbal scaffolding helps children maintain attention and, because the maintenance of attention is difficult while also displaying negative affect (Ruff & Rothbart, 1996), promotes emotional regulation (Landry et al., 2002; 2008). Emotional development can be conceptualized as a series of transactions in which children progress from heavily relying on others to regulate their emotions to being able to regulate their own. This gradual transition occurs because, although children have the biological capacity to develop emotion regulation, they need the assistance of others to develop and refine these regulatory skills (Sameroff & Fiese, 2000). Although research suggesting a specific link between maternal scaffolding and emotional regulation has been limited to children who are at risk for emotional regulation difficulties, such as those born prematurely (Erickson et al., 2013), there is no reason to believe that maternal scaffolding would not promote emotional regulation in typically developing children.

Current Study

The specific aim of the current study was to explore whether maternal scaffolding behaviors moderated the relationship between temperament and maternal reported vocabulary

size. Maternal scaffolding should have created a more stimulating environment in which children could direct their attentional/cognitive resources more effectively toward general learning opportunities and word-learning in particular (Bradley, McKelvey, & Whiteside-Mansell, 2011). Based on the literature reviewed above, I proposed the following hypotheses:

- H1a: Negative affectivity would be negatively correlated with parent-reported productive vocabulary size. This hypothesis reflected expected replications of past research.

- H1b: Effortful control would be positively correlated with parent-reported productive vocabulary size. This hypothesis reflected expected replications of past research.

- H2a: The strength of the relationship between negative affectivity and parent-reported vocabulary size will vary as a function of physical maternal scaffolding. At higher levels of physical maternal scaffolding, the correlation between negative affectivity and parent-reported vocabulary size will be weaker; at lower levels of physical maternal scaffolding, this correlation will be stronger.

- H2b: The strength of the relationship between negative affectivity and parent-reported vocabulary size will vary as a function of verbal maternal scaffolding. At higher levels of verbal maternal scaffolding, the correlation between negative affectivity and parent-reported vocabulary size will be weaker; at lower levels of verbal maternal scaffolding, this correlation will be stronger.

- H3a: The strength of the relationship between effortful control and parent-reported vocabulary size will vary as a function of physical maternal scaffolding. At higher levels of physical maternal scaffolding, the correlation between effortful control and parent-

reported vocabulary size will be stronger; at lower levels of physical maternal scaffolding, this correlation will be weaker.

- H3b: The strength of the relationship between effortful control and parent-reported vocabulary size will vary as a function of verbal maternal scaffolding. At higher levels of verbal maternal scaffolding, the correlation between effortful control and parent-reported vocabulary size will be stronger; at lower levels of verbal maternal scaffolding, this correlation will be weaker.

CHAPTER 2

METHODS

Participants

Data used in the present study were derived from an archival data set from the Program for the Study of Infancy at East Tennessee State University. Participants were 56, typically developing 18-month-olds (n = 26 boys) with ages ranging from 17.55 months to 18.87 months (*M* age = 18.3 months, SD = 0.43 months) who were recruited through birth announcements in the local newspaper. The majority of participants in this dataset included mother-child dyads (~96.4%), but two father-child dyads also participated.

Materials and Tasks

Children participated in multiple behavioral tasks for the duration of their visit, one of which was a mother-child free-play period. Observational measures relevant to the present study were collected via video recordings of this free-play period for each of the mother-child dyads. Measurements of maternal physical scaffolding were coded using a modified version of guidelines used by Wood and Middleton (1975), while maternal verbal scaffolding measures were coded using guidelines adapted from Dieterich, Assel, Swank, Smith, and Landry (2006).

The surveys relevant to the present investigation included the MacArthur-Bates Communicative Development Inventory: Words and Sentences (MBCDI-WS; Fenson et al., 2007) and the Early Childhood Behavior Questionnaire (ECBQ; Putnam, Garstein, & Rothbart, 2006), which measured maternal reported vocabulary size and temperament, respectively. Total vocabulary size was defined as the sum of the number of nouns, predicates, and closed class words (e.g., articles, conjunctions, demonstratives) the child said, as reported by the mother.

Observational Measures

Verbal Scaffolding. Verbal scaffolding was indicated if a mother: 1) used questions, directives, or statements which associated objects to a specific location, 2) verbally related an object to a topic of conversation in which the child was previously engaged, 3) applied verbal descriptors to an object or event that linked sensory experiences to specific objective descriptor of a sense and contrasting concepts (e.g., "This piece has a straight edge so it goes on the outside."), 4) verbalized object uniqueness, use, or function, or object features the child can use to problem solve, 5) verbally suggested object functions or activities, 6) associated feelings and emotions with a reason for the emotion (e.g., "You're frustrated because that piece isn't fitting there."), 7) verbalized cause and effect, or 8) verbalized an object's belongingness to a more general category. Total verbal scaffolding was be defined as the sum of instances a mother met any of these criteria. Examples of each type of verbal scaffolding measure can be found in Table 1.

Table 1

Verbal Scaffolding Examples

1. Using questions, directives, or statements which associate objects to a specific location	"Put that circle in there." "There's a book over there." "Where does the zero go?"
2. Relating and object to a topic of conversation in which the child was previously engaged	"Is that the lid for the pot?" [child previously engaged with the pot] "That one doesn't open either!"
3. Applying verbal descriptors to an object or event that links sensory experiences to specific objective descriptors of a sense and contrasting concepts	"Oh, these stick together, [child's name]!" "The lid comes off." "Is it stuck?"
4. Verbalizing object uniqueness, use, or function, or object features the child can use to problem solve	"See, this one has a panda on it." "Look, [child's name], this one has a straight edge."
5. Verbally suggesting object functions or activities	"You wanna read the book?" "Can you lay her on her pillow?" "Call daddy at work."
6. Associating feelings and emotions with a reason for the emotion	[None observed in this dataset.]
7. Verbalizing cause and effect	"She's hungry, does the baby need food?" "You can't put anything else in there, it's full." "Big Bird won't fit in there, he's too big."
8. Verbalizing an object's belongingness to a more general category	"You like these toys?" "Those toys are over there."

Physical Scaffolding. Physical scaffolding was defined as any cooperative involvement of the mother during an activity the child was already engaged in and was indicated when the mother engaged in at least one of the following criteria: (1) directly providing objects (e.g., moving a puzzle closer to her child once he or she indicates interest in it), (2) preparing objects (e.g., orienting a puzzle so it is face up in front of the child), or (3) modeling a behavior (e.g., showing her child how to fit pieces of the puzzle together). Total physical scaffolding was

defined as the sum of instances a mother met these criteria. Examples of each type of physical scaffolding can be found in Table 2.

Table 2
Physical Scaffolding Examples

1. Directly providing objects	[Gave child a block once she indicated interest in it.] [Gave child a doll once he indicated interest in it.]
2. Preparing objects	[Rotated book so it was face up in front of the child.] [Placed lid on shape sorter.]
3. Modeling a behavior	[Showed child how pieces of a puzzle fit together.] [Showed child how blocks can be stacked.]

Reliability. Interrater reliability was unable to be achieved for verbal scaffolding when a team of two human judges separately scored ten percent (N= 6) of the overall sample. Consequently, the two coders coded side by side using the consensus method to score all verbal scaffolding measures. Any intercoder disagreements were resolved through discussion.

Inter-rater reliability for physical scaffolding was ensured by using a team of two human judges to score behavioral measures. Both team members scored ten percent (N = 6) of the video recordings until an interrater reliability of at least 80% was achieved. Upon reaching reliability, each team member coded approximately half of the remaining videos; and, once coding was completed, an additional six videos were randomly selected to be recoded to ensure coders remained reliable upon completion the coding process. Interrater reliability, defined as the number of agreements divided by the number of agreements plus the number of disagreements, was determined to be above the 80% criterion (pre-reliability = .82, post-reliability = .88)

Maternal Report Measures

MacArthur-Bates Communicative Development Inventory: Words and Sentences.

Language ability wasdefined as maternal reported vocabulary size using the MacArthur-Bates Communicative Development Inventory: Words and Sentences (MBCDI-WS). This measure is designed for use use in children 16-30 months old (Fenson, Marchman, Thal, Dale, Reznick, & Bates, 2007). Children's total productive vocabulary was defined as the sum of a child's scores on nouns, predicates, and closed class vocabulary.

Early Childhood Behavior Questionnaire

Temperament was measured using the ECBQ (Putnam, Garstein, & Rothbart, 2006), a temperament assessment used for18- to 36-month-olds. The ECBQ is a 201-item, parent-report instrument in which parents or caretakers rate the frequency of their children's various behaviors over the previous two weeks using a Likert-type scale, which ranges from 1 (never) to 7 (always). The ECBQ comprises 18 fine-grained subdimensions which make up three overarching superdimensions: negative affectivity, surgency/extraversion, and effortful control. Of interest in the present study were the superdimensions of negative affectivity and effortful control The former is comprised of scores from the subdimensions Discomfort, Fear, Sadness, Frustration, Soothability (negatively), Motor Activation, Perceptual Sensitivity, and Shyness; the latter is comprised of scores from the subdimensions Attentional Focusing, Attentional Shifting, Low-Intensity Pleasure, Inhibitory Control, Cuddliness, and Perceptual Sensitivity (Putnam, Garstein, & Rothbart, 2006).

CHAPTER 3

RESULTS

Descriptive Statistics

Fifty-six parents completed the surveys used in the present investigation (i.e., the MBCDI:WS and the ECBQ). Means and standard deviations of the predictor and outcome measures are presented in Table 3. As indicated in Table 3, some missing data resulted when scoring some of the observational measures. These missing values resulted from instances in which children or mothers were not in view of the camera, when behaviors or speech could not be determined due to microphone volume or camera angle, or when video recordings were missing altogether. Ultimately, physical scaffolding data from 53 parent-child dyads and verbal scaffolding data from 49 parent-child dyads were used in the following analyses.

Table 3

Descriptive Statistics for Observational Measures

		N	Min	Max	Mean	Std. Dev.
Physical Scaffolding Occurances Per Minute						
	Providing objects	52	0	2.99	1.14	.81
	Preparing objects	52	0	1.06	.29	.26
	Modeling a Behavior	52	0	2.73	.75	.56
	Total	52	0	5.11	2.17	1.09
Verbal Scaffolding Occurances Per Minute						
	Associating objects to a location	48	0	2.81	.64	.72
	Relating new object to other object	48	0	1.24	.11	.24
	Applying verbal descriptors of an object or event	48	0	.41	.05	.10
	Verbalizing object uniqueness, use, or function	48	0	2.00	.14	.31
	Suggesting object function or activity	48	0	3.61	1.34	.93
	Associating emotions with a reason for the emotion	48	0	0	0	0
	Cause and effect	48	0	.54	.06	.12
	Relating objects to a general category	48	0	.89	.09	.20
	Total	48	0	6.00	2.46	1.27
Temperament Measures						
	Negative affectivity (α = .72)	56	0.85	2.86	1.68	0.49
	Effortful control (α = .62)	56	2.98	4.48	3.72	0.32
Productive Language Measures						
	Nouns	55	0	238	51.71	55.53
	Predicates	55	0	100	11.64	19.82
	Closed class	54	0	16	3.24	3.64
	Total	54	0	348	65.20	76.95

Inferential Statistics

Prior to data analysis, all verbal and physical scaffolding data were converted to proportion scores because the total amount of free play varied across dyads. Specifically, free play length varied from 2.93 minutes to 6.47 minutes. Consequently, children's total scores for each scaffolding measure, summed across the entire free play episode, were divided by the number of minutes of each free play episode and each dyad received a score representing the average frequency per minute of each type of scaffolding observed.

Main Effects

I first expected to observe main effects consisting of a negative relationship between negative affectivity and maternal reported vocabulary size (H1a) and a positive relationship between effortful control and maternal reported vocabulary size (H1b). To test these hypotheses, I conducted Pearson's product-moment correlational analyses between parent-reported vocabulary size and both negative affectivity (H1a) and effortful control (H1b). Results indicated that negative affectivity and parent-reported overall language at 18 months were not significantly correlated (r = -.18, p = .20). However, there was a positive and significant correlation between effortful control and parent-reported overall language production at 18 months (r = .28, p = .04).

Moderation Analyses

I also expected to observe a reduction in the magnitude of the correlation between negative affectivity and vocabulary size, as well as an enhancement in the magnitude of the correlation between effortful control and vocabulary size, when mothers displayed high rates of both maternal physical and verbal scaffolding. Evaluation of potential moderation effects took

place through a series of regression analyses, conducted separately for each measure of maternal scaffolding (N = 2) and each temperament superdimension of interest (N = 2), for a total of 4 regression analyses.

Regressions were conducted with overall language regressed on 1) the temperament superdimensions of interest (i.e. negative affectivity and effortful control, after centering), 2) the maternal scaffolding measures (i.e., verbal and physical scaffolding measures, after centering), and 3) the temperament x maternal scaffolding interaction terms (representing the moderation terms). Results can be found in Tables 4 and 5.

Table 4
Regression Summary for Effortful Control and Scaffolding Measures

	Verbal Scaffolding					Physical Scaffolding				
	B	*SE B*	*β*	*t*	*p*	*B*	*SE B*	*β*	*t*	*p*
(Intercept)	68.78	12.50		5.50	0.00*	66.48	11.28		5.90	0.00*
Effortful Control	95.98	50.04	0.34	1.92	0.06	93.62	40.66	0.35	2.30	0.03*
Scaffolding Proportion	-5.20	11.43	-0.07	-0.45	0.65	-9.15	10.74	-0.12	0.85	0.40
Effortful Control ∗ Scaffolding Proportion	9.85	38.64	0.05	0.26	0.80	12.49	37.69	0.05	0.33	0.74

Note: *p < 0.05

Table 5

Regression Summary for Negative Affectivity and Scaffolding Measures

	Verbal Scaffolding					Physical Scaffolding				
	B	*SE B*	*β*	*t*	*p*	*B*	*SE B*	*β*	*t*	*p*
(Intercept)	74.47	13.78		5.40	0.00*	69.28	11.87		5.84	0.00*
Negative Affectivity	-25.68	26.69	-0.16	-0.96	0.34	-30.45	23.87	-0.19	-1.28	0.21
Scaffolding Proportion	-3.39	12.18	-0.05	-0.28	0.78	-3.84	11.74	-0.51	-0.33	0.75
Negative Affectivity ∗ Scaffolding Proportion	-12.49	20.90	-0.10	-0.60	0.55	-21.92	23.56	-0.14	-0.93	0.36

Note: *p < 0.05

When evaluating regressions involving maternal verbal and physical scaffolding, results revealed no significant moderation terms. To determine whether the non-significant results were due to lack of statistical power, I conducted a post hoc power analysis using G*Power (version 3.1; Faul & Erdfelder, 1992) with power (1- β) set at 0.80 and α = 05. This indicated a sample size of 48 would be needed to reach statistical significance at the .05 level for the nonsignificant effect sizes found in this study. Thus, it is unlikely that the findings can be attributed to a limited sample size.

CHAPTER 4

DISCUSSION

The overarching goal of this study was to explore whether maternal scaffolding behaviors moderated the temperament – language development relationship. The extant literature suggests that temperament may impact children's language development via its impact on the availability of their attentional resources (e.g., Rieser-Danner, 2003). In this study, I focused on the extent that maternal physical and verbal scaffolding behaviors in early childhood moderated the impact of children's temperament on their allocation of attention and thus their language proficiency. In particular, I expected maternal scaffolding to increase children's capacity for self-regulation, particularly as it pertained to the regulation of negative affectvity. However, in the present investigation, neither physical nor verbal maternal scaffolding behaviors were found to play a moderating role on the relation between children's temperament to their overall language ability.

One subordinate hypothesis was confirmed (H1b), namely that effortful control would be positively correlated with parent-reported productive vocabulary size. This finding was expected as previous research has indicated that higher levels of effortful control is positively correlated with scores on language measures (e.g., Morales et al., 2000; Slomkowski et al., 1992). However, it was surprising that the other subordinate hypothesis (H1a), linking negative affectivity to language proficiency, failed to be confirmed. The failure to confirm H1a may be attributed to the operationalization of overall language in the present study. Overall language in the present investigation was defined as the sum of a child's scores on noun, predicate, and closed class vocabulary production; however, there are many other facets of language

development (Fenson et al., 2007). Nevertheless, this explanation seems unlikely in light of previous findings of correlations involving productive vocabulary (e.g., Dixon & Smith, 2000).

Hypotheses H2 and H3 also failed to be confirmed. It was hypothesized that higher levels of both physical and verbal scaffolding would weaken the correlation between children's negative affectivity (H2a and H2b) and language ability as well as strengthen the correlation between children's effortful control and their language ability (H3a and H3b). It may be that verbal and physical maternal scaffolding do not sufficiently promote children's cognitive or attentional resources to either lessen the effect of their negative affectivity or promote the effect of their effortful control in the service of word learning, at least at this point in developmental time.

It was also possible that the internal consistency of the temperament measures limited their validity. However, the construct with the lower internal consistency (effortful control; α = .62) was significantly correlated with productive vocabulary. Negative affectivity's internal consistency was higher and typical of this type of research (α = .72; Putnam & Rothbart, 2006), but was not significantly correlated with productive vocabulary.

Study Limitations

There were, however, a number of limitations to the current study. The choice of scaffolding protocols may have been a limiting factor. The physical and verbal scaffolding protocols have been used in previous studies with children three to four years old and, although children in the current study were younger, there was no reason to suspect that these protocols would not work for younger children as well. But there may have been additional measures of scaffolding that I could have coded for.

Other forms of scaffolding have been described in the literature, and mothers in this sample engaged in some of them. These behaviors included pointing to an object (e.g., pointing to a puzzle piece; Carr & Pike, 2012) or labeling objects or parts of objects (e.g., "That's a phone;" Masur, 1997; Saylor, Sabbagh, & Baldwin, 2002). Because these behaviors were not transcribed in the chosen protocols, they were not noted as instances of scaffolding. Future studies may benefit from choosing broader coding protocols that allow for the inclusion of multiple modes of maternal scaffolding behaviors.

In addition, no instances of maternal verbal scaffolding involving expressions of affect were coded (e.g., "You're frustrated because that piece won't fit"). However, mothers frequently reassured or motivated their children when they became frustrated or upset during a given task. Mothers also frequently shared behaviorally in their child's positive emotions (e.g., clapping with the child), verbally encouraged their children's attempts at various tasks (e.g., "You can do it!", "Try one more time!"), and made statements that made the task a positive experience for the child (e.g., "You did a good job!"). Previous studies have classified these types of behaviors as motivational and emotional scaffolding, respectively (Hoffman, Crnic, & Baker, 2006). Again, these behaviors were not included in the chosen protocols and, therefore, were not noted as instances of scaffolding. Motivational and emotional scaffolding may better mobilize a child's cognitive/attentional resources and, therefore, his or her ability to attend to object-word mappings.

Another potential limitation of this study may be the age of the children used due to the developmental phenomenon under study. It may be that maternal scaffolding does moderate the temperament-language relationship in childhood, but not in children of this age range (18 month-olds). For example, it may be the case that moderating effects are only observed during the

period of a child's first word acquisition rather than during the period of vocabulary burst seen in children of this age. Maternal behavior may be especially influential when a child is initially learning his or her first language, but this influence may lessen as a child gains more language exposure and experience.

In conclusion, the results from the present investigation failed to support the prospect of a moderating role played by maternal physical and verbal scaffolding on the temperament – language development relationship. However, this study only examined this potentially moderating effect specifically with children's productive language and maternal physical and verbal scaffolding; future research in the field may benefit from a similar study using coding protocols that emphasize emotional and motivational scaffolding as well as the analysis of receptive vocabulary.

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