THE ASSOCIATIONS BETWEEN PARENT-INFANT ATTACHMENT, INFANT TEMPERAMENT, AND EFFORTFUL CONTROL AT THREE YEARS OF AGE

by

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ABSTRACT

There is significant variability in children's capacities for effortful control – the ability to suppress a dominant response and perform a subdominant response. With wide-stretched influences throughout the lifespan, it is important to understand what factors contribute to the development of a healthy capacity for effortful control. Effortful control has a relatively late pattern of development compared to other aspects of temperament, beginning around 12 months of age and ending around 3 years of age. For this reason, constructs that precede effortful control in development can contribute to the developing capacity. The current study examined whether mother- and father-infant attachment relationships and expression of other temperament constructs (negative effect and surgency/extraversion) were contributing factors to the development of effortful control. Data was collected from mothers (n =33), fathers (n =33), and children (n=33), over a time span of two years. Infant temperament was measured at 6-months of age, qualities of mother-infant and father-infant attachment relationships were assessed around 12- and 13-months of age respectively, and toddler capacity for effortful control was measured around 36-months of age. Two attachment interaction behaviors, proximity-seeking with father and resistance with mother, were positively correlated with capacity for effortful control.

The Associations Between Parent-Infant Attachment, Infant Temperament, and Effortful Control At Three Years of Age

Effortful control – the ability to suppress a dominant response and perform a subdominant response – has been a popular area of focus for developmental researchers due to its crucial underpinning in the development of internalization of moral standards (Derryberry & Reed, 1994), socialization (Kochanska et al., 1996), emotion regulation (Eisenberg, Fabes, Guthrie, & Reiser, 2000) and effortful attention (Rothbart, Derryberry, & Posner, 1994). These capabilities have been linked to individual differences in morally relevant behavior in adolescence and adulthood, such as drug use (Ayduk et al., 2000; Block, Block, Keyes, 1988) and empathy (Rothbart, Ahadi, & Hershey, 1994). Due to its lasting influence on human development and behavior, it is important to understand the intrinsic and extrinsic factors that contribute to the development of effortful control in children.

There are two aims of the current longitudinal study. First, we investigated the father-infant attachment and mother-infant relationships at 12 month of age as predictors of children's capacities for effortful control. Research has shown that maternal warmth and positive expressivity are predictors of a high capacity for effortful control (Brody & Ge, 2001; Eisenberg, Zhou, Spinrad, Valiente, Fabes, & Liew, 2005; Gottman et al., 1997). A noteworthy limitation of this body of research is that it focuses on the mother-infant attachment relationship and fails to examine the father-infant attachment relationship. Second, we investigated other temperamental constructs present at 12 months of age as predictors of children's capacities for effortful control at three years of age. Theoretical models of temperament suggest that an individual's actions are determined by individual differences in positive and negative affect (Rothbart & Rueda, 2005). However, it is also important to consider effortful control as a motivator of behavior, as it allows

individuals to suppress and initiate behaviors. Keeping this in mind, we investigated the relationship between effortful control and other temperamental constructs.

Effortful control is a characteristic of temperament and personality that underlies the capacity to suppress an often inappropriate dominant response and perform a subdominant response that is often more socially desirable (Kochanska, 2009). Unlike other aspects of temperament, it emerges relatively late in infancy, beginning development around 12 months of age, surging around 24 months, and continuing to develop throughout the toddler and preschool years (Rothbart, 1989). This relatively late pattern of development is partially due to the fact that contributing factors in the growth of effortful control are formed during the first few years of life, including other temperamental constructs (Derryberry & Reed, 1994), attachment relationships (Stayton, Hogan, & Ainsworth, 1971), parental control (Macoby, 1980), and capacity for effortful attention (Rothbart, Derryberry, & Posner, 1994). The capacity for effortful control increases as childhood progresses. During the preschool years, in a naturalistic environment, effortful control can be observed in the emergence of certain skills, such as following parental requests and sharing toys with peers. The current study examines effortful control at 3 years of age based on Posner and Rothbart's (1998) findings that at 30 months, children show significant improvement in effortful control compared to levels in infancy, and by 36 to 38 months most children achieved high levels of accuracy on tasks that measured effortful control.

Attachment

While twin studies have shown that there is a genetic component to capacity for effortful control (Goldsmith, Pollak, & Davidson, 2008), similar to other temperamental characteristics, it can be significantly modified by intrinsic and extrinsic factors, including the quality of the parent-child attachment relationship and the expression of other temperamental constructs. With the overwhelming amount of research linking the infant-caregiver attachment relationship to social, emotional, and cognitive development, it is important to understand how this relationship predicts an individual's capacity for effortful control (Hoffman, 2000; Lounds, Borkowski, Whitman, Maxwell, & Weed, 2005). The quality of the attachment relationship is determined by the caregiver's responsiveness and ability to meet the needs of the infant. Caregivers who provide consistent and predictable warmth and support instill a sense of trust and security in the infant and promote a secure attachment relationship (Skowron & Dendy, 2004). Caregivers who are unpredictable and inconsistent in their efforts to satisfy the needs of the infant, or who reject the infant, promote insecure attachment relationships (avoidant and resistant). According to Bowlby (1969), the relationship with the primary caregiver in infancy acts as a prototype for relationships in the future via the internal working model, mental representations of self and others, by influencing the individual's responsiveness to others later on in life (Mullis et al., 1999). A secure attachment relationship encourages cognitive, social, and emotional competence, including the development of awareness, self-recognition, and effortful control (Kochanska & Kim, 2013; Kochanska, Murray, & Harlan, 2000; Mittal, Russell, Britner, & Peake, 2013). These competencies are later reinforced when the child is surrounded by peers as they work together to navigate new environments such as school. As an adult, individuals who had a secure attachment in infancy are more likely to have basic trust, higher self-esteem, autonomy, strong relationships with others, and good coping skills compared to individuals who were insecurely attached in

infancy (Malekpour, 2007). Insecurely attached children are at a higher risk for experiencing aggression, non-compliance to the law, and negative immature behaviors in adulthood compared to securely attached children (Speltz *et al*., 1990).

Research has shown that characteristics of a secure attachment, such as maternal warmth, support, and sensitivity, are predictors of a greater capacity for effortful control (Belsky, Fearon, & Bell, 2007; Eisenberg, Smith, & Spinrad, 2011; Eisenberg, Zhou, Spinrad, Valiente, Fabes, & Liew, 2005). Research has also shown that avoidant and resistant infant-caregiver attachment relationships predict a lower capacity for effortful control due to dysregulation of emotions and because children are exposed to more negative emotions, such as fear, shame, and guilt (Viddal et al., 2015). A secure attachment, characterized by caregiver responsiveness, gives the child a sense of security, which supports the development of emotion regulation in the child (Schore, 2001). On the contrary, insecure attachment, characterized by unpredictable and unresponsive caregiving, more likely results in emotional dysregulation (Schore, 2001). Secure attachment has been found to predict exposure to more positive emotions than negative emotions whereas insecure attachment has been found to predict exposure to more negative emotions than positive emotions (Cassidy & Mohr, 2001; Kochanska, 2001; Sroufe, 2005; Zimmerman, Maier, Winter, & Grossmann, 2001). The increased exposure to negative emotions more commonly found in insecurely attached children can be detrimental to the child's capacity of effortful control, as the insecurely attached children are more often overwhelmed by intense negative emotions. On the other hand, children who are able to regulate their emotions are less frequently overwhelmed and develop a greater capacity to suppress a dominant response and perform a subdominant response (Rothbart, Derryberry, & Hershey, 2000).

Strange situation attachment classifications (e.g. secure attachment) are functions of the presence, duration, and intensity of four interaction behaviors displayed by the infant during the strange situation. These four interaction behaviors, proximity seeking, contact maintenance, avoidance, and resistance, are measured during the infant's interaction with his or her mother and father. Secure attachment is characterized by high levels of proximity seeking and contact maintenance behaviors with parent and low levels of avoidant and resistant behaviors toward parent.

While this research is compelling, there is an underwhelming amount of research on the father-child attachment relationship as a predictor of effortful control, despite the growing consensus that both parent-child attachment relationships are important (Brown, McBride, Shin, & Bost, 2007; Dumont & Paquette, 2012; Kochanska et al., 2008; Meuwissen & Carlson, 2015; Tamis-LaMonda, Shannon, Cabrera, & Lamb, 2004). There is evidence that father-child interactions provide children with unique experiences that may not occur in interactions with their mothers (Grossmann et al., 2002). Interactions with the father tend to be more physical and unpredictable, whereas interactions with the mother tend to be more predictable and involve more visual than physical stimulation (Lamb, 2004). In turn, father interactions have been shown to be particularly important in the development of executive functioning because the arousal and excitement levels are cognitively stimulating for children (Grossmann, Grossmann, Kindler, & Zimmermann, 2008; Meuwissen & Carlson, 2015). The current study is investigating the father-infant attachment relationship, as well as the mother-infant attachment relationship, to better understand if these unique experiences in father-child interaction predict capacity for effortful

control, supporting the evidence that both parent-child relationships are important in development.

Temperament

Temperament, specifically negative affect and surgency/extraversion dimensions, is the second predictor of effortful control examined in this study. Rothbart and Derryberry (1981) defined temperament as individual differences in emotional, motor, and attentional reactivity measured by latency, intensity, and recovery of response, and self-regulation processes such as effortful control that modulate reactivity. Rothbart and Bates (2006) have organized temperament into three broad constructs, negative affectivity, extraversion/surgency, and effortful control, each a function of levels of 14 smaller dimensions (Rothbart, 2007). Even broader, these three constructs can be described in terms of two overarching dimensions of temperament, reactivity and regulation, with effortful control classified as the regulatory aspect of temperament (Rothbart, 1981).

Research has shown that one dimension of temperament can influence the expression of other dimensions of temperament. For example, studies have shown that in preschool and school-aged children, effortful control and fear moderate the expression of approach and aggression, and promote the development of a conscience (Gartstein & Rothbart, 2003; Kochanska, 1993; Rothbart, Ahadi, & Evans, 2000). Exemplified by research conducted by Zhou, Lengua, and Wang (2009), and Martel and Nigg (2006), the reactivity aspect of temperament impacts the regulatory effortful control aspect of temperament, with low capacities for effortful control associated with greater reactivity and externalization. With individual

differences in each dimension of temperament becoming apparent at different ages, it is important to understand which dimensions of temperament predict a greater capacity for effortful control. By understanding which dimensions of temperament predict effortful control, adults can identify which children are likely to have lower capacities for effortful control and intervene to enhance their capacities.

The current study is primarily interested in the relationship between parent-infant attachment relationships measured at 12 months of age and capacity for effortful control measured at 36 months of age. Based on the collection of research conducted by Kochanska and Ainsworth, I hypothesized that infants displaying high levels of proximity seeking and contact maintenance behaviors to both mother and father will exhibit greater capacities for effortful control at 36 months of age. A secondary line of research in the current study is the relationship between temperament measured at 12 months of age and capacity for effortful control measured at 36 months of age. Based on the multitude of research conducted by Rothbart and Derryberry, I hypothesized that infants high in temperament dimensions that characterize surgency/extraversion (approach, vocal reactivity, high intensity pleasure, smiling and laughter, activity level, and perceptual sensitivity) and negative affect (distress to limitations, fear, and sadness) will exhibit lower capacities for effortful control at 36 months of age.

Method

Participants

The data examined in the current study is part of a larger longitudinal study that assesses multiple facets of development in children in six months to three years of age. For this study,

data was collected on four separate occasions, when the child was approximately 6-, 12-, 13-, and 36-months old.

Participants consisted of mothers (n = 33), fathers (n = 33), and their children (n = 33, 15 boys and 18 girls). Mothers' ages ranged from 23 to 46 years, with a mean age of 32 years (SD = 4.65). Fathers' ages ranged from 26 to 45 years, with a mean age of 35 years (SD = 4.36). When capacity for effortful control was measured, children's ages ranged from 3 to 3.5 years, with a mean age of 3.2 years (SD = .14). Participants' racial backgrounds were primarily Caucasian (93%), with 6% of participants identifying as African American and 1% identifying as Asian. Overall, the participant sample represented a high level of socioeconomic status. The majority of parents completed some form of higher education, with 15% of mothers and 13% of fathers completing some college, 33% of mothers and 47% of fathers earning a four year degree, and 49% of mothers and 31% of fathers continuing on to earn an advanced degree. Further, the majority of participants reported an annual household income greater than $50,000 a year (88%), with 3% of participants reporting a household income between $20,000 and $29,999 a year and 9% of participants reporting a household income between $40,000 and $49,999 a year.

Procedure

Participants were recruited using campus announcements, at a local fair for expectant mothers, and by flyers placed in local businesses. At each age, parents and their child visited our laboratory located on campus.

6-months. The first laboratory visit took place when the infant was 6 months old. Mothers completed questionnaires regarding demographic information and infant temperament at the beginning of the laboratory visit.

12- and 13-months. At 12-months, mother and infant participated in the video-recorded laboratory session measuring mother-infant attachment. At 13-months, father and infant participated in the video-recorded laboratory session measuring father-infant attachment. The parent-infant attachment relationships were measured using the strange situation procedure outlined in Ainsworth *et al.*, 1978. Parents were compensated $25 at the 12-month visit and another $25 at the 13-month visit.

36-months. The fourth laboratory visit took place when the child was 36-months old. Mother, father, and child participated in the 1.5-hour video-recorded laboratory session and were given a $50 gift card (to Amazon or Target) as well as several small toys for their participation. Following a play session and language testing, the child was connected to sensor to measure their heart rate. Next, the child completed a variety of tasks to assess effortful control and emotion regulation. For the purposes of the current study we will focus on the tasks that measure effortful control, the outcome variable of interest, including the day/night task, less is more task, bird/dragon task, and gift delay task (described below).

Measures

Infant temperament. Infant temperament was assessed using the revised edition of the Infant Behavior Questionnaire (IBQ-R), a parent-report measure that examines specific dimensions of temperament in infants between the ages of 3- and 12-months of age (Rothbart,

1981). Parents were asked to recall and report specific behaviors their infant exhibited within the last two weeks (e.g. When rocking your baby, how often did s/he take more than 10 minutes to soothe?) on a 7-point Likert scale, with possible responses ranging from never (1), to always (7), as well as a not-applicable option if the event did not occur within the 2 week period of interest. The IBQ-R is composed of 191 questions and 14 subscales (approach, vocal reactivity, high pleasure, smile and laughter, activity level, perceptual sensitivity, sadness, distress to limitations, fear, falling reactivity, low pleasure, cuddliness, duration of orienting, and sootheability). The current study examined temperament in terms of three broad dimensions: effortful control, negative affect, and surgency/extraversion (Gartstein & Rothbart, 2003). Subscales that measured the same broad dimensions of temperament were aggregated to form a composite surgency/extraversion score ($\alpha = .80$) and a negative affect score ($\alpha = .71$).

Parent-infant attachment. Mother-child attachment and father-child attachment were assessed in the strange situation (Ainsworth et al., 1978). The strange situation procedure was conducted in a small room with a one-way glass mirror and consisted of a series of eight episodes lasting approximately 3 minutes each: 1) Parent, baby, and experimenter, 2) parent and baby alone, 3) stranger joins parent and infant, 4) parent leaves baby and stranger alone, 5) parent returns and stranger leaves, 6) parent leaves and infant is left completely alone, 7) stranger returns, 8) parent returns and stranger leaves (Ainsworth & Bell, 1970). The procedure is video-recorded and attachment classifications are based on interaction behaviors exhibited by the infant in relation to his or her parent in reunion periods 5 and 8. The strange situation procedure was conducted at both the 12-month visit, with mom participating in the procedure, and again at the 13-month visit, with dad participating in the procedure. Parent-infant attachment behaviors

recorded during the second reunion episode of the strange situation (Ainsworth, 1978) were coded by two research assistants who were blind to the attachment classification system. 25% of the videos were coded for reliability and inter-rater reliability was high, ICCs ≥.80 based on a 95% confidence interval. The observed interaction behaviors used to classify attachment styles were proximity seeking, contact maintenance, avoidance, and resistance behaviors. Secure attachment is characterized by high levels of contact maintenance and proximity seeking and lower levels of resistance and avoidance. Conversely, insecure attachment is characterized by higher levels of avoidance and resistance and lower levels of contact maintenance and proximity seeking.

Effortful control.

Day/night task. The day/night task was developed by Gerstadt, Hong, & Diamond (2011) and is a stroop paradigm that requires that a child actively inhibit a dominant response and respond with an alternative subdominant response. The child was instructed to say "Day" when presented with a picture of a moon and to say "Night" when presented with a picture of a sun. The day stimulus had a black background and depicted a white moon surrounded by stars. The night stimulus had a white background and depicted a bright yellow sun. After the child was given these instructions he or she completed a maximum of 10 practice trials. Testing trials only began after the child responded correctly to the consecutive presentation of day and night stimuli. The task consisted of 16 test trials in a controlled random sequence. No feedback was given to the child during the task. A response was only counted as correct if the child stated "Day" or "Night" to the appropriate card. Alternative answers, such as "Morning" or "Bedtime",

were recorded as incorrect. The composite day/night score used in analyses was the proportion of correct responses during the task.

Less is more task. The less is more task was developed by Carlson, David, and Leach (2005) and requires that a child suppress a dominant action and initiate a subdominant action. The child was presented with two plates of stickers in a randomized controlled sequence, with one on their left side and one on their right side, and one plate containing five stickers and the other plate containing two stickers. The child was asked which pile they preferred (all children preferred the plate with five stickers). The child was told that the purpose of the game was to get as many stickers as possible. Then, the child was introduced to a stuffed bear named Chris and told that Chris was a naughty bear and liked to get all of the stickers for himself. The experimenter explained to the child that each time they are presented with two plates and asked to make a decision between the two, the stickers on the plate that they point to will go to Chris, and they will receive the stickers on the plate that they didn't point to. Children were given a maximum of four practice trials prior to the task. If the child failed all four practice trials they were reminded of the rules of the game and then the test trials began. A total of 16 test trials were administered, with 50% of the plates containing five stickers and 50% containing two stickers. The composite less is more score used in analyses reflects the proportion of correct responses given by the child during the task.

Gift-delay task. The gift delay task was developed by Kochanska and her colleagues (1996) and requires that a child delay and inhibit a desired dominant response. The children were told that they would be given a present because they had done so well on the previous "games" but that it still needs to be wrapped. The experimenter turned the child's chair around, asked the

child to face the other way, and told them not to peek while they were wrapping the present because it is a surprise. The experimenter then proceeded to wrap the present noisily in a standardized manner for 60 seconds, crinkling the paper, cutting the paper tearing off tap, flipping the box over, etc. A peeking score was assigned (0= turned around and peeked, 1= peeked over shoulder, 2 = did not peek) and latencies to peek were measured. The task was coded by two research assistants who were blind to participants' attachment scores and the overall effortful control scale. 25% of the videos were coded for reliability and inter-rater reliability was high, ICCs ≥ .80 based on a 95% confidence interval. Higher scores indicate better capacity for effortful control. The gift delay task score was calculated by standardizing and aggregating two dimensions of the task, 1) peeking score (0 = turned around to peek, 1 = peeked over shoulder, 2 = did not peek) and 2) latency to peek, α =.98 .

Bird/dragon task. The bird/dragon task was adopted from the bear/dragon task developed by Reed, Pien, and Rothbart (1984) and requires that a child suppress a dominant action while activating an alternative subdominant response. The children were introduced to a "nice" bird puppet and a "naughty" dragon puppet and were instructed to do what the nice bird says but not to do what the mean dragon says, (e.g. "*Touch your nose*." "*Wiggle your fingers.*"). The child completed a maximum of 4 practice trails. If the child failed all 4 practice trials a reminder was given and the test 16 trials began. The test trials consisted of 6 bird commands and 10 dragon commands in a random controlled order. Dragon performance was scored (0 = full movement, 1= wrong movement, 2 = self-correction, and 3 = no movement). The bird/dragon task score was calculated based on the child's behavioral responses to 10 dragon commands to which they were instructed to ignore. The child received a movement score for each of the 10 dragon trials (0 =

full movement, 1 = wrong movement, 2 = self-correction, 3 = no movement. The composite bird/dragon task score reflects the average movement score across the 10 trials.

Composite score. To create a comprehensive measure of children's effortful control at 36 months, all effortful control tasks (day/night, less is more, gift delay, and bird/dragon) were standardized and aggregated. The examination of internal consistency revealed that the tasks reliably measured the same construct, $\alpha = .62$. This composite effortful control score was examined as a measure of effortful control in analyses in addition to the individual task scores.

Results

To identify potential covariates to include in analyses, relationships between demographics (parent age, household income, parent education, parent race and ethnicity, child age, and child race and ethnicity) and the outcome variables were examined. Child age was significantly associated with the composite score of effortful control, $r = .34$, $p = .050$, and with the less is more (LIM) task measure of effortful control, $r = .40$, $p = .020$, with older ages associated with higher capacities for effortful control. No other significant correlations were found. Thus, child age was included as a covariate when the composite score of effortful control and the LIM scores were included in the partial correlation and multiple regression models.

Effortful control and parent-infant attachment

Descriptive statistics for all variables are reported in Table 1. Correlations among variables of interest were also examined, as reported in Tables 2 and 3. Effortful control, as measured by the LIM task, was related to two continuous measures of attachment behaviors, proximity seeking behaviors with father, $r = .35$, $p = .031$, and resistance behaviors with mother,

r = .35, p = .031. Contact maintenance behaviors with father were marginally related to LIM scores, r =.29, p = .062.

Scores on the Day-Night task were related to resistance behavior with mother, r = .30, p = .052. Additionally, the relationship between day-night scores and contact maintenance behavior with mother was approaching significance, r = -.24, p = .097. Scores on the gift delay task were marginally associated with resistance behaviors with father, r = .28, p =. 061, and approaching significance with avoidance behaviors with father, r =.23, p =.10. Correlations between composite EC scores and attachment behaviors were non-significant, ps ≥ .098, as well as bird-dragon scores and attachment behaviors, ps ≥ .21.

Hierarchical multiple regressions were conducted to assess whether attachment behaviors (mother and father proximity seeking, contact maintenance, resistance, and avoidance) were predictors of children's capacity for effortful control (composite effortful control score), after controlling for the child's age. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity.

In the first regression model, child's age was entered into step 1. Proximity seeking behavior with father and contact maintenance behavior with father were entered into step 2. Neither child's age, F change (1,30) = .070, nor proximity seeking or contact maintenance behaviors with father, F change (2, 28) = .63, were significant predictors of effortful control.

In the second regression model, child's age was entered into step 1, explaining 19.3% of the variance in effortful control, F change (1, 30) = .012. Proximity seeking behavior with

mother and contact maintenance behavior with mother were entered into step 2 and were not significant predictors of effortful control, F change (2,28) = .24.

In the third regression model, child's age was entered into step 1. Resistant behavior with father and avoidant behavior with father were entered into step 2. Neither child's age, F change (1,30) = .070, nor resistant or avoidant behavior with dad, F change (3,28) = 1.74, were significant predictors of effortful control.

In the fourth regression model, child's age was entered into step 1, explaining 19.3% of the variance in effortful control, F change (1, 30) = .012. Resistant behavior with mother and avoidant behavior with mother were entered into step 2 and were not significant predictors of effortful control, F change (2,28) = .41.

Effortful control and temperament

A partial Pearson correlation was conducted to examine the relationship between effortful control composite scores, less is more scores, negative affect, and surgency/extraversion while controlling for child's age (see Table 4 for correlations). The relationship between effortful control composite scores and negative affect was approaching significance, r = -.22, p = .11. A bivariate Pearson correlation was conducted to examine the relationship between day/night scores, bird/dragon scores, gift/delay scores, negative affect, and surgency/extraversion (see Table 4 for correlations). The relationship between bird/dragon scores and negative affect was approaching significance, r = .23, p = .11. Surgency/extraversion was not associated with effortful control.

A linear regression was used to assess the ability of the temperament construct negative affect to predict capacity for effortful control (composite effortful control score), after controlling for the child's age. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity. Child's age was entered into step 1, which accounted for 11.8% of the variance in effortful control, F change (1, 31) = .050. Negative affect was entered into step 2 and was not a significant predictor of effortful control, F change (1, 30) = .23.

Discussion

The current study sought to understand the relationship between temperament measured at six months, parent-infant attachment measured at 12 and 13 months, and effortful control measured at three years of age. Of particular interest was the father-infant attachment relationship as a unique construct from the mother-infant attachment relationship. Consistent with previous research, the correlational analyses conducted suggested that the father-infant attachment relationship was indeed unique from the mother-infant attachment relationship. While proximity seeking behaviors with mothers and with fathers were moderately positively correlated, contact maintenance behaviors with mothers and fathers were strongly negatively correlated, as well as avoidance behaviors with mothers and fathers. Resistance behaviors with mothers and fathers were unrelated. These results coincide with the findings of George, Cummings, & Davies (2010), that attachment is determined by the behavior of *each* parent rather than by a parental unit.

I hypothesized that toddlers' who exhibited greater levels of contact maintenance and proximity seeking behaviors and lower levels of resistance and avoidance behaviors would display higher levels of effortful control. These high and low levels of attachment behaviors characterize a secure attachment relationship (Ainsworth, Blehar, Waters & Wall, 1978). Correlational analyses revealed that effortful control and proximity seeking behaviors with fathers were moderately positively correlated with effortful control. In addition, effortful control and contact maintenance behaviors with fathers were marginally positively correlated.

First, these results suggest that because effortful control was associated with proximity seeking behaviors with fathers but not with mothers, the father-infant attachment relationship is unique from the mother-infant attachment relationship. The relationship between effortful control and father-infant attachment, and the lack thereof with mother-infant attachment, could be explained by the differences in the types of play and interaction that mothers and fathers facilitate with their children. With fathers spending a greater proportion of time engaging in play with their children compared to the proportion of time that mothers do (Paquette, 2004), and with this play being more "reciprocal" in nature (Grusec & Davidov, 2010), children are able to interact with their fathers on a more equal-status level, learn how to compete appropriately and follow the rules, and improve their capacities for self-regulation and compliance (Kochanska, Aksan, Prisco, & Adams, 2008) through this unique father-child interaction. Similarly, Russell, Pettit, and Mize (1998) reason that fathers engage in more "rambunctious" play with their children than mothers do, which arouses children and opens them up to adaptation when navigating their environments, allowing them to practice skills involved in peer relationships, and enhancing children's social competence. These skills that improve as a result of the unique

nature of father-child play, compliance, self-regulation, and appropriate social functioning, facilitate the development of effortful control.

Second, attachment behaviors characteristic of a secure attachment relationship are positively related to capacity for effortful control, suggesting a possible correlation between the two constructs. This relationship supports previous research findings that a secure attachment relationship promotes the healthy development of important sills, including effortful control (Kochanska & Kim, 2013; Kochanska, Murray, & Harlan, 2000; Mittal, Russell, Britner, & Peake, 2013). Securely attached children are better able to regulate their emotions, are less frequently overwhelmed, and in turn develop a greater capacity to suppress a dominant response and perform a subdominant response (Rothbart, Derryberry, & Hershey, 2000)

Correlational analyses also revealed a moderate positive correlation between resistance behaviors with mothers and effortful control. These findings challenged the original hypothesis. This hypothesis was based on research that found that securely attached children developed greater capacities for effortful control (Kochanska, Murray, & Harlan, 2000; Rothbart & Rueda, 2005; Spinrad et al., 2007; Zhou, Lengua, & Wang, 2009). Resistant behavior refers to the intensity, frequency, or duration of resistance to a person who tries to involve the toddler in play. Ainsworth et al. (1978) found that children often reject toys that are offered to them as a redirection of anger at the parent. Thus, infants who exhibited higher levels of resistance behavior at 12 and 13 months may continue to display this resistance behavior at 3 years of age. In the effortful control paradigm, initial rejection of toys and prizes could look very similar to high effortful control, exhibited in a low number of peeks in the gift delay task and choosing the smaller piles of stickers in the less is more task.

The second line of interest in the current study was the relationship between the temperamental constructs of negative affect, surgency/extraversion, and effortful control. Correlational analyses revealed non-significant relationships between both temperamental constructs and effortful control. These findings challenged the original hypothesis, and past research findings, that infants exhibiting high ratings of negative affect and surgency/extraversion would have lower capacities for effortful control (Gonzalez-Peña, Paredes-Gazquez, Carrasco, & Holgado-Tello, 2015; Rothbart, 1989, 2007). A noteworthy finding in regard to these insignificant results is that the relationship between negative affect and effortful control was approaching significance. One limitation of this study is the relatively small sample consisting of 33 toddlers. With a larger sample, the relationships trending towards significance could reach significance.

Limitations and Future Directions

The current study was limited by the homogeneity of the sample. Due to the relatively small, highly educated, affluent, Caucasian sample, a lesser than usual percentage of the participants were classified as insecurely attached infants. In the future, research should continue to add to the underwhelming body of work on father-infant attachment by examining the relationship cross-culturally, with a greater variation in participant socioeconomic status.

In addition to diversifying the participant sample, future researchers should also examine a larger sample of participants. The current study examined parent-infant attachment in terms of attachment interaction behaviors measured during the strange situation. Devised by Ainsworth (1978), these interaction behaviors can be calculated to form a composite attachment

classification. Due to the small sample size and inadequate numbers of insecurely attached toddlers, the current study was unable to investigate these classification variables. Future research should examine attachment as a secure/insecure classification in addition to the attachment interaction behaviors.

A third limitation to the current study was the use of a single parent-report measure of temperament when the infant was 6-months old. The IBQ-R questionnaire measures temperament on 14 subscales in infants ages 3-months to 12-months. Gartstein & Rothbart (2003) reported that significant age differences emerged for the broad IBQ factors. Specifically, infants demonstrated higher levels of surgency/extraversion and negative affect across the first year of life. With temperamental constructs emerging at different times and many during the second half of the first year, future research should follow up examination of infant temperament at 6-months with temperament measures at 12-months as well (Posner & Rothbart, 1991;Worobey, 1989).

Lastly, future researchers should ensure that effortful control measures distinguish between the expression of resistance behavior and capacity for effortful control. A possible solution to this limitation would be measuring children's emotions while they complete the effortful control task. High capacity for effortful control is positively associated with good emotion regulation skills. It is unlikely that a child who is performing well on effortful control tasks and who is calm and collected is exhibiting resistance behavior. On the contrary, resistant children are often times angry and frustrated.

In sum, capacity for effortful control is variable and related to constructs present early in infancy. With its adaptive and maladaptive influences extending over the entire lifespan, it is important for researchers to continue to examine the intrinsic and extrinsic factors that contribute to the development of capacity for effortful control (Eisenberg & Fabes, 1992). This study points an arrow to a very important direction of future research. Identifying preschoolers at risk for developing low capacities for effortful control would allow parents and teachers the opportunity to intervene and enhance those skills. Future research with a larger and more representative sample of participants could tap into relationships and clarify major influences in the development of effortful control that were unavailable to us with the current limitations.

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Appendix

Table 1. *Descriptive Statistics of Toddler's Effortful Control (EC), Attachment, and Temperament Measures*

Measure	*M*	*SD*	Minimum	Maximum
EC composite	-.0050	.680	-1.21	1.38
Less is more	0	1	-1.83	1.99
Day/night	0	1	-1.49	1.53
Bird/dragon	0	1	-1.06	1.57
Gift delay	0	1	-1.49	1.93
Mother contact maintenance	1.41	.84	1	6
Mother proximity seeking	2.30	1.43	1	4
Mother avoidance	3.73	2.12	1	7
Mother resistance	3.86	1.63	1	6
Father contact maintenance	3.63	2.14	1	7
Father proximity seeking	4.060	1.50	1	6
Father avoidance	1.52	1.09	1	5
Father resistance	2.27	1.44	1	5
Negative affect	3.56	.43	2.83	4.47
Surgency/extraversion	4.79	.64	3.64	5.99

Table 2. *Correlations Among Attachment Behaviors*

Parent	Attachment Behavior	1.	2.	3.	4.	5.	6.	7.	8.
Father	1. Proximity seeking	-	0.79 *	0.35 *	-0.62 *	0.31*	-0.51 *	0.74 *	0.64 *
	2. Contact maintenance	0.79 *	-	0.46 *	-0.53 *	0.56 *	-0.46 *	0.66 *	0.69 *
	3. Resistance	0.35 *	0.46 *	-	-0.12	0.39 *	-0.28	0.22	0.28
	4. Avoidance	-0.62 *	-0.53 *	-0.12	-	-0.26	-0.013	-0.50 *	-0.50 *
Mother	5. Proximity seeking	0.31*	0.56 *	0.39 *	-0.26	-	-0.13	0.12	0.46 *
	6. Contact maintenance	-0.51 *	-0.46 *	-0.28	-0.013	-0.13	-	-0.60*	-0.52*
	7. Resistance	0.74*	0.66*	0.22	-0.50*	0.12	-0.60 *	-	0.68 *
	8. Avoidance	0.64 *	0.69 *	0.28	-0.50 *	0.46 *	-0.52*	0.68 *	-

* Significant at $p \leq .05$

Table 3. *Correlations Among Effortful Control (EC) Measures and Attachment Behaviors*

	Father				Mother			
EC Measure	Proximity seeking	Contact maintenance	Resistance	Avoidance	Proximity seeking	Contact maintenance	Resistance	Avoidance
EC Composite	.25 +	.22	.28 +	.065	.0060	-.18	.22	.028
Less Is More	.35 *	.29 +	.13	-.079	.014	-.055	.35 *	0.13
Day/Night	.13	.20	.012	-.014	.14	-.24 +	.30 +	.18
Bird/Dragon	-.011	-.029	.13	.032	.029	-.15	-.078	-0.0090
Gift Delay	.042	.0040	.28 +	.23 +	-.14	-.17	.035	-0.11

* Significant at $p \leq .05$

+ Approaching significance $p \leq .10$

Table 4. *Correlations Among Effortful Control (EC) and Temperament*

EC Measure	Negative affect	Surgency/extraversion
EC composite	-.22 +	-.20
Less is more	-.21	-.12
Day/night	-.19	-.12
Bird/dragon	-.23 +	-.12
Gift delay	.014	-.11

+ Approaching significance $p \leq .11$