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MATERNAL STRUCTURING OF TODDLER SELF-REGULATION AND ITS RELATION TO LATER CHILD TASK PERSISTENCE

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ABSTRACT

Background: Self-regulation is a complex construct that reflects a person's ability to control one's words and actions in a situationally-appropriate way (Kopp, 1982). Structuring is one form of parenting that is assumed to be helpful to children's development of self-regulation. Similar to the construct of scaffolding (Vygotsky, 1978), structuring reflects parental attempts to recruit children's emerging skills, such as their control of their attention, and apply these skills to engaging in self-regulation. The current study evaluated the degree to which sensitive maternal structuring during toddlerhood contributed to individual differences in children's self-regulation skills by child age 36 months. Specifically, the thesis tested the prediction that sensitive maternal structuring during a task that challenged children's self-regulation at age 24 months would contribute to children's task persistence in a different challenging task at child age 36 months. **Methods:** The sample is composed of 112 toddlers and their mothers, participants in a larger longitudinal study, the Development of Toddlers Study (DOTS). At child age 24m, structuring quality and structuring success were measured in a Wait Task. At child age 36m, child task persistence was measured in a frustrating Locked Box Task. **Results:** Hierarchical linear regression analyses failed to yield support for the hypothesis. The only significant predictor of child task persistence at age 36m was child task persistence at age 24m. **Conclusions:** Although maternal structuring quality during toddlerhood was not significantly related to children's later task persistence, support for stability of child persistence over time emerges from these results. In future studies, the particular details of structuring, i.e. skills harnessed, strategies used, may yield more significant results than overall quality.

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Chapter 1

Introduction

Self-regulation is a complex construct that reflects a person's ability to control one's words and actions in a situational-appropriate way, including the ability to follow instructions and/or inhibit one's desires without being encouraged to do so by a parent or external force (Kopp 1982). One important reason to study self-regulation is its relation to school readiness, defined as the possession of necessary skills, knowledge, and attitudes for success in school and in later learning and life (School, 2014). High levels of self-regulation are related to the regulation of goal-directed behavior, high levels of mastery motivation and engagement, which are all linked to academic success (Zhou, Hofer, Eisenberg, Reiser, Spinrad & Fabes 2007; Zimmerman, 1998). Early academic success then goes on to predict lower crime and substance abuse in early adulthood (Fergusson, Horwood, & Ridder, 2005).

Self-regulation first emerges during toddlerhood and the role of parenting is particularly important for toddlers' ability to adopt family and social standards during this period (Kopp, 1982). Structuring is one form of parenting that is assumed to be helpful to children's development of self-regulation. Similar to the construct of scaffolding (Vygotsky, 1978), it reflects the attempts of parents to harness emerging cognitive, linguistic, and motor skills in toddlers, such as inhibitory control, verbalizing, planning, and attention control, and apply these to self-regulation. These harnessing attempts are expected to be helpful to child self-regulation if they are administered in a developmentally sensitive manner, such that the mother, for example, encourages behavior that she believes the toddler can accomplish. It is not expected to be helpful

if it is administered in an insensitive manner, e.g., when a mother aims her intervention above what the toddler is capable of achieving.

The current study evaluated the degree to which sensitive maternal structuring during toddlerhood contributed to individual differences in children's self-regulation by age 36 months. Self-regulation was evaluated in terms of children's ability to persist in an emotionally frustrating situation. It is important to review why self-regulation is important for development, what structuring is, and how it relates to self-regulation in the form of task persistence in challenging tasks.

School Readiness

The development of self-regulation in toddlerhood carries its importance into the classroom when children become school-aged, and as they grow into young adults. High levels of regulation are related to regulation of goal-directed behavior, high levels of mastery motivation and engagement, which are all linked to academic success (Zhou, Hofer, Eisenberg, Reiser, Spinrad & Fabes 2007; Zimmerman, 1998). Effortful control, a construct defined as the compilation of executive functions such as inhibition and planning, has been shown to be positively linked to school achievement (i.e. scores on standardized tests and social competence) (Fabes, Martin, Hanish, Anders, & Madden-Derdich, 2003; Valiente, Lemery-Chalfant, & Castro, 2007). Studies have linked low levels of effortful control in early childhood, which occur in children who have difficulty regulating themselves, to higher levels of externalizing problems in later childhood that might look like irritability, aggression toward other children, or destructive behaviors (Eisenberg, Spinrad, Fabes, Reiser, Cumberland, Shepard, … &

Thompson, 2004; Kochanska & Knaack, 2003). Many studies prove that both effortful control and self-regulation are related to school readiness (Ursache, Blair, & Raver 2012).

When considering the true mechanism behind school readiness, the question of whether or not intelligence overrides self-regulation might arise; maybe intelligent children also happen to be generally better regulated, and therefore perform better in school. However, even while controlling for IQ, regulation is linked with early standardized achievement test scores in math and literacy (Graziano, Reavis, Keane, & Calkins, 2007). Studies have linked low levels of effortful control in early childhood to higher levels of externalizing problems in later childhood (Eisenberg, Spinrad, Fabes, Reiser, Cumberland, … & Thompson, 2004; Kochanska & Knaack, 2003). Additionally, early school success and intelligence in middle childhood has been shown to predict lower crime and substance abuse levels in early adulthood (Fergusson, Horwood, & Ridder, 2005).

In sum, the importance of early self-regulation in regards to school readiness and success in later childhood is made clear by these findings. Moreover, it is imperative to understand the mechanism behind the development of this self-regulation, in order to promote it more. Thus, it can be concluded that how mothers foster the development of self-regulation, possibly through constructs such as structuring, is an under-studied topic that has the potential to greatly impact the clinical field of Psychology.

Structuring

Structuring is a new way to conceptualize parenting tactics. It was developed to define specific ways that parents attempt to harness children's emerging skills, e.g., expressive or

receptive language, and attention control, and encourage children to apply these skills to engage in self-regulation. More specifically, structuring refers to attempts by parents to recruit children's ability to focus their attention, redirect their attention, distract themselves, use words to reason through situations, inhibit action, and plan ahead in order to regulate their desire to act. All of these skills can be applied to different types of self-regulation challenges in which children are expected to be tolerant and conform to social standards, such as taking turns during peer play, waiting for their mothers to finish work before attending to them or yielding to their demands.

The concept of structuring is similar to that of scaffolding, which has been applied to the study of children's cognitive development (Lindeke, 2011; Vygotsky & Kozulin 2011). It also differs from the original concept of scaffolding in important ways. Structuring and scaffolding both are child-centered caregiver practices, and both attempt to build on skills that children already possess to engage in more mature behavior than they ordinarily can engage in independently. Unlike scaffolding, structuring does not assume that the child needs to perform the behavior successfully and does not assume that the mother has explicit knowledge of her child's skill level. Nonetheless, structuring does assume that the mother's intervention should aim to be sensitive to the toddler's developmental level. High quality structuring encourages the toddler's use of imagination and higher-level thinking. Low quality structuring can be far too much for the toddler to handle (i.e. mother speaks too quickly, suggests strategies that do not interest the child), not enough to help the toddler (i.e. mother speaks too quietly or barely at all), or simply insensitive (i.e. lack of "mothering" sense to the structuring, lack of understanding of the toddler's struggle).

Task Persistence

One aspect of self-regulation potentially influenced by maternal structuring is the ability to manage frustration such that a child can persist at a task even if the child encounters difficulty with the task goal. Persistence is a vital quality for toddlers to possess while learning a difficult skill, or experiencing frustration in general. A toddler cannot persist through a difficult task if he/she is not in control of his/her inhibitions, actions, and/or words. While it is relatively under-examined, persistence in infancy and toddlerhood has been found to be stable, as well as related to standardized developmental tests of cognition (Banerjee & Tamis-LeMonda 2007). In another study, task persistence at six months predicted task persistence at 12 months, which then predicted cognitive abilities at 30 months (Messer, McCarthy, McQuiston, MacTurk, Yarrow, & Vietze, 1986). By early preschool age, some children should be able to autonomously persist at overcoming a frustrating obstacle to their goal whereas other children may resign effort.

The present study examined the degree to which earlier parenting behavior, specifically structuring, accounts for children's subsequent task persistence. Persistence is an important skill to study in toddlers, as it has implications in many settings and life situations; if a toddler can persist through a challenging task such as learning to read and write, he/she will master that task with greater speed and efficacy. Persistence and self-regulation are two arguably very important qualities a toddler must possess in order to master difficult tasks, as is necessary to be successful in school and in life.

The current study is interested in toddlers' abilities to persist through challenging situations because the absence of this skill has been shown to lead to undesirable behaviors later in life (Calkins & Johnson, 1998). In a study wherein toddlers were subject to challenging tasks, it was found that distress in these challenging tasks was related to externalizing behaviors, such as

aggression or acting out (Calkins & Johnson, 1998). Distress was also negatively related to the use of adaptive strategies such as constructive coping or distraction (Calkins & Johnson, 1998). In the same study, if mothers used positive guidance, toddlers were more likely to use distraction in a frustrating task by looking away or talking about things other than the frustrating task at hand. On the other hand, mothers who tended to overtly do things for their toddlers rather than allowing the toddler to do it him/herself often had toddlers who were more likely to show distress during the frustrating tasks.

These findings indicate that mothers' guidance, whether sensitive or insensitive, influences toddlers' behavior in challenging situations. They also present the possibility that mothers' positive guidance could help toddlers handle challenging situations autonomously—in terms of self-regulation—later in their childhood. In contrast, parental interventions that are inadequate or overly complicated, i.e. less sensitive may hinder toddlers' skill at self-regulation later in childhood. More specifically, if mothers encourage the skills that need to be applied to autonomous self-regulation during the developmentally sensitive years of toddlerhood, children should be able to plan, focus, and manage the frustration they may face when working on a difficult task on their own.

Present Study and Hypotheses

In sum, during toddlerhood, there are many situations that require self-regulation; these situations can often bring about emotions such as frustration and anger in toddlers. This can occur because toddlers have begun to develop a strong sense of self-efficacy by this age (Kopp 1982). Mastering difficult skills, such as early use of tools, or understanding the rules of a game

or activity, can be frustrating if children do not succeed initially. This relates to why self-regulation is important: if the toddler cannot regulate his/her emotions during the task, it is possible he/she will have difficulty mastering the task, or lack the desire to continue trying to do so. For instance, a child learning to read may not want to continue trying if his/her frustration is too great. However, if a child is frustrated while learning to read, but regulates his/her actions enough to continue through the challenging parts, he/she will learn to read with much more ease.

We predict that children whose mothers structure their self-regulation sensitively during toddlerhood, specifically at child age 24 months, will persist at working on a difficult task at age 36 months. In contrast, children whose mothers who do not structure their self-regulation sensitively in toddlerhood, will be less likely to persist at the task at age 36 months. Furthermore, we predict that toddlers (age 24 months) who successfully use their mothers' structuring attempts by engaging in self-regulation, will have a greater likelihood of persisting when on their own at age 36 months; that is, toddler success after structuring will moderate the effects of maternal structuring on children's subsequent self-regulation during a difficult task.

Chapter 2

Methods

Participants

Families from rural central Pennsylvania were recruited to participate in a larger longitudinal study investigating the development of emotion regulation in early childhood. In order to be selected for participation, families had to have a child who was 18 months of age at the first visit and family income that was above the federal poverty level but at or below the national median income level for the family's size. In addition, the child must have been in the family's care from at least the age of three months. Finally, the child could not have any preexisting conditions that would interfere with the study participation, such as developmental delays or sensory impairments.

Initially, 128 families were recruited for the study. Data from three families were omitted due to the families' incomes being outside the income inclusion criteria (i.e. family income was above the national median income level), and data from five other families were omitted because the families did not complete at least three visits between child ages 18 and 48 months. Of the 120 families remaining, there are additional missing data for the analyses for this thesis. Specifically, data from three mothers and children were missing because one or both tasks were not completed during the visit (e.g., children were already fussy and the task was not attempted). Data from two more mothers or children were omitted due to abnormalities in task administration. Finally, data were omitted from three cases because they were not present for

one of the two time points of interest, leaving the final sample size at 112 families. One significant difference between the omitted families and the included families is that father's annual income and household annual income were significantly higher for families' whose data was omitted. In all other collected demographic data, there are no significant differences between the two groups. The majority of the 112 children participating in the study were identified as Caucasian (92.9% Caucasian, 7.1% African American, Hispanic, and Asian). Mothers' education ranged from completing some high school (2.7%, n=3), to completing high school (17.9%, n=20), to attendance of vocational school (4.5%, n=5), to completion of vocational school (10.7%, n=12), to completion of some college courses (20.5%, n=23), to completion of a college degree (39.3%, n=44), to completion of an advanced degree (4.5%, n=5).

For this thesis, data from two different tasks, each administered at both 24 and 36 months of child age, were analyzed. Specifically, to assess the contribution of maternal structuring to child self-regulation, data were taken from the Wait Task at child ages 24 (predictor variable) and 36 months (control variable). To assess children's task persistence, data were taken from the Transparent Locked Box Task administered at ages 24 (control variable) and 36 months (dependent variable). The details of the tasks and how variables were created are described next.

Procedures

Wait Task (Block & Block, 1980; Cole et al., 2011; Kopp, Vaughn, & Krakow, 1984). Delay tasks have frequently been used to study child self-regulation (e.g., Espy, Kaufmann, McDiarmid, & Glisky, 1999; Kochanska, Murray, Jacques, Koenig, & Vandegeest, 1996). Delay tasks require children to use effortful control, attention redirection and/or distraction in

order to be successful in the task. These happen to be some of the skills mothers harness when structuring. Thus, this Wait Task was chosen to encourage sensitive structuring. In the version used in the present thesis, mothers are present and told that they can act as they normally would in a situation in which they need the child to wait. The mother and child are in a small laboratory room that is plainly furnished with a child size table and chair and an adult table and chair. There are no toys in the room but there are a few educational posters on the wall. The research assistant gives the mother, who is seated at the adult table, written instructions for the wait task as well as a few questionnaires to complete. Mothers were coached earlier in the visit to avoid their laughing at the task and stimulating child positive emotion instead of the frustration the task is intended to evoke. The research assistant tells the mother "Here is the work that I told you about." The research assistant then places a gift wrapped in shiny paper on the child size table, saying, "Here is a surprise for you," and hands the child a single boring toy, saying, "And here is something for you to play with. I'll be back in a few minutes." At 24m, the boring toy is a single cloth cymbal. At age 36m, the boring toy is a pink plastic car with no wheels. The research assistant then leaves the room. The task is eight minutes long and timing begins when the mother tells the child about the gift, "This is a surprise for you, but you need to wait to open it until I'm done with my work." The procedure is filmed through a two-way mirror and trained coding teams subsequently coded the video records.

Transparent Locked Box. This task was developed as part of a child temperament assessment battery (LABTAB, Goldsmith & Rothbart, 1996) and the transparent locked box task was designed specifically to elicit child anger. It has been used in a variety of child development studies including those aimed at assessing self-regulation (Buss & Kiel, 2004; Cole, Dennis, Smith-Simon, & Cohen, 2009; Goldsmith & Rothbart, 1996). In the present study, the mother

was present but occupied by a task at child age 24m and the child was alone during the task at age 36m. The task was used to study individual differences in children's task persistence, an index of self-regulation, at ages 24m and 36m.

After a non-challenging task, the research assistant brings a large, clear acrylic box with a lock, two sets of keys (one correct set and one incorrect set), and two small figurines into the room. The research assistant places the two toys equidistant from the child, and asks which of the two the child prefers. The research assistant then places the preferred toy inside the box, and teaches the child how to lock and unlock the box, using the correct set of keys. Once the child is able to open the box with the key, the research assistant tells the child "I'll be back in a little bit. I will let you work on that for a while. When you open the box, you can play with the toy inside!" The research assistant gives the child the incorrect set of keys and immediately leaves the room, removing the undesired toy. After two and a half minutes, the research assistant returned, saying, "Did you open the box? Why couldn't you open it?" After the child responded, the assistant said, "Uh oh! It was my fault! I gave you the wrong set of keys. I'm sorry! Why don't you try this one?" Occasionally children attempted to leave the room during this task, in which case the research assistant said, "Just sit down and wait for a minute and I'll be right there." If the child attempted to leave a second time, the procedure was ended. After giving the child a chance to open the box with the correct set of keys and helping if necessary, the child receives the desired toy and the procedure is over. The procedure is filmed through a two-way mirror and trained coding teams subsequently coded the video records.

Measures

Structuring Coding. The structuring coding system was designed to assess mothers' structuring of toddlers' emotion regulation skills (Cole & Reitz, 2007). The structuring coding system has been used on multiple tasks that were a part of the overall D.O.T.S. project, including the Wait Task and the Reading Task. The Wait Task is broken up into 32 15-second time blocks called epochs. Coders first determined if structuring, directing, or neither happened. Structuring is how a parent attempts to harness a child's self-regulation skills. The six skills that can be harnessed are attention focusing, attention redirecting, distraction, planning, language, or inhibition. Directing is coded if the mother issues a command to the child, and then nothing else is coded for that epoch. If both structuring and directing occurred, only the structuring would be coded. If structuring did not occur, the rest of the epoch would not be coded. If structuring occurred, the coder then determined which of the six skills the mother was attempting to harness. Coders then determined what methods the mother used to supplement her efforts: positive or negative emotion, physical movement, or use of language. These are each coded on a scale from zero to two in every epoch. Mothers could attempt to harness more than one skill per epoch, as well as use more than one method. Child success was coded for each epoch, as well as quality of maternal structuring; both were coded on a scale from zero to four. If a mother received a zero for structuring quality, this indicates that no structuring happened, or directing happened. Because the present study is focused on the occurrence of structuring, any epoch coded with a zero for maternal structuring quality was not included. Finally, coders determined whether or not the epoch was on-task (i.e. If the mother was helping the child inhibit his/her proponent response to play with the light switch in the room, this would be coded as "off-task."). The only codes used in the present study were child success and quality of maternal structuring.

Child Task Persistence. An index of child task persistence was derived from the project's behavioral coding system, which classified all child behavior in all challenging tasks but did not code nonverbal expressions of emotion (Cole, Wiggins, & Radzioch, 2005). For the thesis analyses, task persistence was defined by two codes from this system, specifically: Attempt to fix (AF), which was defined by children's efforts to solve whatever problem they encountered in a task, and attempt to fix alternative (AFA), which was defined by efforts that were creative and not necessarily afforded by the task conditions. For the Locked Box task, AF was coded when children actively and appropriately (e.g., not by breaking) tried to unlock the box with the set of keys, and AFA was coded when children tried alternative strategies such as seeing if they could pry open the box's lid or open it from the hinges. Either, neither, or both of these could be coded in any of the 10 available 15s epochs in the Locked Box Task. Therefore, as these two codes were combined to create the AF Total score, the maximum AF Total could be 20 if children exhibited both appropriate and unconventional attempts to open the box in all 10 15s epochs.

Chapter 3

Results

Descriptive Statistics

First, the descriptive statistics for all study variables are summarized in Table 1. This table provides information for both age points (24 and 36 months). It also includes variables that were explored in post-hoc analyses.

Child Task Persistence in Locked Box Task. The variable analyzed in the Locked Box Task is the AF Total Score: a combination of attempt to fix codes and attempt to fix alternative codes. Either, neither, or both of these could be coded in each of the 10 15s epochs of the Locked Box Task. Therefore, a child could receive a maximum AF Total score of 20, if he/she exhibited both attempt to fix and attempt to fix alternative behaviors in all 10 15s epochs.

As shown in Table 1, the average attempt to fix score in the Locked Box Task at child age 24m suggests that the majority of children spent a little under half the task attempting to open the locked box with the keys ($M = 4.66$), with notable between-person variability ($SD = 2.89$, range 0.00 – 10.00). Twelve children never tried to open the locked box with the keys, and one child continued to try to use the keys to open the locked box during each of the 10 available 15-second epochs. There was no statistically insignificant increase, $t(111) = -0.73$, $p = 0.47$, in attempt to fix behaviors exhibited at child age 36m in the Locked Box Task ($M = 4.91$), but between-person variability was again noted ($SD = 2.97$, range 0.00 – 10.00). Fourteen

children never attempted to open the locked box with the keys, and four children continued to try to use the keys to open the locked box during each of the 10 available 15s epochs.

As can be seen in Table 1, the average attempt to fix alternative score in the Locked Box Task at child age 24m suggests that the majority of children spent less than a quarter of the available time trying to open the locked box in an alternate way (M = 1.54), but again there is considerable between-person variability (SD = 1.86, range 0.00 – 8.00). Of the 112 children, 47 never attempted to open the locked box in an alternate way, and one child did so during 8 of the 10 available 15s epochs. There was a trend toward a significant increase in alternative attempts, $t(111) = -1.77$, $p = 0.079$, between child ages 24m and 36m (36m M = 1.96), with between-person variability (SD = 1.80, range 0.00 – 9.00). Of the 112 children, 28 never used alternate strategies and one did so during 9 of the 10 available 15s epochs.

The average AF Total score in the Locked Box Task at child age 24m suggests that most children spent most of the time trying to open the box (M = 6.27), with notable between-person variability (SD = 2.75, range 0.00 - 11.00). Only one child had a score of 0, indicating no effort, and seven children received a composite score of 11 (with possible range being 0 – 20). The average AF Total score in the Locked Box Task at child age 36m showed a slight, but not significant, $t(111) = -1.72$, $p = 0.088$, increase from child age 24m (M = 6.91), with between-person variability (SD = 3.569, range 0.00 – 15). Seven toddlers never engaged in AF behaviors, and one toddler received a composite score of 15.

Structuring Quality in Wait Task. As can be seen in Table 1, the average structuring quality score for the Wait Task at child age 24m indicated moderate quality (M = 2.43 on a scale of 1-4) with considerable between-person variability (SD = 0.50, range 1.00 - 3.53). Only one mother consistently received the lowest quality score for all her structuring attempts and no

mother received the highest value every time. The average structuring quality score for the Wait Task at child age 36m indicated slightly higher, but not significantly higher, quality, $t(111) = -1.22$, $p = 0.224$, than at 24m ($M = 2.49$ on a scale of 1-4), with between-person variability ($SD = 0.337$, range 1.67 - 3.43). Two mothers received an average quality score of 1.67, and one mother received an average quality score of 3.43. No mothers received exclusively low or exclusively high quality scores.

Structuring Success in Wait Task. As reported in Table 1, the average structuring success score for the Wait Task at child age 24m indicated moderate child success ($M = 1.67$ on a scale of 0-4) with between-person variability ($SD = 1.02$, range 0.00 – 4.00). Eight 24-month-olds were unsuccessful (received the lowest success score) every time they were structured and two 24-month-olds were highly successful (received the highest success score) every time they were structured throughout the task. The average structuring success score for the Wait Task at child age 36m showed a statistically significant increase, $t(111) = -5.013$, $p < 0.00$, from 24m success ($M = 2.20$ on a scale of 0-4), and between-person variability ($SD = 0.80$, range 0.20 – 3.50). One 36 month old received a 0.20 average success score, and two 36 month olds received average success scores of 3.50.

Correlations

Zero-order Pearson correlations for all study variables are presented in Table 2. Structuring quality at child age 24m was significantly correlated with structuring success at child age 24m, $r(111) = .50$, $p < 0.001$. This means that the more sensitively a mother structured, the more likely her toddler would be successful, and the less sensitively a mother structured, the less likely

her toddler would be successful in the task. Structuring quality at child age 24m was significantly correlated with structuring quality at child age 36m, $r(111) = 0.28$, $p = 0.003$. This indicates that mothers' sensitivity was statistically stable over time. Structuring quality at child age 24m was significantly correlated with structuring success at child age 36m, $r(111) = 0.20$, $p = 0.039$, suggesting potential influences of maternal structuring quality on child success over time. Greater sensitivity predicted greater success at the next age point, while lesser sensitivity predicted lesser success at the next age point. Structuring success at child age 24m was significantly correlated with structuring success at child age 36m, $r(111) = 0.25$, $p = 0.007$. This means that toddlers' structuring success was modestly but significantly stable over time. Structuring quality at child age 36m was significantly correlated with structuring success at child age 36m $r(111) = .21$, $p = 0.025$. This means that the more sensitively a mother structured, the more likely her toddler would be successful, and the less sensitively a mother structured, the less likely her toddler would be successful in the task.

Hierarchical Linear Regressions

To test the study hypothesis that high quality maternal structuring in the Wait Task at child age 24m would account for greater task persistence in the Locked Box Task at child age 36m, hierarchical linear regression was used. To control for the concurrent influences of the predictor (24m maternal structuring) and outcome (36m child persistence), each variable's concurrent score was entered in the first step as a control variable. Then maternal structuring at the earlier age point (24m) was entered as the target predictor. The results of this analysis are presented in Table 4. As can be seen, the model did not account for significant variance in children's task

persistence at age 36m, $R^2 = 0.04$, $F(3, 108) = 1.56$, $p = 0.203$. Closer inspection of the results indicated that only one variable trended toward significant variance in child persistence at age 36m: child persistence at age 24m, $b = 0.12$, $t(111) = 1.62$, $p = 0.109$.

To explore the possibility that a trimmed model that might better predict child persistence at age 36m, a second hierarchical linear regression analysis was conducted. In this model, structuring quality at child age 24m was omitted because it was not significant in the first model (see Table 5). However, the trimmed model again revealed that 24m child persistence trended toward accounting for variance in 36m child persistence, $R^2 = 0.03$, $F(2, 109) = 1.85$, $p = 0.162$; $b = 0.17$, $t(111) = 1.82$, $p = 0.072$.

Given the lack of evidence that maternal structuring contributed to child task persistence at age 36 months, several exploratory regressions were conducted. In Model 3, average structuring success for the Wait Task at child age 24m was added. The results were not significant (see Table 6), $R^2 = 0.03$, $F(2, 109) = 1.71$, $p = 0.186$; $b = 0.17$, $t(111) = 1.82$, $p = 0.072$. In Model 4, both structuring quality and structuring success for both age points were included. As can be seen in Table 7, the findings were not significant, $R^2 = 0.05$, $F(5, 106) = 1.15$, $p = 0.337$; $b = 0.15$, $t(111) = 1.60$, $p = 0.112$.

Finally, Model 5 included the interaction term for 24m structuring quality and structuring success. This exploratory model attempted to determine whether the effect of one of these factors was moderated by the other factor. As seen in Table 8, the results were not significant, $R^2 = 0.03$, $F(3, 108) = 1.23$, $p = 0.304$; $b = 0.17$, $t(111) = 1.82$, $p = 0.072$.

Chapter 4

Discussion

The present study investigated the prediction that developmentally sensitive maternal structuring of child self-regulation during a frustrating task at child age 24 months would predict child task persistence, an index of autonomous self-regulation, at child age 36 months, over and above the contributions of children's task persistence at age 24 months or maternal structuring at child age 36 months. The results did not support the prediction. Notably, the only significant predictor of child task persistence at age 36 months was child task persistence at age 24 months, suggesting stability of this child characteristic over a year's period in early childhood. Maternal structuring quality did not account for any significant amount of variance in child task persistence, regardless of various approaches taken to assess its influence.

It is, of course, premature to conclude on the basis of the present findings that parenting is not a significant predictor of children's development of task persistence. The finding shines light on the beauty of the child as an individual but also suggests careful consideration of the construct of structuring and how best to study it to determine if it is or is not an important parenting strategy for child self-regulation. First, we discuss limitations of the present study and then suggestions for future research, including studies that examine structuring as a parenting strategy.

One limitation in this study is the fact that the prediction spanned a year in the life of a child, attempting to predict behavior in one task to behavior in a different task. Although both tasks created self-regulation challenges for a young child, a better approach may have been to examine child self-regulation in a task that was similar to the task in which structuring had been provided. While the time between visits is important to the heart of the research question in this

study, the specific tasks might not be. Perhaps if there were a task more similar to the Wait Task that still required autonomous child task persistence, structuring quality might have shown a contributing effect.

Another possible explanation for the lack of support for the study's hypotheses may be the age period studied. Potentially, the relation between maternal structuring and child task persistence accumulates over the course of early childhood and would be more apparent if later ages were included in the study design. The within-age correlation between structuring and task persistence was not significant at child age 24 months, but approached significance by child age 36 months. Future research might consider looking at the history of maternal structuring as well as the concurrent relations with child task persistence later in the preschool years, e.g. at ages 48 and 60 months.

It is noteworthy that many of the 24-month-olds in this study had already established some ability to persist at a task despite difficulty, and that there was a non-significant suggestion of some stability (perhaps just for some children) over time in task persistence regardless of how well or poorly their mothers structured them. Toddler task persistence may reflect effortful control, a temperamental characteristic of children defined as the ability to inhibit a dominant response and/or to act on a subdominant response, to plan and detect errors in one's work (Rothbart & Bates, 2006). Researchers have proven effortful control to be stable by 45 months of age (when measured at 22, 33, and 45 months), which suggests it is an individual trait rather that may not be highly influenced by external factors such as maternal structuring (Kochanska & Knaack, 2003). This interpretation is consistent with the trends in the data in the present study. If task persistence requires effortful control, i.e. regulating frustration in order to achieve a goal that is blocked, then it may be that toddler effortful control was a contributing factor to stability

of task persistence for at least some children. These similar findings validate the notion that both effortful control and task-persistence are integral components to the development of self-regulation, defined as a person's ability to control one's words and actions in a situational-appropriate way, including the ability to follow instructions and/or inhibit one's desires without being encouraged to do so by a parent or external force (Kopp, 1982).

Controlling one's actions in a situation such as the Locked Box Task may be demonstrated behaviorally by continuing to try to solve the problem at hand (e.g. attempting to open the box with the keys, or in another fashion). However, these findings suggest that what the authors had deemed as "giving up" may actually have been an intelligent, self-regulating decision in the Locked Box Task. When confronted with a frustrating situation, some children persisted, attempting to open the box during all of the 10 available 15-second epochs in the task. However, some children did not attempt to open the box at all during the 2.5 minutes, or attempted during only one or two of the 15-second epochs. To clarify what these children might have done instead of persisting, the authors reviewed video data of randomly selected children who used attempt to fix or attempt to fix alternative behaviors during five or less epochs, and all video data of children who did not engage in any attempt to fix or attempt to fix alternative behaviors. Several of the children who never attempted to open the box seemed to simply be waiting for the research assistant to return to the room before they attempted. This is of course one limitation of a task such as this with young children; the researcher assistants were required to ask the children if they understood the task before they left the room, but even if a 36-month-old nods her head, one cannot be sure if she truly understands. If a child believes he or she is supposed to wait during this task, then one could say that those children who never attempted to open the locked box were actually very well regulated.

One of the children who engaged in the present study's definition of persistent behaviors during less than five epochs gave insight into other ways to operationalize self-regulation. This particular child tried feverishly to get the box open with the keys for the first few seconds of the task. Upon realizing that that solution was not working, he began to distract himself by singing and looking around the room. He even sang to himself, "I have to wait, I have to wait," and talked to the toy inside the box. A child of 36 months of age, who has learned that some tasks require the assistance of an adult, recognizes his limits and chooses to avert his attention away from the frustrating task, could certainly be self-regulating. In future studies, researchers could broaden the view of self-regulation behaviors, possibly including behaviors such as distraction, to gain a more generalized understanding of toddler's behavior in frustrating tasks.

Researchers have found results similar to those of this study. Maternal sensitivity, measured using the MBQS (Pederson & Moran, 1995), was found to be moderately related to toddler effortful control (Bernier, Carlson & Whipple, 2010). In the same study, however, maternal autonomy support, which refers to maternal behaviors which aim to support children's goals, choices, and sense of volition (Grolnick & Ryan, 1989), was found to strongly correlate with toddlers' effortful control (Bernier, Carlson & Whipple, 2010). Maternal sensitivity, as defined in the present study, would capture maternal autonomy support, but still did not relate to effortful control, as defined in the present study. Similarly to the present study, Bernier et al found that one particular aspect of sensitive parenting correlated more strongly with toddler effortful control than did sensitivity measures themselves (Bernier, Carlson & Whipple, 2010). Perhaps replications of the present study would benefit from parsing sensitivity into more specific maternal behaviors.

It is clear that sensitivity of structuring cannot wholly account for the relation between maternal structuring and toddler self-regulation. Coders reliably determined how sensitively mothers structured their toddlers during the Wait Task, which was unrelated to child task persistence. However, it would be interesting to determine the relationship between the particular skills mothers harness during structuring, such as distraction and inhibition, and toddler self-regulation, or whether the structuring of a particular skill accounts for more variance than another. Furthermore, it could be useful to analyze the relationship between a particular structuring strategy, such as the use of positive emotion or physical movement, toddler self-regulation. Structuring is a relatively new way of conceptualizing parenting practices related to the development of children's self-regulation (Hoffman, Crnic, & Baker, 2006). It remains to be determined whether structuring is a unique parenting tactic that contributes to children's self-regulation, although related constructs have been shown to contribute to children's learning (Martin, Ryan, & Brooks-Gunn, 2007; Pluess, & Belsky, 2010).

On the basis of the results, it is likely that variables present in the Locked Box Task, other than strategic behavior, may have a connection to structuring. For instance, there is much negative emotion displayed in the Locked Box Task, as it is meant to elicit feelings of frustration and anger. Relatedly, sensitivity of structuring, the key component in determining the quality score, could relate to the expression of emotion in the Locked Box Task. Maternal scaffolding has been proven to be a significant predictor of child emotional dysregulation; mothers who scaffolded ineffectively had children with higher dysregulation scores at a later time point (Hoffman, Crnic, & Baker 2006). High quality structuring scores are received when the mother is attuned to her child's needs, which could include things like emotional comforting, and well-

timed words of encouragement, and high quality, effective, scaffolding involves "a mother providing the optimal level of support and assistance necessary to allow her child to succeed beyond what she or he would have been capable of achieving alone. Based on the notable similarities between structuring and scaffolding, these results would likely be supported by a similar model measuring structuring rather than scaffolding.

The research on parenting is far from young, but there is still much to be learned. Relatively new constructs, such as structuring, require further exploration. These findings represent a step toward understanding the connection between maternal structuring and child outcomes, and provide insight into children as individuals, suggesting that they have innate stability in their task persistence abilities.

Appendix A

Tables

Table 1 Descriptive Statistics

Variable	Mean	SD	Minimum	Maximum
Quality 24m	2.43	0.495	1.00	3.53
Quality 36m	2.49	0.337	1.67	3.43
Success 24m	1.67	1.021	0.00	4.00
Success 36m	2.20	0.800	0.20	3.50
Attempt to Fix 24m	4.66	2.890	0.00	10.00
Attempt to Fix 36m	4.91	2.967	0.00	10.00
AFA 24m	1.54	1.855	0.00	8.00
AFA 36m	1.96	1.801	0.00	9.00
AF Total 24m	6.21	2.745	0.00	11.00
AF Total 36m	6.88	3.569	0.00	15.00

Table 2 Wait Task Variable Correlations

	Quality 24m	Quality 36m	Success 24m	Success 36m
Quality 24m	1	0.277**	0.503**	0.196*
Quality 36m	0.277**	1	0.051	0.212
Success 24m	0.503**	0.051	1	0.253**
Success 36m	0.196*	0.212	0.253**	1

*$p < .05$. **$p < .01$.

Table 3 Lock Box Variable Correlations

	Attempt to Fix 24m	AFA 24m	Attempt to Fix 36m	AFA 36m	AF Total 24m	AF Total 36m
Attempt to Fix 24m	1	-0.397**	0.223*	-0.027	0.785**	0.172
AFA 24m	-0.397**	1	-0.057	0.063	0.257**	-0.015
Attempt to Fix 36m	0.223*	-0.057	1	0.065	0.197*	0.864**
AFA 36m	-0.027	0.063	0.065	1	0.014	0.559**
AF Total 24m	0.785**	0.257**	0.197*	0.014	1	0.171
AF Total 36m	0.172	-0.015	0.864**	0.559**	0.171	1

*$p < .05$. **$p < .01$.

Table 4 Regression Model 1: Summary statistics, correlations and results

Variable	Mean	SD	Correlation with AF Total 36	Multiple Regression Weights	
				b	β
AF Total 36m	6.875	3.569	-	-	-
AF Total 24m	6.205	2.745	0.171	0.200	0.154
Quality 36m	2.491	0.337	0.107	1.052	0.099
Quality 24m	2.431	0.495	-0.053	-0.630	-0.087

Table 5 Regression Model 2: Summary Statistics, Correlations and Results

Variable	Mean	SD	Correlation with AF Total 36	Multiple Regression Weights	
				b	β
AF Total 36m	6.875	3.569	-	-	-
AF Total 24m	6.205	2.745	0.171	0.226	0.173
Quality 24m	2.431	0.495	-0.053	-0.437	-0.061

Table 6 Regression Model 3: Summary Statistics, Correlations and Results

Variable	Mean	SD	Correlation with AF Total 36	Multiple Regression Weights	
				b	β
AF Total 36m	6.875	3.569	-	-	-
AF Total 24m	6.205	2.745	0.171	0.226	0.123
Success 24m	1.668	1.021	-0.023	-0.122	-0.331

Table 7 Regression Model 4: Summary Statistics, Correlations and Results

Variable	Mean	SD	Correlation with AF Total 36	Multiple Regression Weights	
				b	β
AF Total 36m	6.875	3.569	-	-	-
AF Total 24m	6.205	2.745	0.171	0.196	0.126
Quality 36m	2.491	0.337	0.107	1.283	1.093
Quality 24m	2.431	0.495	-0.053	-0.639	0.827
Success 36m	2.201	0.800	-0.085	-0.471	0.446
Success 24m	1.668	1.021	-0.023	0.112	0.395

Table 8 Regression Model 5: Summary Statistics, Correlations and Results

Variable	Mean	SD	Correlation with AF Total 36	Regression Weights 1		Regression Weights 2	
				b	β	b	β
AF Total 36m	6.875	3.569	-			-	-
AF Total 24m	6.205	2.745	0.171	0.226	0.123	0.224	0.124
Quality 24m	2.431	0.495	-0.053	-0.416	-0.790	-0.675	1.271
Success 24m	1.668	1.021	-0.023	-0.021	-0.006	-0.396	1.492
QualXSuc 24m	4.307	3.099	-0.027	-	-	0.152	0.582

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Gold's Gym Kids' Club **Camp Hill, PA**
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