

**LAWFUL PATTERNS OF EARLY ATTACHMENT DISORGANIZATION ARE  
RELATED TO EXTERNALIZING BEHAVIORS ACROSS CHILDHOOD**

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by  
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## ABSTRACT

Increasing importance has been placed on identifying precursors to childhood and adolescent problem behaviors as a step to intervene in early years and prevent maladaptive developmental outcomes. Using publicly available data from the NICHD Study of Early Child Care and Youth Development (SECCYD) longitudinal cohort, the current study investigates the patterns of disorganization from infancy to early childhood as precursors to childhood externalizing behaviors. With specific focus on both the stability and directionality of change in disorganization, latent growth curve modeling was conducted and showed overall main effects of continuous attachment disorganization as a precursor for heightened externalizing behaviors across middle childhood – specifically for male children. To further disentangle the impact of having an organized internal working model versus lacking one, organized models were repeated to exclude attachment security. Results remained generally the same, suggesting the grave importance of attachment disorganization beyond even unfavorable, insecurely organized internal working models.

## **DEDICATION**

I dedicate this project to my daughter Josephine Maebh.

In completing this project, you served as my biggest motivation.

Your future dreams and goals will one day be guided, in part,  
by my success and achievements.

I hope you now see there is no limit.

## ACKNOWLEDGMENTS

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# CHAPTER 1

## MANUSCRIPT IN JOURNAL ARTICLE FORM

### Introduction

Identifying developmental risk factors that contribute to adolescent problem behaviors is of grave importance, as adolescent behaviors are often shown to predict maladaptive adult outcomes such as criminal activity, psychopathology, or depression (e.g., Andrea, Allemand, Robins, & Fend, 2014; Lynam, Caspi, Moffitt, Loeber, & Stouthamer-Loeber, 2007; Mason, Hitch, Kosterman, McCarty, Herrenkohl, & Hawkins, 2010; Zara & Farrington, 2013). Researchers have identified disorganized attachment among mother-child dyads in the early years as a critical predictor of problem behaviors across development (for a review, see van IJzendoorn, Schuengel, & Bakersman-Kranenburg, 1999). Research has yet to examine the discontinuity or continuity in disorganization from infancy to early childhood as having differential predictive validity to maladaptive outcomes. The present study aims to fill the gap in prior research by examining lawful *patterns* of disorganization from infancy to early childhood as differential predictors of adolescent problem behaviors.

Psychological attachment representations are complex adaptive internal working models that children reflexively and unknowingly activate in times of need (Bowlby, 1969/1982). John Bowlby and his adherents theorized that these internal working models contain mental scripts of prior interactions that provide the child with expectations concerning an attachment figure's responsiveness and ability to meet their attachment-related needs (Bowlby, 1969/1982; Main, Kaplan, & Cassidy, 1985). These models engender specific patterned response behaviors when the child is faced with an

attachment related threat or insecurity that serve to preserve the child's relationship with the attachment object.

Attachment researchers identified three *organized* patterns of behaviors: Secure, Insecure-Ambivalent, and Insecure-Avoidant attachment and one *disorganized* pattern (Ainsworth & Bell, 1970; Ainsworth, Blehar, Waters, & Wall, 1978). Although organized insecure patterns of attachment are often linked with negative outcomes throughout the course of development (for a review see Waters, Merrick, Treboux, Crowell, & Albersheim, 2000; Weinfield, Sroufe, Egeland, & Carlson, 2008), it is the fourth group of children categorized as having a disorganized attachment that warrants particular concern. Babies with a disorganized attachment lack a coherent strategy or expectation of how their attachment figure will respond or meet their needs when they experience fear or emotional stress (Main & Solomon, 1990).

According to many theorists, failure to form an organized internal working model is due to an unresolvable paradox. The mother is simultaneously experienced as an instinctual source of comfort and security as well as a frightful figure who displays frightening or frightened behaviors (Lyons-Ruth, Bronfman, & Parsons 1999; Main & Hesse, 1990; Schuengel, van IJzendoorn, & Bakermans-Kranenburg, 1999; True, Pisani, & Oumar, 2001). Children who experience maltreatment or parental abuse in their environment (Carlson, Cicchetti, Barnett, & Braunwald, 1989; Cicchetti & Barnett, 1991; Crittenden & Ainsworth, 1989; Cyr, Euser, Bakermans-Kranenburg, & van IJzendoorn, 2010) or who have parents classified as having unresolved loss or trauma (established by the Adult Attachment Interview; Ainsworth & Eichberg, 1991; George, Kaplan, & Main, 1985; Lyons-Ruth & Block, 1996; Main & Hesse, 1990) are more likely to be categorized

as having disorganized attachment than other children. Disorganized attachments are also found among relatively low-risk samples in which the maternal behavior may be less extreme, yet still unpredictable and/or fear-provoking (van IJzendoorn et al., 1999).

Several mechanisms have been proposed to explain the pathway from early insecure or disorganized attachment to later problem behaviors (see Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010). Two proposed mechanisms are particularly pertinent to attachment disorganization. Taking a neurological perspective, DeKlyen and Greenberg (2008) suggest that early attachment adaptations set the stage for later coping strategies and emotion regulation, not only at the surface level of interpersonal relationships, but also by way of the neurological coping strategies related to fear arousal and stress. Unresolved fear-inducing experiences affect the development of fear conditioning in the amygdala and impair the linkage between limbic regions and the prefrontal cortex (Pattwell & Bath, 2017). This is especially pertinent in the case of disorganization in which fear arousal is common and there is no adaptive attachment strategy for fear/threat resolution, described by Hesse and Main (1999, p.484) as “fright without solution.” Assuming that limbic regions represent the core of the emotional self and the prefrontal cortex functions as the center of decision making and moderation of social behavior (Cozolino, 2006), research directly supports this explanation, showing strong associations between early disorganization and increased emotional reactivity (Forslund, Peltola, & Brocki, 2019) and poor emotion regulation (van IJzendoorn et al., 1999).

Taking a second, more social cognitive perspective, Dimaggio and Lysaker (2015) explain that early attachment experiences build behavioral expectations for future

attachment figures in future scenarios. Early attachment experiences create social cognitions that generalize to other interpersonal experiences throughout development. In the case of disorganized dyads, disruptive and unpredictable maternal behavior maladaptively shapes the social cognitive attributes disorganized children rely on in interpersonal situations (Sharp et al., 2016). In support of this view, research has linked early attachment disorganization with catastrophizing interpretations of interpersonal experiences (Brumariu & Kerns, 2011) and increased hostile attribution bias and aggressive behavioral responses to interpersonal situations (Zaccagnino, Cussino, Callerame, Actis Perinetti, Veglia, & Green, 2013).

Whether through disrupted emotion regulation, social cognition, or another mechanism, early disorganization has been repeatedly linked with an array of maladaptive developmental outcomes. Socioemotionally, children with a disorganized pattern of attachment display poorer social interactions as evidenced by lower quality parent-child communication, poorer interactions with friends and teachers, and poor emotion regulation skills (Lyons-Ruth & Jacobvitz, 2008; McElwain et al., 2003; O'Connor & McCartney, 2006; Moss, Cyr, & Dubois-Comtois, 2004). Cognitively, they exhibit impaired cognitive skills compared to their organized peers, such as impaired joint attention skills (Claussen et al., 2002) and deficient cognitive regulatory abilities (Jacobsen, Edelstein, & Hofmann, 1994). Most seriously, early disorganization has been linked with an increased risk for dissociative psychopathology in late adolescence and early adulthood (Blizard, 2003; Carlson, 1998; Liotti, 2004), including borderline personality disorder (Khoury, Zona, Bertha, Choi-Kain, Henninghausen, & Lyons-Ruth, 2019), dissociative identity disorder (Nakash-Eisikovits, Dutra, & Drew Westen, 2002),

eating disorders (Barone & Guiducci, 2008), and post-traumatic stress symptomology (MacDonald et al., 2008).

Research is mixed regarding the impact of early disorganization on internalizing and externalizing behaviors across child development. Some studies have linked disorganization to increased internalizing behaviors compared to peers with organized attachments (O'Connor, Scott, McCormick, & Weinberg, 2014; Groh et al., 2016), but two meta-analyses showed no link between disorganization and internalizing symptomatology (Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012; Madigan, Atkinson, Laurin, & Benoit, 2013). An early meta-analysis by van IJzendoorn and colleagues (1999) that included 12 prior studies of 734 children identified a robust association between disorganization and externalizing problems ( $r = .29$ ).

Although National Institute of Child Health and Human Development - Study of Early Child Care and Youth Development (NICHD-SECCYD) researchers failed to identify a link between externalizing problems and attachment (Belsky & Fearon, 2002; McCartney, Tresch Owen, Booth, Clarke-Stewart, & Lowe Vandell, 2004; NICHD Early Child Care Research Network, 2006), a second meta-analysis re-affirmed the association between disorganization and externalizing problems ( $d = .34$ ; Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010).

Inconsistencies in the literature may be due to an array of research considerations. Often, disorganized babies are grouped together with organized-insecure babies, either to make a secure vs. non-secure comparison or to gain statistical power in group sizes (e.g., Levendosky, Bogat, Huth-Bocks, Rosenblum, & Von Eye, 2011). Because the key distinction of disorganized attachment is the lack of a coherent and reliable internal

working model, it can be argued that disorganized babies should be investigated separately from their organized-insecure peers who have an established and reliable, albeit not ideal, internal working model of attachment.

Inconsistencies across studies may also be in part due to different outcome points at which externalizing symptoms are assessed. Rather than look at how early attachment predicts a single observation of externalizing behavior, Fearon and Belsky (2011) looked at how early attachment predicted the *trajectories* of externalizing behavior across middle childhood. At the starting outcome measurement in Grade 1, children with organized insecure-avoidant attachments at 15-months were the only children who showed increased higher externalizing behaviors. In contrast, children with 15-month disorganization showed *increases* in the growth of externalizing behaviors *across* childhood, from Grade 1 through Grade 6. When the researchers included contextual risk (income-to-needs ratio, father absence, maternal age, and maternal education) and gender as moderators of the attachment and externalizing behaviors correlation, they found that boys with high contextual risk and early disorganized attachments uniquely had significant externalizing growth trajectories (Fearon & Belsky, 2011).

The most obvious yet unacknowledged limitation of prior attachment research is the use of a single assessment of attachment during infancy. Using a single time-point attachment measure ignores the *developing* aspect of the internal working model. This is especially pertinent for disorganized babies. Even in high-risk samples prone to disorganized attachment representations, babies are often classified with a secure representation in early infancy yet present as disorganized by 18-20 months (Egeland & Sroufe, 1981; Lyons-Ruth et al., 1991). Overall stability of attachment disorganization

from infancy to early childhood ranges from 13%-20% in low-risk samples (NICHD, 2001; Vondra, Hommerding, & Shaw, 1999) to 67% in high-risk samples (Barnett, Ganiban, & Cicchetti, 2003). McCartney, Tresch Owen, Booth, Clarke-Stewart, & Lowe Vandell (2003) found that attachment at infancy did not predict problem behaviors at 15-months, but attachment during early childhood (24 months and 36-months) did. Likewise, Groh and colleagues (2014) showed that attachment at the 36-month assessment was more strongly related to Adult Attachment Interview (AAI) dimensions in late adolescence than the attachment at the 15-month assessment. Thus, examining attachment disorganization at only one time point may miss early risk indicators; examining attachment at later time points is more effective.

Given the cognitive nature of internal working models of attachment (Bowlby, 1969/1982), it is sensible that attachment styles could have different implications when classified at different ages throughout early development. As a child transitions from infancy to early childhood, the frontal lobe continues to develop ability with other related cognitive functions (e.g., Diamond & Taylor, 1996) and abstract representations (Bowlby, 1980). A meta-analysis showed a small slope of .002 for the relationship between age at attachment assessment and problem behaviors (Fearon et al., 2010). Therefore, it is likely that later attachment models may have more salience for children's subsequent development than attachment assessed at earlier ages, and two assessments will be more predictive than one, especially when the pattern of the assessments is considered.

Although it may be tempting to conclude that attachment researchers should use childhood assessments rather than infant assessment as a solution to this limitation, this

would ignore the importance of the overall growth of the internal working model during this critical period of infancy and early childhood. In the present study, I investigate the relationship between *patterns* of disorganized attachment from infancy to early childhood and the differential predictive validity these patterns have for maladaptive outcomes. Although there are many outcomes of concern, I focus on externalizing behaviors, as prior research has linked childhood externalizing behaviors with substance abuse, adolescent delinquency, and violent behavior (Thompson et al., 2010).

Prior research has identified child sex as a moderator of the relation between early attachment and later externalizing behaviors. The pathway from early attachment insecurity and disorganization has been established in boys (see meta-analysis for review: Fearon et al., 2010), but the findings are mixed when examining this relation in girls. Early studies failed to link attachment to externalizing behaviors in girls (Lewis, Feiring, McGuffog, & Jaskir, 1984), even in high risk samples such as the Minnesota Longitudinal Study (Renken, Egeland, Marvinney, Mangelsdorf, & Sroufe, 1989). Female samples commonly show no relation between disorganization and externalizing behaviors, with some samples even showing a negative association (Fearon et al., 2010); whereas mixed-gender samples showed more equal effects between males and females (Fearon et al., 2010). Attachment continuity may explain these gender differences and warrant additional investigation.

### Hypotheses

*Hypothesis I. Patterns vs. Single assessments as predictors.* To investigate the *developing* internal working model, I hypothesized that models predicting growth trajectories and age-specific differences in externalizing symptoms would have stronger

model fit when *patterns* of disorganized attachment are used to predict outcome compared to a single assessment of early or later attachment.

*Hypotheses II. Differentiating Patterns Predicting Externalized Symptomology.* I hypothesized that the continuity of disorganization would differentially predict externalizing symptoms across childhood. Compared to organized continuous peers ('OO'), I expected that children with continuous disorganization ('DD') will show greater externalizing behaviors throughout middle childhood. I did not expect children showing discontinuous disorganization ('DO' and 'OD') to differ significantly from their organized continuous peers ('OO') in externalizing symptoms across middle childhood as having a reliable internal working model at one point in development would provide some adaptive value.

*Hypothesis III: Disentangling Organization from Insecurity.* I hypothesized that the findings of Hypothesis II would remain even after removing organized-secure babies from the sample. Research continually documents attachment security as the hallmark of healthy development (De Wollf & van Ijzendoorn, 1997). Therefore, by looking at attachment organization solely under the lens of organization vs. no organization and controlling for lack of security, the present research will speak more directly and specifically to the detrimental effects of lacking an internal working model or attachment disorganization and the importance of separating disorganization from organized insecurity.

Given the inconsistencies of prior research on gender as a moderator (Fearon et al., 2010), planned exploratory analyses also investigated gender as a moderator in the

relationship between lawful patterns of disorganization and externalizing behaviors across childhood.

## Method

### *Participants*

Data used in the present study were taken from the publicly available National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (Study of Early Child Care and Youth Development (SECCYD) Overview, 2019). In that study, 1,364 mothers were recruited at hospitals from 10 sites across the nation and followed until their children were aged 15 years. (For a complete description of sample recruitment and procedures see NICHD, 2001).

Only dyads who had attachment data available at both the 15- and 36-months assessments were included in the present study (1,060 children, 77.7% of the original NICHD sample). Babies who were missing at least one or both attachment assessments were more likely to have a younger mother ( $t(1362) = 5.19, p < .001$ ), a mother who finished high school ( $\chi^2(1) = 17.65, p < .001$ ), or a mother who reported lower income-to-needs ratios ( $t(1271) = 2.55, p = .011$ ), and these children were more likely to be of minority backgrounds ( $\chi^2(1) = 13.61, p < .01$ ).

As with all longitudinal research, some children were missing data at various time points up to Grade 6. There were 505 children (47.6% of the present study's sample) who had data available at both attachment measurements and every assessment of externalizing behaviors from Grade 1 to Grade 6. Bivariate analyses were completed to identify significant differences between the participants with fully complete data and those who had missing data at one or more assessments. Although no significant

differences were found for the child's sex or birth order, children with missing data were more likely to have younger mothers ( $t(1059) = -5.14, p < .001$ ) and mothers who did not complete high school ( $\chi^2(4) = 29.71, p < .001$ ), and these children were more likely to be of minority backgrounds ( $\chi^2(1) = 26.12, p < .001$ ).

Considering the amount of missing data at various time points (common to longitudinal datasets), the analyses employed the Full Information Maximum Likelihood (FIML) estimation. This approach uses all available data and rather than imputing data it uses maximum likelihood parameters (by calculating the log-likelihood of the data) for missing data (Allison, 2003). Research has shown FIML to be preferable to alternative methods of handling missing data (Enders & Bandalos, 2001).

Of the 1,060 mother-child dyads included in the present study, mothers' mean age was 28.5 years old, and 79.7% of mothers had earned more than a high school degree. This was a predominantly white, non-Hispanic sample with only 17.5% of children reported to come from minority families. Child's sex was evenly distributed (50.7% male), and 44.1% of the children were first-borns.

### *Measures*

**Attachment at 15-months.** The Strange Situation task (Ainsworth & Bell, 1970; Ainsworth et al., 1978), was used to assess mother-child attachment at 15-months. The mother-child dyad was videotaped in a laboratory playroom during eight, 3-minute stress-inducing episodes involving the presence or absence of a stranger. The mother and child were introduced to the room by the experimenter (1) and left alone to become accustomed and play (2). A female stranger entered the room and sat quietly (3), then after a minute tried to engage with the child. The mother departed the room so that the

baby was left alone with the stranger (4). The mother then returned to the room and the stranger departed the room (5). The mother then departed the room again, leaving the child alone (6). Next, the stranger returned (7). Finally, the mother returned to the room and the stranger left (8).

From videotapes, trained coders scored the child's behavior (proximity and contact seeking; contact maintaining resistance; and avoidance) during the child's exploration, the child's behavior towards the stranger, the child's behavior when the mother left, and the child's behavior during the reunion. The coders initially classified mother-child dyads as Insecure-Avoidant (A), Secure (B), Insecure-Ambivalent (C), or Disorganized (D). The disorganization classification was assigned when the child's behaviors did not consistently reflect the behavioral patterns of any of the three organized attachment styles (for a description, see Main & Morgan, 1996), when the child's behaviors did not demonstrate a logical response to the situation, or when the child's behaviors were incoherent or contradictory. Next, disorganized dyads were rated on a 9-point scale for "D"-ness. When the dyad was rated at 5 or higher, coders assigned a classification of disorganized. When a dyad initially classified as disorganized was given a rating below 5, they were then re-coded as "Unclassifiable". The remaining Unclassified dyads (42, 3.1% of the sample) were not included in the current study to avoid over-interpreting any atypical attachment behavior as disorganized and incoherent. Across all coder pairs, agreement with the 5-category classification system was 83% ( $k = .69$ ; NICHD Early Child Care Research Network (ECCRN), 1997).

**Attachment at 36-months.** A modified Strange Situation paradigm<sup>1</sup> (Cassidy & Marvin and the MacArthur Working Group on Attachment, 1992) was used to assess attachment classifications at 36-months. This procedure was analogous to the task at 15-months, as the mother-child dyad was placed in a room and underwent similar stress-inducing situations for the child to activate the attachment system. The same coding system was used as in the 15-month Strange Situation paradigm which included Insecure-Avoidant (A), Secure (B), Insecure-Ambivalent (C), and Disorganized (D). Disorganization was characterized by showing combinations of other styles, controlling, or illogical behavioral patterns. Interrater reliability for this coding was 75.7% ( $k = .58$ ).

**Patterns of Disorganization.** Patterns of disorganization were identified using combinations of attachment classifications from 15- and 36-month assessments. For the purpose of the present study, all organized attachment styles (secure, insecure-ambivalent, and insecure-avoidant) were combined to form an organized classification to contrast to those classified as disorganized. The reference group (761 dyads; 71.8% of the children with attachment data at both 15 and 36-months of age) for subsequent analyses were children classified with any of the three organized attachment classifications at both 15- and 36-month assessments (“positive continuity” group, ‘OO’).

Dyads who were classified as organized (O) at the 15 month assessment but changed to a disorganized (D) classification by 36-months (134 dyads; 12.6% of all the children with attachment data at both 15 and 36-months of age) were assigned to the “negative discontinuity” group (OD), whereas those who showed the reverse pattern (132 dyads – 12.5%) were assigned to the “positive discontinuity” group (DO). Finally,

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<sup>1</sup> The modified Strange Situation assessed at 36-months did not include a 9-point rating scale for disorganization.

mother-child dyads classified as disorganized at both 15 and 36-months (33 dyads – 3.1%) were assigned to the “negative continuity” group (DD). See Table 1.

**Table 1.** Patterns of Attachment Organizational Structure.

	36-month assessment		
		O (organized)	D (disorganized)
15-month assessment	O (organized)	OO Positive Continuity <i>n</i> = 761 (71.8%)	OD Negative discontinuity <i>n</i> = 134 (12.6%)
	D (disorganized)	DO Positive discontinuity <i>n</i> = 132 (12.5%)	DD Negative Continuity <i>n</i> = 33 (3.1%)

**Externalizing Behaviors.** Children’s teachers from 1<sup>st</sup> to 6<sup>th</sup> grade completed the Teacher Report Form of the Child Behavior Checklist (CBCL; Achenbach, 1991). Using this questionnaire, teachers rated the child on 100 behaviors using a 3-point scale ranging from 0 (not true of the child) to 2 (very true of the child). Subscales scores for social problems, aggression, depression/anxiety, delinquent behavior, somatic complaints, withdrawn, thought problems, and attention problems were calculated. We then created a composite score for externalizing behaviors comprised of the subscales delinquent behaviors and aggression. The Achenbach System of Empirically Based Assessment (ASEBA) showed .90 test-retest reliability for this scale.

**Demographic Variables.** Mother-reported demographics were collected at the one-month interview; including mothers age, baby's gender, baby's ethnicity, birth order, highest educational level, and reported income. An income-to-needs ratio was calculated by taking the total family income (minus welfare payments) and dividing by the poverty threshold (defined by the family size). Higher income-to-needs ratios reflects greater financial resources.

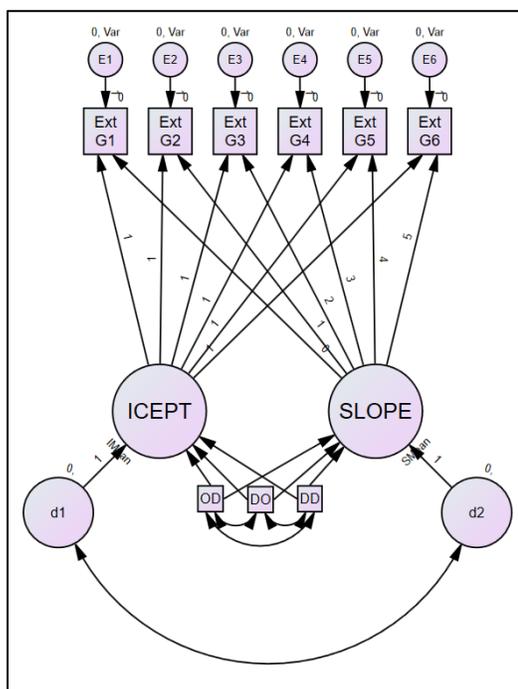
### Data Analysis

Bivariate relations were examined between the patterns of attachment and outcome variables and maternal age, child minority status, maternal education, child sex, childbirth order, and income-to-needs ratio for the sample used in the present study ( $N = 1,060$ ). A series of chi squares and one-way Analysis of Variance (ANOVAs) were conducted to detect demographic differences between attachment groups. Variables that significantly differentiated between patterns of disorganization were added as covariates in statistical models.

Latent Growth Curve (LGC) models using the structural equation modeling framework (Curran, Obeidat, & Losardo, 2010) were used to examine the relation between patterns of disorganization across infancy and early childhood and externalizing symptoms (see Figure 1 for a sample model structure) through to 6<sup>th</sup> grade. The data for externalizing symptoms from Grade 1 through 6 show a sharp climax at Grade 3, suggesting that a quadratic curvilinear model would best illustrate the overall growth of externalizing behaviors. LGCs using the structural equation modeling approach treat multiple repeated measures as indicators and the unobserved growth trajectory as a latent variable (Curran et al., 2010). In the present study, models produced difference scores for

the initial externalizing level (intercept) and growth trajectories (both linear and quadratic). Model fit for growth curves were determined by fit indices, specifically a root mean squared error of approximation (RMSEA) score of .08 or lower and a comparative fit index (CFI) score of .90 or higher (Bentler, 1990). Attachment patterns were included as predictor dummy variables with the positive continuity ‘OO’ group as a reference. All LGC analyses were performed using IBM SPSS AMOS (v26) and Full Information Maximum Likelihood method was employed for missing data. Statistical significance was based on  $p < .05$ , and all tests were two-tailed.

**Figure 1.** Latent-Growth Curve Model Structure Example.



## Results

### *Descriptive Analyses*

A series of chi squares and one-way ANOVAs were conducted to detect demographic differences among the four attachment pattern groups (positive continuity

‘OO’, positive discontinuity ‘DO’, negative discontinuity ‘OD’, and negative continuity ‘DD’; see Table 1 for group *ns*). These four groups did not differ on demographics such as childbirth order, maternal education, or family income.

Analyses did show significant differences in children’s ethnicity such that children in the negative discontinuity group and the negative continuity group were more likely to be from a minority group than their positive continuity peers ( $\chi^2(1) = 7.54, p < .01$ ). Also, a one-way ANOVA revealed that the groups differed significantly on maternal age ( $F(3,1056) = 4.69, p < .01$ ). Tukey’s post hoc analyses revealed that the negative continuity group were more likely to have younger mothers than both the positive discontinuity group ( $p < .05$ ) and the positive continuity group ( $p < .05$ ). Therefore, these two variables (child minority status and maternal age) were included as covariates in subsequent analyses to remove possible influence from differences in these demographic characteristics.

#### *Hypothesis I: Patterns v. Single Assessments as Predictors*

Hypothesis I stated that models predicting age-specific and growth trajectories of externalizing symptoms would have stronger model fit using patterns of disorganized attachment as a predictor compared to a single assessment of attachment. To assess the predictive power of using a single time point assessment of attachment (15-months or 36-months) compared to a combination approach (patterns of attachment between 15 and 36-months), two comparisons were made. First, a series of Analysis of Covariance (ANCOVA) were computed using 15-month attachment, 36-month attachment and attachment patterns to predict teacher-reported externalizing symptoms at Grades 1 through 6 after controlling for child minority status and maternal age.

Models only using a 15-month attachment dichotomy of Organized versus Disorganized found significant differences at Grade 6 (see Table 2). No other differences in externalizing behaviors were predicted at any grade level. Models using a 36-month attachment dichotomy of Organized versus Disorganized significantly predicted differences in Grade 1 and Grade 2 (see Table 2). Models using the patterns of disorganization detected significant group differences at Grades 2, 5, and 6 (see Table 2). In support of Hypothesis I, for grade level-specific differences in externalizing behaviors, only the models that included the patterns approach was able to identify the significance of attachment disorganization at *both* early grade levels and at Grade 6.

**Table 2.** Model comparisons of mean differences in single assessment teacher-rated externalizing behavior scores at each grade level.

		Gr.1 Ext	Gr. 2 Ext	Gr. 3 Ext	Gr.4 Ext	Gr. 5 Ext	Gr. 6 Ext
15 month <sup>1</sup>	O	5.52	5.68	6.38	5.54	5.58	5.13
	D	5.33	5.10	6.13	6.01	7.06	7.03
	Test Statistic	0.07	0.53	0.08	0.33	3.10	4.31*
36 month <sup>2</sup>	O	5.24	5.19	6.01	5.51	5.59	5.25
	D	6.89	7.83	7.62	6.12	7.04	6.35
	Test Statistic	5.10*	11.09**	3.34	0.54	2.98	1.44
Patterns <sup>3</sup>	OO <sup>a</sup>	5.31	5.36	6.19	5.46	5.42	5.09
	DO <sup>b</sup>	4.83	4.20	5.63	5.84	6.52	6.16
	OD <sup>c</sup>	6.73	7.46 <sup>a, b</sup>	7.44	5.98	6.50	5.36
	DD <sup>d</sup>	7.60	9.52 <sup>a, b</sup>	8.57	6.91	9.11 <sup>a</sup>	10.5 <sup>a, b, c</sup>
	Test Statistic	1.90	4.72**	1.34	0.31	2.09	2.89*

*Note.* \* $p > .05$ , \*\* $p > .01$ , \*\*\* $p > .001$ . OO = continually organized, DO = disorganized at 15-months, organized at 36-months, OD = organized at 15-months, disorganized at 36-months, DD = continually disorganized. Externalizing means are estimated means after controlling for child minority status and maternal age.  $n^1 = 1,149$ ,  $n^2 = 1,140$ ,  $n^3 = 1,060$ .

To examine model comparisons for growth trajectories of externalizing behaviors, Latent Growth Curve (LGC) models were computed to assess the intercept and growth changes (linear and quadratic) across grades 1 through 6. Three identical models were examined, one using the 15-month attachment dichotomy of Disorganized vs Organized measure as a predictor, one using the 36-month attachment dichotomy of Disorganized vs Organized, and one using dummy coded patterns of disorganization that used both the 15- and 36-month attachment classifications. Child minority status and maternal age were added as covariates.

All three models had good model fit as indexed by the chi-square test statistic ( $p < .001$ ) and acceptable CFI ( $> .90$ ) and RMSEA ( $< .08$ ) indices (see Table 3). The model using the 15-month attachment dichotomy detected small growth changes between organized and disorganized babies (linear slope), but no differences in the starting externalizing level (intercept; see Table 3). The model using the 36-month attachment dichotomy showed no differences in the growth of externalizing behaviors between disorganized and organized children, although there were significant differences in the starting levels of externalizing symptoms (see Table 3). For the LGC model using dummy coded patterns of disorganization, significant differences were only detected in the initial externalizing scores of the continuous disorganization group ('DD'). Marginally significant differences were found in initial externalizing levels in the 'OD' group compared to the continuous organized peers ('OO') and the 'DO' group showed a marginally significant linear trend compared to 'OO' peers (see Table 3).

Each LGC model was significant with the two dichotomous models showing distinct outcomes on the linear trend (15-month model) and initial externalizing rating (36-month model). However, in support of Hypothesis I for externalizing trajectories, the LGC model was able to disentangle the findings in initial externalizing ratings and marginally significant growth trends providing a more comprehensive view.

**Table 3.** Model comparisons predicting growth curves of teacher-rated externalizing behaviors from Grade 1 through 6.

	O v D 15 mo <sup>1</sup>	O v D 36 mo <sup>2</sup>	Patterns <sup>3</sup>		
			DO	OD	DD
$\chi^2$	39.50	43.58		46.80	
Df	23	23		29	
<i>p</i>	.017	.006		.020	
Intercept	0.06	1.84**	-0.38	1.49†	3.29*
Linear Slope	0.37*	-0.14	1.72†	-1.16	1.79
Quadratic Slope	0.02	0.00	-0.11	0.04	-0.22
CFI	0.992	0.991		0.992	
RMSEA	0.023	0.026		0.021	

*Note:* \* $p > .05$ , \*\* $p > .01$ , \*\*\* $p > .001$ , † $p < .10$ . DO = disorganized at 15-months, organized at 36-months, OD = organized at 15-months, disorganized at 36-months, DD = continually disorganized. For 15- and 36-month assessments disorganization is dummy coded as 1. Attachment patterns were dummy coded with the reference category as ‘OO’).  $n^1 = 1,149$ ,  $n^2 = 1,140$ ,  $n^3 = 1,060$ .

#### *Hypothesis II: Differentiating Patterns Predicting Externalizing Symptomology*

Hypothesis II states that negative continuity of disorganization across infancy to early childhood (‘DD’) would show increased externalizing behaviors across childhood compared to their positive continuous peers (‘OO’). Analyses for Hypothesis I demonstrated the value of using patterns of disorganization to predict both single-

assessment and growth trajectory externalizing behaviors compared to using a single-assessment of attachment. To investigate the differential predictive power of patterns of disorganization to externalizing symptoms across childhood, here the first model estimated growth curves for the main effects of patterns of disorganization on externalizing symptoms from Grades 1 through 6. The overall model fit was strong ( $\chi^2(23) = 39.87, p = .016, CFI = .99, RMSEA = .023$ ). Adding the covariates (replicating the LCG using patterns of disorganization from Hypothesis I) did not alter the main effects, therefore main effects described reflect controlling for child minority status and maternal age. Compared to their positive continuous peers ('OO'), children showing negative continuity ('DD') were higher in initial externalizing teacher ratings ( $B = 3.29, S.E. = 1.49, p = .027$ ; see Table 4). Children in the positive discontinuity group ('DO') did not differ in initial externalizing teacher ratings compared to their positive continuity peers, albeit the negative discontinuity group ('OD') were marginally higher ( $B = 1.49, S.E. = 0.78, p = .057$ ; see Table 4). There were no linear or quadratic effect differences on the slopes between any of the groups.

**Table 4.** Latent growth curve regression estimates for teacher rated externalizing behaviors.

	Intercept			Linear			Quadratic		
	<i>B</i>	S.E.	<i>p</i>	<i>B</i>	S.E.	<i>p</i>	<i>B</i>	S.E.	<i>p</i>
Main Effects of Patterns									
DO	-0.15	0.80	0.853	1.38	0.82	0.094	-0.06	0.24	0.796
OD	2.01	0.80	0.011	-1.36	0.97	0.162	0.05	0.21	0.805
DD	4.41	1.59	0.003	1.77	1.62	0.278	-0.08	0.34	0.802
Main Effects of Patterns with Covariates									
DO	-0.38	0.79	0.628	1.72	0.89	0.052	-0.11	0.16	0.480
OD	1.49	0.78	0.057	-1.16	0.89	0.194	0.04	0.10	0.687
DD	3.29	1.49	0.027	1.79	1.66	0.282	-0.22	0.30	0.473

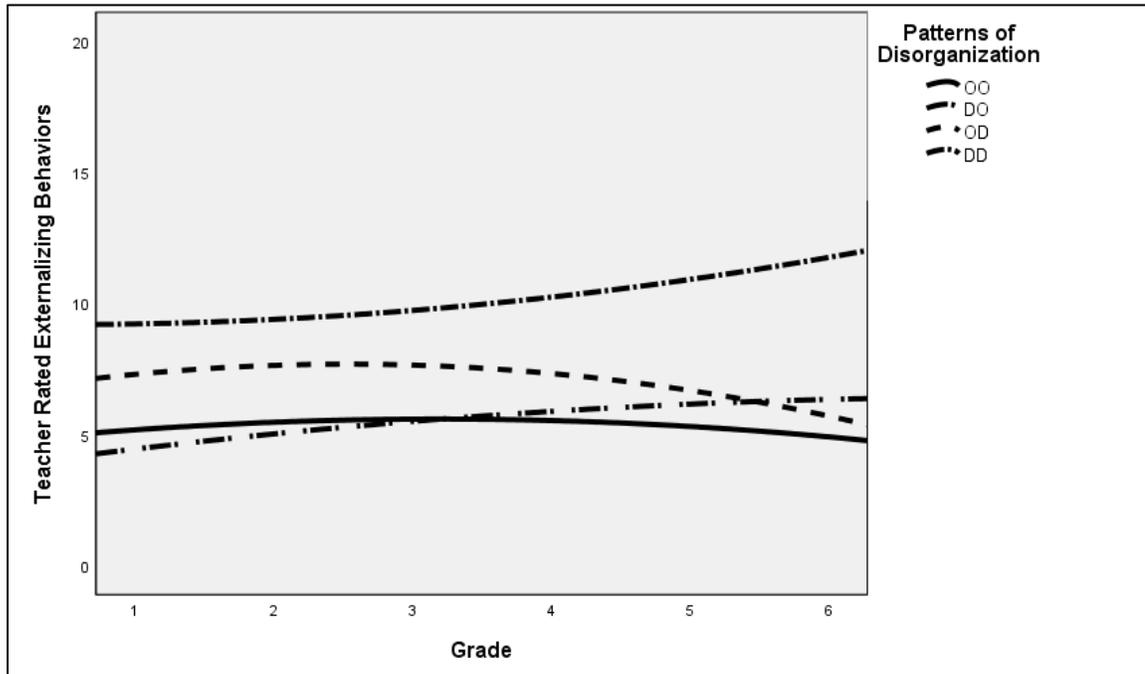
**Table 4**, continued.

Interactive Effects of Patterns x Gender									
Boys									
DO	-0.22	1.27	0.862	2.27	1.61	0.160	-0.01	0.05	0.883
OD	2.55	1.31	0.051	-1.14	1.67	0.494	0.01	0.07	0.868
DD	6.58	2.28	0.004	1.01	2.91	0.729	-0.04	0.20	0.844
Girls									
DO	-0.14	0.91	0.881	1.69	0.89	0.058	-0.04	0.17	0.837
OD	1.59	0.88	0.070	-1.07	0.87	0.216	0.01	0.05	0.854
DD	0.05	1.78	0.976	3.97	1.73	0.022	-0.07	0.32	0.837

*Note:* DO = disorganized at 15-months, organized at 36-months, OD = organized at 15-months, disorganized at 36-months, DD = continually disorganized. Attachment patterns were dummy coded (reference category = ‘OO’). *B* estimates are estimated differences from the comparison group ‘OO’.  $N = 1,060$ ,  $n^{OO} = 761$ ,  $n^{OD} = 132$ ,  $n^{DO} = 134$ ,  $n^{DD} = 33$ .

Models were readjusted to align the intercept (Duncan & Duncan, 2009) with each corresponding grade level and significant main effects were detected in every grade level for the negative continuity group (‘DD’) compared to their positive continuity peers (‘OO’) (see Table 5), suggesting this group has high initial levels of externalizing symptoms and remains high through childhood compared to their positive continuity peers. The negative discontinuity group had significantly higher externalizing ratings in Grade 2 ( $B = 1.45$ ,  $p < .05$ ), but not at later grades (see Table 5). The predicted growth curves for each pattern of disorganization was plotted to visualize this interface of starting level and growth change (see Figure 2).

**Figure 2.** Plotted predicted growth curves by pattern of disorganization.



To investigate the moderating impact of gender, LGC models were repeated to include a multi-group analysis factor differentiating the latent growth curves by gender. The overall model fit was strong ( $\chi^2(69) = 136.24, p < .001, CFI = .88, RMSEA = .030$ ) and significantly improved with the addition of gender from the main effect model ( $\chi^2\Delta(46) = 96.38, p < .001$ ). For boys, higher initial externalizing rating differences emerged for the negative continuity group ('DD':  $B = 6.58, S.E. = 2.28, p = .004$ ; see Table 4) and marginally higher for the negative discontinuity group ('OD':  $B = 2.55, S.E. = 1.31, p = .051$ ; see Table 4) compared to continuously organized peers ('OO'). No significant differences in growth trends were detected across any of the male patterns of disorganization. For girls, marginally higher initial externalizing ratings were observed for the negative discontinuity group ('OD':  $B = 1.59, S.E. = 0.88, p = .070$ , see Table 4 and Figure 3), but not for the other patterns. Continually disorganized females ('DD')

showed a significant linear growth ( $B = 3.97$ ,  $S.E. = 1.73$ ,  $p = .022$ , see Table 4) accompanied by significantly higher externalizing ratings by Grade 6 ( $B = 3.68$ ,  $S.E. = 1.77$ ,  $p = .038$ , see Table 5). Marginally significant linear trends were observed for the positive discontinuity female group ( $B = 1.69$ ,  $S.E. = 0.89$ ,  $p = .058$ ; see Table 4).

**Table 5.** Latent growth curve regression weights from adjusted intercept models.

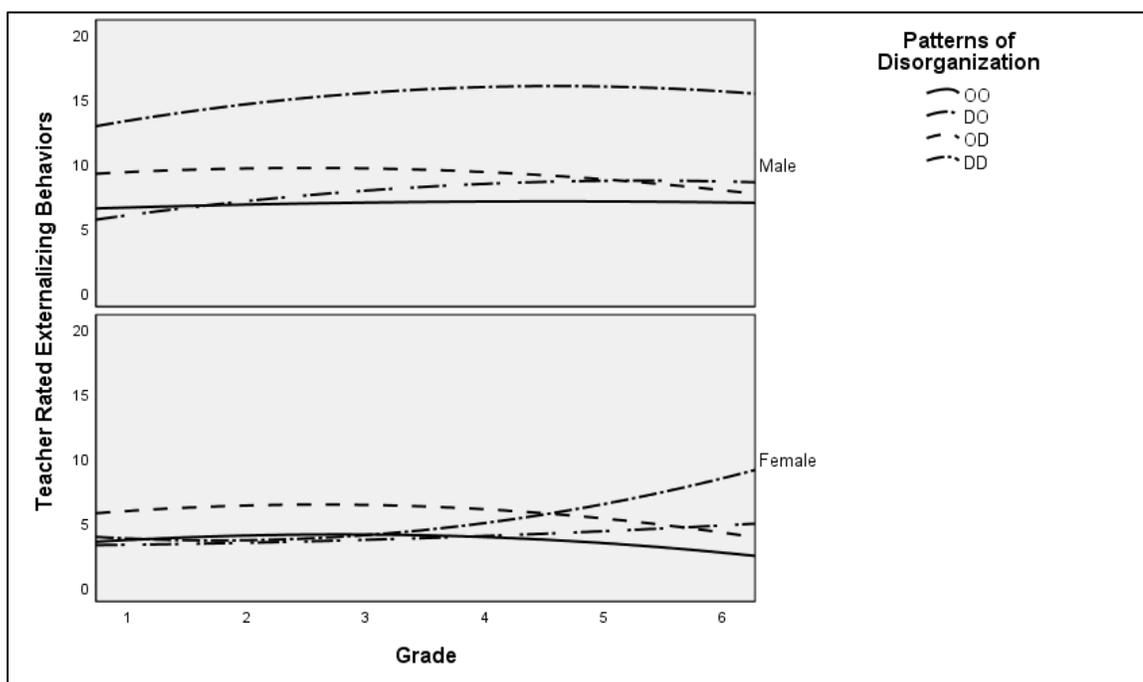
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Main Effects of Patterns						
DO	-0.59	-0.51	-0.12	0.48	0.52	1.11
OD	1.28	1.45*	1.24	1.05	0.68	0.03
DD	2.94*	2.75*	2.89*	3.32**	3.64**	4.58**
Interactive Effects of Patterns x Gender						
Boys						
DO	-0.22	0.75	0.71	0.92	1.51	1.95
OD	2.55†	2.45*	2.08	2.49	1.87	1.20
DD	6.58**	6.02**	5.92**	6.66***	6.65**	7.06*
Girls						
DO	-0.14	-0.44	0.11	0.07	0.56	1.47
OD	1.59†	1.50*	1.51*	1.09	0.90	0.27
DD	0.05	-0.37	0.41	0.90	1.96	3.68*

*Note:* \* $p > .05$ , \*\* $p > .01$ , \*\*\* $p > .001$ , † $p < .10$ . DO = disorganized at 15-months, organized at 36-months, OD = organized at 15-months, disorganized at 36-months, DD = continually disorganized. Attachment patterns were dummy coded (reference category = 'OO').  $B$  estimates are estimated differences from the comparison group 'OO'.  $N = 1,060$ ,  $n^{OO} = 761$ ,  $n^{OD} = 132$ ,  $n^{DO} = 134$ ,  $n^{DD} = 33$ .

As with the main effect model, the interactive model was readjusted to align the intercept (Duncan & Duncan, 2009) with each corresponding grade level. For boys, the negative continuity group has significantly higher initial levels of externalizing ratings and remained significantly higher at every grade level (see Table 5). Boys in the negative discontinuity group showed significantly higher externalizing ratings in the early school

years (Grades 1 through 3) but were not statistically different than their positive continuity peers in the remaining grade levels. For girls in the negative discontinuity group ('OD'), higher externalizing ratings were observed in Grades 2 and 3 only, see Table 5. Following the significant linear trend observed for the continuously disorganized girls, they did not show significant externalizing levels until Grade 6 ( $B = 3.68$ ,  $S.E. = 1.77$ ,  $p = .038$ ; see Table 5). Predicted growth curves were plotted by gender and pattern of disorganization to visualize these effects (see Figure 3).

**Figure 3.** Plotted predicted growth curves by pattern of disorganization and gender.



### *Hypothesis III: Disentangling Attachment Organization*

To fully establish the weight of a disorganized attachment style, I hypothesized that the findings of Hypothesis II would remain even after removing organized-secure babies from the sample. The next stage repeats the LGC models removing the organized-

secure children from the samples. In doing so, the lack of a coherent internal working model will be of significance beyond ideal versus non-ideal attachment styles that have been used commonly in prior research when grouping disorganized and organized-insecure children together. Bivariate analyses were repeated using this sub-sample. Because no significant relationships were detected between the independent or outcome variables and the relevant demographic variables (child minority status, maternal age, birth order, maternal education, single mother status, family income, maternal employment factors, or psychosocial factors, for these models no covariates were added.

The overall model was significant ( $\chi^2(33) = 53.26, p = .014, CFI = .95, RMSEA = .061$ ). Main effects showed no significant differences in initial externalizing behavior ratings or growth curves except for the positive discontinuity group ('DO') showing a significant quadratic effect ( $B = 0.55, S.E. = 0.26, p = .036$ ; see Table 6). As with the Hypothesis II models, the main effect model was readjusted to align the intercept (Duncan & Duncan, 2009) with each corresponding grade level (see Table 7). No main effect differences were detected among patterns of disorganization across the grade levels, thus not supporting Hypothesis III that the main effects of disorganization patterns would remain after removing organized-secure attachments.

**Table 6.** Latent growth curve regression parameters for model with attachment security removed: main and interactive models.

	Intercept			Linear			Quadratic		
	<i>B</i>	S.E.	<i>p</i>	<i>B</i>	S.E.	<i>p</i>	<i>B</i>	S.E.	<i>p</i>
Main Effects of Patterns									
DO	-0.83	2.23	0.711	-1.72	1.21	0.154	0.55	0.26	0.036*
OD	0.54	2.32	0.815	0.80	1.28	0.531	-0.17	0.28	0.542
DD	1.53	2.27	0.501	-0.27	1.24	0.828	0.17	0.27	0.529

**Table 6**, continued.

Interactive Effects of Patterns x Gender									
Boys									
DO	0.22	3.16	0.945	-2.31	1.97	0.241	0.65	0.43	0.130
OD	1.74	2.93	0.553	-0.25	1.80	0.891	0.08	0.39	0.847
DD	6.04	3.08	0.050*	0.05	1.91	0.977	0.07	0.42	0.864
Girls									
DO	-1.32	2.48	0.594	-1.06	1.42	0.455	0.45	0.30	0.133
OD	-0.82	2.95	0.780	2.55	1.76	0.147	-0.54	0.37	0.142
DD	-3.29	2.64	0.213	-0.30	1.54	0.847	0.27	0.33	0.413

*Note:* DO = disorganized at 15-months, organized at 36-months, OD = organized at 15-months, disorganized at 36-months, DD = continually disorganized. Attachment patterns were dummy coded (reference category = ‘OO’ with secure attachments removed). *B* estimates are estimated differences from the comparison group ‘OO’.  $N = 164$ ,  $n^{OO} = 65$ ,  $n^{OD} = 31$ ,  $n^{DO} = 35$ ,  $n^{DD} = 33$ .

To investigate the moderating effect of gender, the LGC model was repeated to include a multi-group analysis of gender. The overall model was strong ( $\chi^2(69) = 108.01$ ,  $p = .002$ , CFI = .89, RMSEA = .059). Hypothesis III was supported when looking at male children. Male children in the negative continuity group had significantly higher externalizing ratings at the initial level ( $B = 6.04$ , S.E. = 3.08,  $p = .050$ , see Table 6). When the interactive model was readjusted to align the intercept (Duncan & Duncan, 2009) with each corresponding grade level, the effect of the negative continuity group (‘DD’) was found at each level (see Table 7), suggesting that for boys, the negative continuity group has higher levels of externalizing ratings at all levels of school age (Grades 1 through 6). No significant differences were found for the male negative discontinuity group or the positive discontinuity group. Hypothesis III was not supported for female children; no significant effects were found at the initial levels of externalizing

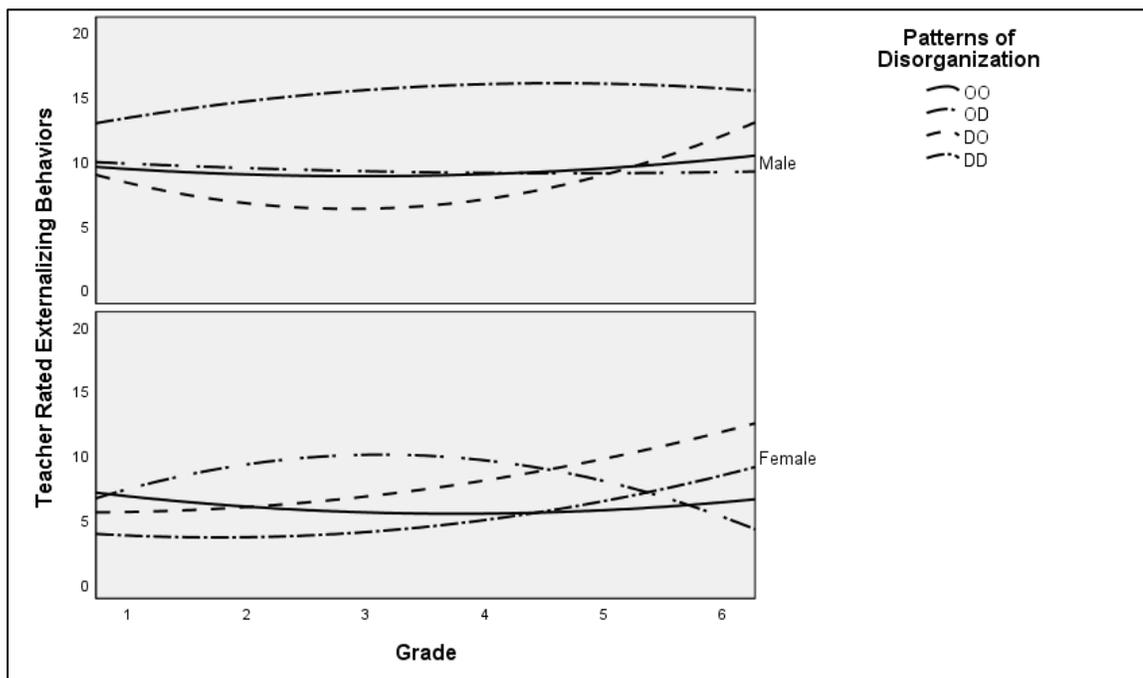
ratings for any of the patterns of disorganization or growth curves (see Table 6). To visualize these effects, the predicted growth curves were plotted in Figure 4.

**Table 7.** Latent growth curve regression weights from adjusted intercept models for model with attachment security removed.

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Main Effects of Patterns						
DO	-0.83	-1.54	-0.70	0.10	1.64	4.23
OD	0.54	1.04	1.15	1.02	0.96	0.14
DD	1.53	1.59	1.94	2.80	3.41	4.30
Interactive Effects of Patterns x Gender						
Boys						
DO	0.22	-0.93	-0.48	0.70	2.07	4.71
OD	1.74	1.60	1.82	1.95	2.04	2.13
DD	6.04*	6.23*	6.04*	7.44*	7.52*	7.82*
Girls						
DO	-1.32	-1.55	-0.36	0.27	1.98	4.36
OD	-0.82	0.76	0.93	0.96	0.36	-1.98
DD	-3.29	-3.11	-2.15	-1.28	0.02	1.59

*Note:* DO = disorganized at 15-months, organized at 36-months, OD = organized at 15-months, disorganized at 36-months, DD = continually disorganized. Attachment patterns were dummy coded (reference category = 'OO'). *B* estimates are estimated differences from the comparison group 'OO'.  $N = 164$ ,  $n^{OO} = 65$ ,  $n^{OD} = 31$ ,  $n^{DO} = 35$ ,  $n^{DD} = 33$ .

**Figure 4.** Predicted growth curves of teacher-rated externalizing behaviors plotted by pattern of disorganization and gender for model with attachment security removed.



### Discussion and Conclusions

This study expands prior literature by providing an extensive investigation into the *developing* internal working model (or lack thereof) of children with early disorganized attachment representations. This is the first study to date to look at patterns of disorganization rather than attachment security as precursors to later problem behaviors and was aimed at three goals. First, to support the idea that it is more advantageous to use more assessments of attachment when available rather than just a single assessment, Hypothesis I was supported. When looking at age-specific differences, continuous disorganization ('DD') was significantly higher in externalizing behaviors in both early grade years and at Grade 6, while other models only using a single assessment of attachment failed to detect this difference. When looking at growth trajectories,

different trends were apparent for babies who had different patterns of disorganization, with only the continuous disorganized group ('DD') showing higher initial levels. Although the dichotomous models were able to identify differences, the patterns model was able to disentangle these differences.

Hypothesis II was supported, showing that it is the continuously disorganized babies ('DD') that are at distinct risk for externalizing behaviors across middle childhood. Continuous disorganized children did not show significantly different growth curves, rather they showed elevated externalizing behaviors across all grade levels. Neither discontinuous group ('DO', 'OD') were different in teacher rated externalizing behaviors compared to their continuously organized peers ('OO') outside of initial grade levels. When examined by gender, boys in the continuous disorganization group ('DD') showed elevated externalizing ratings at every grade level, while girls in the continuous disorganization group ('DD') showed a growth curve with higher externalizing ratings by Grade 6.

Hypothesis III was not supported in the main effect models to suggest that even after removing secure attachments, continued disorganization would remain at distinct risk for externalizing behaviors. The hypothesis was supported, however, during planned post-hoc investigations of gender as a moderator. Specifically, for boys, the goal of Hypothesis III was supported, stressing the importance of maintaining an internal working model of attachment, even if it is an unfavorable one.

Overall, the results demonstrate the predictive power of using a two-pronged view of attachment disorganization. Continuous disorganization from infancy to early childhood uniquely predicted higher externalizing teacher ratings across childhood.

Discontinuity of disorganization (regardless of the direction of change) was not associated with increased externalizing ratings beyond early school years. Given this importance, further research is needed to examine what factors predict continuity of disorganization from infancy to early childhood.

This study does not entirely negate the predictive power of the single-time point assessment of attachment. Although the 15-month disorganized classification (as evidenced by the positive discontinuity ('DO') group) failed to predict any constant differences or growth pattern differences in externalizing ratings, the 36-month assessment did provide some predictive validity. Specifically, children in the negative discontinuity ('OD') group had increased externalizing ratings compared to their peers in the positive continuity ('OO') group. However, this finding was limited to externalizing assessment in the early grade school years only. By late childhood, there were no differences in externalizing behaviors between the 'OD' and 'OO' group. This suggests that for predicting early and mid-childhood behaviors, the 36-month attachment classification is still useful. Yet, when looking to predict problem behaviors into Grade 6, a repeated measure of attachment disorganization ('DD') provides more predictive validity. Without the two-pronged view, use of the 36-month attachment measure to predict long term behavioral symptoms would miss the increased risk of the disorganized children at 36-months who have never developed an internal working model of attachment (as evidenced by their 'D' status at 15-months).

These findings raise questions about the 15-month assessment of disorganization, echoing prior research showing weaker predictive validity of early infant attachment assessments (see meta-analysis for age of assessment effect on attachment, Fearon et al.,

2010). It is possible that the 'DO' babies were 'less disorganized' or were less reliably coded during the Strange Situation procedures compared to the 'DD' babies. Post-hoc *t*-tests showed no significant differences between the 'DO' and 'DD' babies in any of the Strange Situation ratings, including the 1-9 D-rating scale ( $ps > .05$ ) Given these lack of differences, it is more likely that positive changes in the child's environment (i.e., maternal attachment figure) correspond with the development of an organized-attachment representation for these early disorganized babies ('DO'). Such changes would likely indirectly result in positive behavioral changes for the child. This finding speaks to the importance of intervening in mother-child dyads early in development to remedy any maladaptive dynamics that would promote attachment disorganization.

As with other studies looking at attachment and externalizing behaviors (see meta-analysis, Fearon et al., 2010), the current study highlights the importance of considering child gender. Boys with a history of attachment disorganization, especially continuous disorganization, have an elevated risk for externalizing behaviors across all middle childhood. Externalizing behaviors are not uncommon ways for boys with difficulties to act out (Compton, Snyder, Schrepferman, Bank, & Shortt, 2003; Maughan, Rowe, Messer, Goodman, & Meltzer, 2004). However, for girls for whom externalizing is not only lower, but also more frowned upon by others due to socialization (Keenan & Shaw, 1997), there may be a more complex relationship between disorganization and externalizing. In the early grades, girls in this study with continuous disorganization were indistinguishable from girls with other disorganized attachment patterns. Significant differences only emerged later, showing a significant growth in girls' externalizing that was evidently different by Grade 6. It is possible that girls with continued disorganized

attachments reflect their disorganization in ways other than externalizing or in other forms of aggression not directly measured by the CBCL.

The growth curve and increase in externalizing symptomology by Grade 6 for girls with continuous disorganization may be explained in part by the beginnings of puberty that occur around this period. Prior research has commonly linked early pubertal timing in girls to externalizing behaviors such as aggression and delinquency (Caspi, Lynam, Moffitt, & Silva, 1993; Lynne, Graber, Nichols, Brooks-Gunn, & Botvin, 2007). One sample of Mexican-American girls showed that when coupled with harsh parenting, early puberty predicted higher externalizing scores (Deardorff et al., 2013). Although harsh parenting is not a proxy for parenting behaviors experienced by disorganized babies, it does highlight the potential relationship between parenting behaviors, puberty, and female externalizing symptoms. Future research should examine pubertal timing as a moderating factor, especially for girls, in the context of disorganization patterns and externalizing symptoms. Future research may also want to explore variables other than externalizing that distinguish girls with continuous disorganization from other girls.

Prior attachment research has not attempted to disentangle attachment security from the existence of an organized, internal working model. Generally, attachment researchers have compared securely attached children with insecurely attached children to gauge the predictive effects of attachment security. Yet all these babies (secure and insecure) possess an internal working model of attachment, albeit some more unfavorable than others. Although such comparisons allow researchers to differentiate based on security of attachment organization, they do not allow researchers to examine the importance of having an internalized model of any sort. Bowlby (1969, 1973, 1980) was

less concerned with qualitative differences in attachment security than the fact of having an organized attachment itself. He argued that having an organized attachment model enabled children to cope adaptively in the face of differing caregiver behaviors while still maintaining the relationship with the attachment object (Bowlby, 1973; Bowlby, 1980). For example, the ambivalent/resistant child who has an attachment object who is often unpredictable in her availability will show heightened proximity-maintaining behaviors on reunion, thus ensuring that the attachment object will not leave the child alone again. The insecure avoidant child, who has an attachment object who is often intrusive, may show avoidant behaviors on reunion as a way of not allowing the attachment object to intervene in an intrusive manner. These styles of attachment and the concomitant attachment behaviors all function to maintain the caregiver in an adaptive attachment relationship. That insecurely attached children compared to securely attached children may show so few differences in outcomes may be because having an *attachment organization* enables the child to successfully adapt to varying types of caregivers. The bigger concern is what happens when the child does not have an organized internal working model of attachment that enables them to function adaptively considering the caregiver's unavailability, threatening behaviors, or frightening demeanors.

In this study, we not only compared patterns of disorganization to stress the importance of having an organized attachment model, but we also conducted a follow-up, more stringent test of organization in and of itself, independent of attachment security. All children who were categorized as securely attached at either the 15- or 36-month measurement were removed from the analyses, leaving only children who were avoidant or ambivalent/resistant in the organized groups to be compared to the children in the

disorganized group. In this way, the current study was able to show that the impact of disorganization is a specific precursor to increased externalizing behaviors across school age, above and beyond attachment security. Although no main effects were detected, the finding was evident for boys, highlighting the importance of having an organized internal working model, even if it is not an ideal one for boy babies.

These findings also demonstrate the importance of studying disorganized children separate from their organized-insecure peers. Mothers of disorganized dyads are distinct in their unpredictable maternal behaviors, preventing babies from developing expectations and an internal working model of attachment. In this, disorganized babies lack the adaptive coping mechanism that an internal working model provides. Insecurely attached (avoidant or ambivalent) babies, in contrast, have an internal working model. Despite their coping mechanism being less optimal, it still serves its adaptive purpose.

Although this study focused on the impact of patterns of disorganization on externalizing symptoms across middle childhood, the question remains as to whether disorganization might also predict internalizing symptoms. Some studies have linked disorganization to increased internalizing behaviors (O'Connor, Scott, McCormick, & Weinberg, 2014; Groh et al., 2016). However, two meta-analyses showed no link between early disorganization and childhood internalizing symptomatology (Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012; Madigan, Atkinson, Laurin, & Benoit, 2013). These meta-analyses did not find effects of potential moderators, including gender, on the relationship between disorganization and internalizing symptoms. Groh and colleagues' (2012) meta-analysis found firm associations between earlier organized-insecure avoidant attachment representations, but

not attachment disorganization, and childhood internalizing ratings. To investigate whether early disorganization was related to internalizing in this sample, we conducted planned post-hoc analyses which examined the relation of *patterns* of disorganization and internalizing behaviors across childhood. We found no evidence of a relation between continuous disorganization and internalizing symptoms in the overall model with or without gender added. In fact, the positive discontinuity group ('DO') showed higher internalizing at Grade 2 and 3 and the negative discontinuity group ('OD') showed higher internalizing ratings from Grade 3 to Grade 6 (see Table 9 in the Expanded Analyses section). It is possible that these contradictory findings reflect measurement error in the classification of babies as disorganized at these corresponding times when they might have been organized-insecure avoidant.

There are considerable factors that limit the generalizability of these results. First, although that the NICHD-SECCYD cohort was similar in many ways to the demographics of the U.S. in 1992, it was generally a low-risk sample. It excluded families whose children were born prematurely or in which the mother or infant were hospitalized soon after birth and delivery. The sub-sample used for these analyses contained fewer minority families, younger mothers, and had fewer economic resources than the initial sample due to participant drop out. Prior research has established distinct differences in disorganization across low and high-risk samples (see meta-analysis by van IJzendoorn et al., 1999). It would be fruitful to investigate these patterns in the context of high risk as the presence of disorganization at any age may have a differential impact on subsequent problem behaviors. Yet, even in this relatively homogenous, low-risk sample,

continuous disorganization distinctly relates to increased externalizing behaviors across childhood, especially for boys.

A second limitation, as with any attachment research, is the unknown measurement error associated with our current measures of attachment representations. Although the Strange Situation is universally used and validated, it captures a representational construct that cannot be directly observed. Therefore, it is possible that some children in the discontinuity groups have maintained a continuous organized attachment representation from infancy to early childhood and were just assessed incorrectly or behaved atypically in the laboratory context on that day. Either way, using more assessments of attachment decreases the likelihood of measurement error.

A third limitation concerns the small numbers of children categorized as being disorganized at both the 15- and 36-months assessment. This is especially true for the models that removed children with secure attachments. A common concern of small samples is being underpowered and unable to adequately assess model assumptions. Despite this, growth curves are particularly robust and suitable for these sample sizes (Curran et al., 2010; Satorra, 1990) and growth curves have been successfully fitted to small samples (e.g., 22; Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991).

Finally, despite the common use of the CBCL in capturing child externalizing behaviors, the anomalous findings for girls among patterns of attachment suggests a possible limitation in using this measure to identify female externalizing behaviors. Prior research has suggested that girls may use different forms of aggression in childhood and adolescence (e.g. Salmivalli & Kaukiainen, 2004). Investigation for gender bias is needed into the CBCL aggression scale that is used in comprising the externalizing construct as

children age into mid-late childhood/adolescence. Further research is warranted into the effect of patterns of disorganization on different types of growing aggression across childhood.

Despite these limitations, the current study expands the field of attachment and disorganization on both a methodological and practical level. From this research, is evident that disorganized attachment should be investigated separately from organized insecurity. More importantly, these findings highlight the need for intervening measures when early disorganization is present to prevent developmental problem behaviors.

## CHAPTER 2

### EXPANDED LITERATURE REVIEW

#### Introduction

A critical aspect in development is the secure attachment that develops out of the cumulative interactions between the caregiver, usually the mother, and her infant. This attachment provides the child with a sense of security. A secure attachment promotes expectations of responsiveness and availability from the caregiver, provides a secure base for exploration of the environment, and enables the development of positive and accurate self-evaluations (Bowlby, 1969/1982; Main, Kaplan, & Cassidy, 1985). Attachment theory and its application to child development extends beyond describing a dyadic bonding experience. At its core, attachment theory attempts to explain and predict personality development from childhood through adulthood. In developing attachment theory, John Bowlby (1969, 1973, 1978) expanded upon traditional psychoanalytic theories and incorporated ideology from cognitive information processing, interpersonal relationships, ethological theories, separation and deprivation concepts, and psychoanalysis to describe how early experiences direct and shape personality and intra- and inter-personal relationships.

John Bowlby's theory began with a controversial and instrumental move away from the psychoanalytic emphasis on drive reduction prevalent in the mid-20th century. He emphasized the role of the mother-child relationship in our evolutionary history and the primacy of the mother-child relationship for survival purposes. Incorporating ideas from early research on imprinting and social bonding within critical periods of development (Bowlby, 1969; Bretherton, 1992), Bowlby argued for the examination of

mother-child interactions in natural settings. His work led to a new understanding of the significance of maternal separation and deprivation. To formalize decades of research and findings, Bowlby produced a trilogy of books designed to elaborate his theory. Bowlby's first volume (1969) took an evolutionary adapted-ness approach using ethological studies to explain the development of mother-child attachments and argued for the importance of studying maternal separation in naturalistic settings. During early repeated interactions with their mothers, babies have 'small-scale experiments in the head' that result in 'mental data' analyzed and reflexively utilized to predict future outcomes with a caregiver or "attachment figure". These experiments result in a child's 'fixed action plan'. Once the child has enough data points to describe and evaluate mother-child interactions, the child subconsciously applies this "internal working model" to predict future behavioral outcomes across an array of real and imaginary situations. To be used accurately, the child's data model must have internal consistency. This is the essence of our current understanding of Bowlby's internal working model of attachment.

In the second volume (Bowlby, 1973), Bowlby extended his view of the internal working model of attachment to suggest that 'mental data' from interactions with the attachment figure create not only predictions to direct future interactions with the attachment figure, but also a model of the child's own self-perception and self-evaluation. A mother's responsiveness and sensitivity to the child's needs not only provide the child with expectations of future responsiveness, but also greatly affect the child's perception of self-efficacy -- being able to address such needs. For example, comforted and supported children not only trust in their attachment figure to meet their needs; but they also perceive themselves as valued and efficacious in getting their needs met. In contrast,

insecure children expect inconsistency from attachment figures and perceive themselves as incompetent in getting their needs met. Children without an attachment figure, Bowlby argues, have no attachment related strategy for fear or threat reduction and a lack of developed self-efficacy or trust in expectations for future interpersonal relationships.

In his third volume (Bowlby, 1980), Bowlby explained how internal working models continue to develop, paralleling advances in cognition and information processing. Incorporating Piagetian theory with the onset of preoperational thinking, the child can create representations; Bowlby postulated that these representations (or internal working models) serve as the basis for expectations in interpersonal relationships and self-evaluation. Children incorporate experiences and information into their internal working model as they make sense of the world, and their models direct their behavior creating the anticipated outcomes. As development proceeds, attachment becomes increasingly less susceptible to new influences. However, Bowlby was limited in that he saw a dichotomy of children being attached or unattached, with the potential for unfavorable situations where individuals developed attachment ‘injuries’.

Bowlby’s mentee, Mary Ainsworth, expanded on Bowlby’s foundation and provided the necessary methodological framework that has shaped the way attachment research has been conducted for decades. Ainsworth’s important contributions were the result of her work studying mother-child dyads in Ganda and her American study of 26 Baltimore families. Also, during her time in Ganda, Ainsworth combined Blatz’s Security theory (Blatz, 1944) and Bowlby’s attachment theory to introduce the idea of a familial secure base in infancy and early childhood. (Ainsworth, 1963, 1967).

After careful naturalistic and laboratory observations, Mary Ainsworth and her students realized that attachment could not be considered on a continuum from attached to unattached, nor was it useful to categorize children as simply attached or not attached as Bowlby presented. Instead, their observations led them to conceptualize three *organized* patterns of attachment behaviors. Initially, they labeled these patterns “A”, “B,” and “C”; later they called them “secure”, “insecure-avoidant”, and “insecure-resistant/ambivalent” (Ainsworth, Blehar, Waters, & Wall, 1978). Ainsworth and her students validated these categorizations by demonstrating that the children in these groups all exhibited predictable patterns of behaviors in response to predictable maternal patterns of responsiveness/ unresponsiveness and sensitivity /insensitivity (Ainsworth et al., 1978). These children were easily grouped because the maternal behaviors they received (while not always favorable) were consistent and provided rich, internally consistent ‘data’ from which the children could derive expectations of their caregivers’ behaviors in a variety of attachment-related situations. This consistency allows the child to develop reliable expectations for future interactions when they have needs to be met or when they face situations of threat or insecurity.

Even with these three reliable attachment categorizations, there remained children whose attachment behavior could not be reliably classified. For nearly twenty years, these children were simply categorized at “Can’t Classify”, or for short, “CC”. In 1990, Main & Solomon (1990) identified a fourth group of children from within this CC group. In this fourth group, children showed mixed and sometimes confusing patterns of attachment behaviors or attachment strategies. Main and Solomon initially labeled this group “D” and later “disorganized”, because their behavior appeared to have no coherent

strategy or expectations of how their mother would respond to or meet their needs (Main & Solomon, 1990).

The explanation for this failure to form an organized pattern of attachment was at first a puzzle. Children are generally expected to see their caregiver as a source of comfort, seeking them out during times of need or fear and approaching their caregivers on reunion after separation. Attachment behaviors are *organized* strategically to maintain the relationship to the caregiver, whether the caregiver is intrusive (in the case of avoidant attachments) or unreliable (in the case of resistant/ambivalent/ attachments). Yet, these children categorized as “D” seemed to not have an organized set of behaviors in responding to their caregiver after separation. Sometimes they seemed to freeze, as if there were something that was causing them to hold back from approaching the caregiver. At times they showed bizarre behaviors, like collapsing on the floor or hiding behind a desk or a curtain.

The clue to understanding these bizarre behaviors came when researchers noted that these children’s caregivers showed contradictory and unpredictable behaviors when responding to their child’s attachment-related needs (Main & Hesse, 1990; Schuengel, van IJzendoorn, & Bakermans-Kranenburg, 1999; True, Pisani, & Oumar, 2001). Main and Hess (1990) proposed that parents of these children are themselves frightful figures, displaying either frightening or frightened behaviors; leaving the child with an unresolvable paradox of their mother being both a source of comfort and also a source of fear and uncertainty (Main & Hesse, 1990; Schuengel et al., 1999; True et al., 2001).

Children who develop a disorganized attachment representation may have parents that at times are responsive and sensitive, just like the parents of otherwise attached

children. The distinction is that parents of these children also show frightening or frightful behaviors. Children of these mothers instinctively have an attachment system that directs them to pursue safety from the frightening or frightful situation by seeking proximity to their attachment figure; who in this instance also serves as the source of the threat or unsafety. This creates conflicting strategies of resolving their fears or uncertainties. These children are caught in an approach-avoidance situation—wanting to approach their caregivers for comfort and safety yet fearing their parents and needing to avoid or hide from them. Furthermore, as children engage in self-evaluations via the development of an attachment representation, these children who experience such incomprehensible, contradictory interactions can experience dissonance and dissociated self-states (Blizard, 2003; Solomon & George, 1999).

According to Bowlby, internal working models of secure, adaptive attachment representations are be relatively stable. So long as both parties (caregiver and child) are satisfied, they are both likely to continue using the same fixed action plans and internal working models. The organization works for them both: the caregiver continues her behavior, and the child develops an organized pattern of attachment behaviors that allow the child to use the caregiver adaptively as a secure base. Bowlby hypothesized that there is propensity for change among maladaptive attachment internal working models. When there is poor internal consistency of the ‘data’ or when either party is dissatisfied and seeks to change the interactional dynamic by altering behaviors, internal working models can change, although change becomes increasingly difficult as the individual grows out of childhood. Bowlby noted that, under optimal circumstances there is conscious reflection and appraisal of new ‘data’ that results in the revising, extending, and checking

of internal models. Without this, the model would continue to rely on the data that has created the original automatic, reflex-like action plans (Bowlby, 1969). Bowlby's consideration of attachment change focused mostly on the disharmonious mother-child relationships that resulted in severe separation and maternal deprivation, or attachment 'injuries' or disruptions. In these situations, he suggested, change in the internal working model was possible through the repairing of these attachment injuries.

Under what conditions does attachment remain stable or change? Are there predictable circumstances that would account for attachments change? Combined with the known instability that occurs in some children, some researchers have proposed explanations as to how early attachment representations and environmental change relate to the internal working model of attachment. Prototype theory (Fraley, 2002; Fraley & Brumbaugh, 2004; Fraley et al., 2011), a dynamic lifespan anchor perspective (ECCRN, 2006) and a structural approach (Sroufe, 2005) all describe early attachment representations as a psychological anchor the self uses throughout the lifespan to base their expectations, interpretations, and responses to environmental changes from. Although these perspectives allow for influences and potential change from variation in their development and subsequent internal working model, they maintain that there is an inherent set of cognitive expectancies that affect a person's interpersonal relationships from their fundamental early attachment representations. These perspectives predict relative stability over time because they argue that the developed attachment representation is an intrinsic part of the self. For change to occur, the 'mental data' that has built the internal working model must have instrumental modifications or new

significant 'data' must be collected and added to the model for a new prototype to develop.

Conversely, the opposing model views early attachment representations as simply setting the initial stage for development. This perspective has identified early attachment representation models as mediational (ECCRN, 2006), linkages (Sroufe, 2005), or revisionist/contextual (Fraley, 2002). These perspectives suggest that attachment internal working models used for expectations and interpersonal strategies are updated and modified regularly as a person goes through life and encounters different attachment representations through other meaningful relationships. It starts individuals with a template, but then the next period in life can be congruent with this view or opposing, and it is that current period in life that influences the next, not the underlying attachment model. This view assumes more flexibility and allows for more variation in attachment representations across the lifespan as the individual undergoes personal and environmental changes that may contradict their original internal working model's specifications.

While both camps of attachment stability mechanisms have been supported with research, there is still much to be discovered about the underlying structure of the attachment representation and its continuity or discontinuity. This is particularly pertinent to children who lack a developed, organized attachment representation where internal consistency of 'data' is extremely low – or children with a disorganized attachment. These children (unlike their organized peers) receive contradictory, unpredictable 'data' or maternal behavior – leaving them with no coherent attachment strategy or foundation. Without an early attachment foundation, we cannot predict lawful continuity of an

attachment representation or related attachment outcomes. This important distinction is critical to understanding the varying findings on children with a disorganized attachment representation. This review will highlight these critical differences between disorganized and organized children and expand on how lawful discontinuity applies to understanding the outcomes and stability of disorganized attachment.

### Measuring Attachment

During the 33-minute Strange Situation task that Ainsworth and her students developed (Ainsworth & Bell, 1970; Ainsworth et al., 1978), the attachment figure (who is usually the mother but possibly another caregiver) and the child are videotaped in an unfamiliar laboratory playroom. The task is composed of a series of eight, 3-minute increasingly stress-inducing situations involving the presence of a stranger and separations from the mother who is presumed to be the attachment figure. The mother-child dyad begins by becoming accustomed to the playroom; the child is encouraged to explore the room and toys. A female stranger enters the room and sits quietly, then after a minute tries to engage with the child. Next, the mother leaves the room for three minutes. When she returns to the room, the stranger leaves the room. After another three-minute period, the mother leaves the room, and the child is left all alone for three minutes (or until they are distressed and the stranger needs to be sent back). The stranger enters the room and tries to engage the child in play or console the child. Finally, the mother returns to the room and the stranger leaves.

During each of these 3 minutes episodes, researchers record the child's proximity- and contact seeking, contact maintaining or resistance; and avoidance, noting the child's behavior towards the stranger and the mother, the child's behavior when the mother

leaves, and the child's behavior during the reunions. Trained coders watch videos and classify mother-child dyads as Insecure-Avoidant (A), Secure (B), Insecure-Ambivalent (C), and Disorganized (D). A classification of disorganization is assumed when the child's behaviors do not consistently reflect the behavioral patterns of any of the three organized attachment styles, when the child's behaviors do not demonstrate a logical response to the situation, or when the child's behaviors are incoherent or contradictory. Children are rated on a 9-point scale for "D"-ness. When the dyad is rated at 5 or higher, a primary classification of disorganized is given, as well as best-fitting secondary classification of Secure, Insecure-Ambivalent, or Insecure-Avoidant.

In the Strange Situation, children categorized as Secure freely explore the strange room and toys and often interact naturally with the stranger while the mother is present. These children may show signs of distress when the mother leaves the room, but they greet the mother joyfully on reunion and easily return to play. Children categorized as Insecure-Avoidant often seem independent of the mother, exploring the strange room confidently in her presence and in her absence. Children categorized as Avoidant rarely seem distressed on separation or reunion, yet they studiously avoid or ignore the caregiver on reunion. This behavior is not to be mistaken as a lack of response, rather as a suppressive behavior as research has confirmed heart rate increases similar to other attachment styles during this distressing time for these children, regardless of their stoic emotional appearance (Zelenko, Kraemer, Huffman, Gschwendt, Pageler, & Steiner, 2005). In contrast, children categorized as Insecure-Ambivalent/Resistant often stay close to the mother, needing encouragement to explore the room and play with the toys. Often stressed during separation, they are unable to be consoled by the stranger. Even

with the return of the caregiver, they may be difficult to soothe, clinging to the caregiver while also showing resistant, angry behavior.

Children with a disorganized attachment representation are sometimes mistaken for securely attached children, as they often will not show either anxious or ambivalent behaviors. What makes them distinctly different are the atypical responses in the reunion situation. They may show fear, intense uncertainty, or contradictory behaviors that together display their lack of a coherent attachment response. These children may be apprehensive towards their mothers, freezing, or overall disoriented during the reunion phase.

To measure attachment during the preschool period, researchers modified the Strange Situation paradigm (Cassidy & Marvin and the MacArthur Working Group on Attachment, 1992). As in the original Strange Situation, the mother-child dyad is introduced to the strange laboratory room, and the child is subjected to increasingly stress-induced situations to activate the attachment system. For these older children, the stranger reunion phase is eliminated, and the second separation is shortened. The same coding system is used as in the infant Strange Situation paradigm, resulting in Insecure-Avoidant (A), Secure (B), Insecure-Ambivalent (C), and Disorganized (D) classifications. The attachment classification of Disorganization has been expanded to include characterization of combinations of other styles, controlling-caregiving, controlling-abusive, or illogical behavioral patterns (Moss, Bureau, Cyr, Mongeau, & St-Laurent, 2004; Lyons-Ruth, Easterbrooks, & Cibelli, 1997).

Attachment has also been measured in adolescence and adulthood. Arguably, the most used method to assess adult attachment is the Adult Attachment Interview (see

Hesse, 2008). In the AAI, participants answer questions regarding their childhood experiences and are encouraged to recall their early attachment relationships in detail. Coders focus on the coherence and clarity of the participant's recollection rather than on the positivity/negativity of the experiences being recalled (Hesse, 2008). Participant's 'state-of-mind' can be assessed as Secure-autonomous, Dismissing, Preoccupied, or Unclassified. Coders are trained to look for a continuous narrative of the childhood experiences, while also looking for factors related to dismissing or preoccupied mindsets such as idealization, passivity or vagueness, derogation, or anger towards the parent (Hesse, 2008). This measure has been validated by correlating the parent attachment organization as measured by the AAI with their child's attachment organization as measured by the Strange Situation (Ainsworth et al., 1978).

Other measures have been designed to access attachment representations across the lifespan in the form of questionnaires (e.g. Kerns Security Scale (Kerns, Klepac, & Cole, 1996), Adult Attachment Questionnaire (Feeney, Noller, & Hanrahan, 1994), interviews (e.g. Child Attachment Interview (Target, Fonagy, & Shmueli-Goetz, 2003), Adult Attachment Interview (George, Kaplan, & Main, 1984), Adult Attachment Scale (Collins & Read, 1990), or natural observational/story time interactions with the child (e.g. Attachment Q-sort (Waters & Deane, 1985), Incomplete Stories with a Doll Family (Cassidy, 1988), Attachment Story Completion Task (Bretherton, Ridgeway, & Cassidy, 1990), Manchester Child Attachment Story Task (Green, Stanley, Smith, & Goldwyn, 2000). Each of these methods is intended to capture the patterns of expectations of responsiveness, communication, reliability, and sensitivity in an attachment figure that make up corresponding attachment styles.

### Antecedents of Attachment Representations

To this point, we have reviewed the evolution of attachment and the internal working model that serves as the child's internalized attachment representation. More specifically, as Bowlby postulated, a child's internal working model is developed early in the child's life over years of interactions with the primary caregiver. Making the internal consistency of the 'data' available to babies an important factor in predicting the lawful continuity/discontinuity of attachment. Here lies a critical difference between organized and disorganized attachment representations – consistency and severity of antecedent maternal behavior.

#### *Organized Attachment Representations*

Following Ainsworth's initial findings among the Ganda mother-child dyads, research overwhelmingly supports consistent maternal sensitivity as the hallmark of forming a secure attachment representation (see De Wolff & van IJzendoorn, 1997; ECCRN, 2001). Other interpersonal maternal behaviors associated with secure attachment development include maternal mutuality or harmony, coordinated social play or synchronous interaction, stimulation, positive attitude, and emotional support (De Wolff & van IJzendoorn, 1997). Mothers' ability to infer their infants' mental states appropriately predicts secure attachment representations independent of maternal sensitivity scores (Meins, Fernyhough, Fradley, & Tuckey, 2001).

Beyond maternal behavior, external factors such as socioeconomic status appear to play a role in the link between attachment and maternal sensitivity (De Wolff & van IJzendoorn, 1997). The link between maternal sensitivity and secure attachments is stronger in dyads with higher socioeconomic statuses, while children from families of

lower poverty statuses are at higher risks for developing insecure attachment representations (Bakermans-Kranenburg, van IJzendoorn, & Kroonenberg, 2004; Egeland & Sroufe, 1981; ECCRN, 2001; van IJzendoorn, Schuengel, & Bakers-Kranenburg, 1999).

The development of insecure organized attachments is marked by adverse maternal behaviors. For instance, mothers of insecure infant attachment styles are more likely to be depressed (Atkinson, Paglia, Coolbear, Niccols, Parker, & Guger, 2000; Campbell, Brownell, Hungerford, Spieker, Mohan, & Blessing, 2004; Hipwell, Goosens, Melhuish, & Kumar, 2000; Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Lyons-Ruth, Lyubchik, Wolfe, & Bronfman 2002), especially in mothers with comorbid diagnoses (Carter, Garrity-Rokous, Chazan-Cohen, Little, & Briggs-Gowan, 2001). Mothers of babies classified as having an insecure attachment style have low emotional attunement with their babies (Isabella & Belsky, 1991), show high maternal expressed emotion (as marked by overinvolved and critical; Jacobsen, Hibbs, & Ziegenhain, 2000) and low levels of reflective functioning (Slade, Grienenberger, Bernbach, Levy, & Locker, 2005).

Young mothers who also have cumulative risk factors (such as low education, low income, single parent status) have babies with an increased risk of developing insecure attachments (see meta-analysis Cyr, Euser, Bakermans-Kranenburg, & van IJzendoorn, 2010). At the same time, attachment classifications do not differ significantly among children of adolescent mothers and non-adolescent mothers (Andreozzi, Flanagan, Seifer, Brunner, & Lester, 2002; Broussard, 1995), despite the fact that adolescent mothers report lower self-esteem, more parenting stress, and more child abuse potential, and they

also provide lower quality of the home environment (Borkowski, Bisconti, Weed, Willard, Keogh, & Whitman, 2002).

### *Disorganized Attachment Representations*

Contrary to babies classified with organized attachment representations, babies showing disorganized attachments commonly experience a wide range of contradictory maternal behavior. Mothers of children with disorganized attachment classifications are more likely to exhibit maltreatment or parental abuse to their babies (Carlson, Cicchetti, Barnett, & Braunwald, 1989; Cicchetti & Barnett, 1991; Crittenden & Ainsworth, 1989; Cyr et al., 2010), have unresolved loss or trauma (established by the Adult Attachment Interview; Ainsworth & Eichberg, 1991; George, Kaplan, & Main, 1985; Lyons-Ruth & Block, 1996; Main & Hesse, 1990), or show several atypical maternal behaviors (Goldberg, Benoit, Blokland, & Madigan, 2003; Lyons-Ruth, Bronfman, & Parsons, 1999).

Disorganized dyads are also found among relatively low-risk samples where the maternal behavior may be less extreme, yet still unpredictable, extremely inconsistent, or fear-provoking (van IJzendoorn et al., 1999). These anomalous maternal behaviors range from withdrawn and dissociative parenting behaviors to being rough with a child or using attack-like posture (see Madigan, Bakermans-Kranenburg, van IJzendoorn, Moran, Pederson, & Benoit, 2006 for a meta-analytic review). Like mothers of insecure-dyads, mothers of disorganized dyads may show high maternal expressed emotion (as marked by overinvolvement and critical behaviors; Jacobsen et al., 2000).

Unlike their organized peers, mothers of disorganized dyads differ on their observed maternal sensitivity, sometimes showing similar sensitivity behavior to mothers

of securely attached children and other times much lower (ECCRN, 1997; Schuengel et al., 1999; van IJzendoorn et al., 1999). Sociodemographic factors may play a role in teasing apart maternal behaviors that contribute to disorganized attachments. Mothers lower in sensitivity in high sociodemographic risk situations are more likely to have babies with disorganized attachments than mothers in low sociodemographic risk situations (Gedaly & Leerkes, 2016). Single-minority mothers are more likely than single-Caucasian mothers to have disorganized attached children (Cyr et al., 2010), although it's not clear how ethnicity and single-mother status each relate to disorganization.

The dynamics of women's interpersonal relationships relate to their babies' attachment development. Mothers of babies classified as disorganized compared to organized peers report more life stress, overall stress, and cumulative stress across various samples (Atkinson et al., 2000; Cyr et al., 2010; Mills-Koonce, Garipey, Sutton, & Cox, 2008; O'Connor, Bureau, McCartney, & Lyons-Ruth, 2011). Romantically, marital conflict is associated with disorganized attachment classifications (Owen & Cox, 1997; Solomon & George, 1999; van IJzendoorn et al., 1999), albeit the strength of this association differs greatly across various samples. A mother's social support, depression, and the baby's temperament do not appear to relate to disorganized attachment (Atkinson et al., 2000; Huth-Bocks, 2004; van IJzendoorn et al., 1999).

The factors that predict organized attachment representations, albeit not always positive, are almost exclusively factors that are more stable in nature (such as negative maternal attunement or maternal depression). Conversely, disorganized attachment children have mothers experiencing maladaptive factors that are subject to extreme

inconsistency, such as traumatic loss, abusive behavior, stress, or financial risk. Research is mixed when examining children with an organized-insecure attachment representation. At times they are linked with preexisting maternal factors mirroring those of disorganized dyads.

A major limitation of this research is that historically researchers have commonly grouped children with disorganized attachments with those with an organized-insecure attachment representation. Another problem is that most research looks only at one time assessment of attachment in early childhood, despite the developing nature of a child's attachment style. In doing so, they have greatly limited the external validity of these results, particularly under the lens of predicting a stable attachment prototype.

#### Sequelae of Attachment Representations

We now understand how the internal consistency of 'maternal behavior data' can contribute to the development of organized versus disorganized attachment representations. In this next section we consider how these early internal working models contribute to developmental outcomes.

While children with organized attachment representations may all experience consistent maternal 'data' that allows for predictable and expected interactive outcomes, they don't all associate with positive outcomes. For example, a child that experiences consistent, reliable avoidant maternal behavior may develop an organized internal working model due to the high internal consistency and repeatability of maternal behavior. However, that child's expected interactive outcomes will relate to avoidance and non-responsivity. While it may be tempting to group these maladaptive outcomes

with those of children with disorganized attachments, it is important to recall the distinctive dissociative nature of disorganized attachment representations that forms.

### *Organized Attachment Representations*

Children with early secure attachment organizations show greater social competence/adjustment, independence, interpersonal skills, better peer-rated social status (Granot & Mayseless, 2001; Weinfield, Sroufe, Egeland, & Carlson, 2008), fewer externalizing problems, fewer internalizing problems (Groh, Fearon, van IJzendoorn, Bakermans-Kranenburg, & Roisman, 2016) and stronger emotion understanding (Cooke, Stuart-Parrigon, Movahed-Abtahi, Koehn, & Kerns, 2016) compared to all other attachment styles. Children showing insecure attachment often show internalizing problems, anxiety, and social withdrawal (Brumariu & Kerns, 2010; Colonnaesi, Draijer, Stams, Van der Bruggen, Bogels, Noom, 2011; Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012; Madigan, Atkinson, Laurin, & Benoit, 2013). Not surprisingly, children with insecure attachment styles are reported by teachers as less socially competent, having poorer emotional health (Bergin & Bergin, 2009; van IJzendoorn et al., 1999), and more likely to exhibit bullying behavior than their peers with secure attachment styles (Koiv, 2012).

Academically, children with a secure attachment style show higher levels of school connectedness and prosocial behavior than children with insecure attachment styles (Oldfield, Humphrey, Hebron, 2016). These children outperform their insecurely attached counterparts academically (Bergin & Bergin, 2009; Ekeh, 2012; Majimbo, 2017), and as early as preschool children with a secure attachment style outperform insecure counterparts in math and reading skills (Bus, Belsky, van IJzendoorn, & Crnic,

1997; McCormick, O'Connor, & Barnes, 2016). Insecure toddlers show shorter attention skills than secure peers (Commodari, 2013; Main 1983). Continuing across the lifespan, children with a secure attachment style compared to peers with an insecure attachment show favorable attention skills, self-security, and academic performance in middle childhood and adolescence (Aviezer, Resnick, Sagi, & Gini, 2002; Jacobsen & Hoffman, 1997), and higher academic preparation, concentration, and academic efficacy in college (Larose, Bernier, & Tarabulsy, 2005).

Cognitively, children with a secure attachment style continually score higher than children with an insecure attachment on cognitive and language performance tests in childhood and adolescence (Jacobsen, Edelstein, & Hofmann, 1994; Spieker, Nelson, Petras, Jolley, & Barnard, 2003). Children with an insecure attachment style are found to lag in their emotion and cognitive communication compared to securely attached peers (Lemche, Klann-Delius, Koch, & Joraschky, 2004). Children classified as avoidant and ambivalent in their attachment score lowest on mastery motivation, while peers showing secure attachments outscore their insecure peers on communication, cognitive engagement, and mastery motivation (Moss & St-Laurent, 2001).

Physiologically, a recent meta-analysis provided limited support for infant attachment style predicting baseline physiological measures, but did show more clear differences in reactivity to change (Groh & Narayan, 2019). Insecurely attached infants show heightened RSA activity during the reunion phase and increased cortisol activity across all separation-reunion procedures compared to their securely attached peers (Groh & Narayan, 2019). Similarly, insecure attachments have been linked to abnormal activity in the hypothalamic-pituitary-adrenal (HPA) axis that is related to the body's stress

response system (Badanes, Dmitrieva, Watamura, 2012; Rogue, Verissimo, Oliveira, Oliveira, 2012). Among children starting childcare, insecure infants show higher cortisol levels during the initial adaptation phase even with the mothers present compared to children with secure attachments (Ahnert, Gunnar, Lamb, & Barthel, 2004). Insecure-resistant attachment styles add additional influence towards heightened cortisol activity beyond genetic factors (Luijk, Velders, Tharner, van IJzendoorn, & Bakermans-Kranenburg, 2010).

Being classified as having an avoidant insecure attachment is linked to both externalizing and internalizing problems (O'Connor, Scott, McCormick, & Weinberg, 2014; Groh et al., 2016). Inside the classroom, teachers rate avoidant infants as having more internalizing symptoms, though these ratings are not always congruent with parent ratings (Lyons-Ruth, Easterbrooks, & Cibeli, 1997). Children showing an insecure attachment style lack social competence with peers (Erikson, Sroufe, & Egeland, 1985). Alternative methods of studying attachment also show children with insecure attachments show more disruptive behavior in preschool age (Devito & Hopkins 2001). Finally, compared to children with secure, high quality attachments (as assessed by a continuous measure of attachment), those with lower attachment qualities are more likely to have behavior problems at age 3 (Shaw & Vondra, 1995) and be bullies or be themselves bullied in grade school (Walden & Beran, 2010).

#### *Disorganized Attachment Representations*

Disorganized children show more aggressive behaviors across childhood and adolescence above and beyond all their organized peers (Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010; van Ijzendoorn et al., 1999). Not unlike

children with organized insecure attachments, children with attachment disorganization show more internalizing and externalizing behaviors than secure peers (Fearon et al., 2010; Groh et al., 2016; Moss et al., 2004; Smeekens, Riksen-Walvern, & van Bakel, 2007). Yet, some studies have failed to find a link between disorganization and internalizing (Groh et al., 2012; Madigan et al., 2013) or externalizing behaviors (Belsky & Fearon, 2002a; McCartney, Tresch Owen, Booth, Clarke-Stewart, & Lowe Vandell, 2004; ECCRN-ECCRN, 2006).

One study uniquely examined the link between early attachment and externalizing behaviors, specifically through the lens of risk-elevating effects. Rather than look at how early attachment predicts a single observation of externalizing behavior, Fearon & Belsky (2011) looked at how early attachment predicted the trajectories of externalizing behavior across childhood. At the single-time point measurement, only insecure-avoidant attachments were related to externalizing behaviors, yet disorganized attachments predicted increases in the growth of externalizing behaviors across childhood (Fearon & Belsky, 2011). More interestingly, the researchers looked at contextual risk (income-to-needs ratio, father absence, maternal age, and maternal education) and gender as moderators and found that males with high contextual risk and early disorganized attachments uniquely had significant externalizing growth trajectories (Fearon & Belsky, 2011).

Children with a disorganized attachment representation are at an elevated risk for anxiety (Achtergarde, Muller, Postert, Wessing, Mayer, Romer, 2015) and are found to re-experience PTSD symptomatology at greater levels than organized peers (MacDonald et al., 2008). Disorganized attachment representations are also linked with inflamed C-

reactive protein (Bernard, Hostinar, Dozier, 2018), which is commonly associated with depression, increased depressive symptomatology (Borelli, David, Crowley, & Mayes, 2009), and ADHD symptomatology (Thorell, Rydell, & Bohlin, 2012).

Not surprisingly, during preschool and early school years, children with disorganized attachment representations display poorer social interactions as evidenced by lower quality parent-child communication, poorer interactions with friends and teachers, poor emotion regulation skills, and more hostile behaviors in preschool settings (Lyons-Ruth & Jacobvitz, 2008; Lyons-Ruth et al., 1993; O'Connor & McCartney, 2006; Moss et al., 2004). Within the classroom, children with a disorganized attachment score lower on measures of academic achievement compared to organized peers and show particularly lower mastery motivation scores (Moss & St-Laurent, 2001). Amongst children with a disorganized attachment, those who showed higher levels of dysregulation and controlling behavior towards academic authority negatively predicted school readiness (Stacks & Oshio, 2009).

An abundance of research has demonstrated the cognitive disadvantages that accompany disorganized attachment among school-aged children. Children with disorganized attachments show significantly lower scores on deductive reasoning tasks (Jacobsen et al., 1994), joint problem solving skills and metacognitive strategies (Moss, St-Laurent, & Parent, 1999), cognitive regulatory abilities (Jacobsen et al., 1994), and joint attention skills (Claussen, Mundy, Malik, & Willoughby, 2002). In overall cognitive development, children with disorganized attachment representations fall behind their organized peers (Spieker et al., 2003; Stams, Juffer, & van IJzendoorn, 2002), lag in

vocabulary cognition (Lemche et al., 2004), and language outcomes in general compared to their peers showing organized attachment styles (Spieker et al., 2003).

Biologically, children with disorganized attachment representations show elevated cortisol levels and stress reactions compared to organized peers (van IJzendoorn et al., 1999). Infants who are disorganized are 2.5 times as likely to have the 7-repeat DRD4 allele that is associated with negative emotional regulations, Attention Deficit Hyperactivity Disorder, and maladaptive behavioral issues (Lakatos, Toth, Nemoda, Key, Sasvari-Szekely, Gervai, 2000). Low baseline cortisol specifically coupled with disorganized attachment is associated with problem behaviors in early childhood (Fong, Measelle, Conratt, & Ablow, 2017). Maternal-infant cortisol attunement is incongruent for disorganized dyads compared to organized peers (Nofech-Mozes, Jamieson, Gonzalez, & Atkinson, 2019). In adolescence, disorganized individuals show increased adrenocortical responses compared to organized peers (Spangler & Zimmermann, 2014). In adulthood, unresolved adult attachment (most commonly paralleled to disorganized childhood attachment) is linked to prolonged cortisol recovery in stress induced situations (Petrowski, Beetz, Schurig, Wintermann, & Bucheim, 2017).

Bowlby originally postulated that unresolvable conflicting interactions with an attachment figure would ultimately lead to dissociation, and research seems to support his postulation. Being classified as disorganized in infancy and early childhood predicts an increased risk for developing adult dissociative tendencies and psychopathology in late adolescence and early adulthood (see Stovall-McClough & Dozier, 2016 for a comprehensive review). A more in depth look at this association is detailed in the next section.

## Clinical Considerations

Compared to the longitudinal research that has provided the developmental psychology field with an abundance of studies linking early disorganized attachment representations to maladaptive developmental behaviors, investigations into the links between early disorganized attachment and clinical psychopathology have just begun. Although prior literature provides an early framework for how the dissociative nature of disorganized attachment relates to clinical psychopathologies (e.g. Liotti, 2004), at its current state there are many limitations preventing researchers from giving evidence-based statements linking early disorganized attachment to these severe adolescent and adult disorders.

For instance, there are few longitudinal studies that have the statistical power to study sub-samples of psychopathologies within their small populations. Samples that are large enough are commonly low-risk samples. Additionally, many prior studies group disorganized attachment representations with organized-insecure attachment representations to make an overarching 'insecure' group, limiting the availability of research that uniquely looks at the links of disorganized attachment representations. Despite these limitations, several studies have laid a strong foundation linking early disorganized attachment representations, adolescent and adult disorganized attachment representations, or traits of disorganized attachment representations (such as unresolved loss or trauma or an inability to coherently discuss attachment related narratives) are linked to clinical psychopathologies.

Insecure attachments (including disorganized attachments) have been linked with severe personality disorders across the lifespan. However, few of these studies

specifically focus on disorganized attachment representations exclusively. Similarly, few studies have the longitudinal opportunity to look at infant/early childhood attachment styles with adult personality disorders. So far, what has been found is that adult unresolved attachment states (commonly paralleled with infant disorganized attachments) are associated with Borderline Personality Disorder (BPD; Barone, 2003). BPD patients are specifically more likely to have a disorganized attachment representation than comparison groups containing less severe clinically diagnosed patients and those with no diagnosis (Khoury, Zona, Bertha, Choi-Kain, Henninghausen, & Lyons-Ruth, 2019). Clinicians associate adolescent patients showing disorganized/unresolved attachment with patterns of multiple personality (Nakash-Eisikovits, Dutra, & Drew Westen, 2002). When examining mothers who had borderline personality disorder (BPD) compared to those who did not, researchers found that BPD mothers recalled more negative and dangerous events and were rated as unresolved in their psychological trauma compared to the non-BPD group (Crittenden & Newman, 2010).

Suicidal ideations, tendencies, and attempts are all self-harming behaviors that have been studied through the lens of the dissociative nature of disorganized attachment representations. Unresolved attachment organization in adulthood has been positively correlated with increased suicidal ideation scores (Valizadeh, Davaji, & Nikamal, 2010). Adolescents being treated in a psychiatric ward with a history of suicidal behavior show significantly higher attachment-related dissonance in recall and lapse of reasoning during attachment discourse (Adam, Sheldon-Keller, & West, 1996) than a clinical comparison group without previous suicidal attempts or ideation. Likewise, adolescents considered high-risk for suicide are more likely to lack attachment-related coherence (a common

aspect of disorganized attachment representations) compared to clinical and control groups (Wright, Briggs, & Behringer, 2005).

While pre-pubescent suicidal attempts are rare and thus not widely studied, a case study of a boy involved in a longitudinal study is particularly interesting. During infancy, the boy had been classified as showing avoidant attachment patterns in infancy. By 6 years old, he was classified as having a disorganized attachment representation (Jacobsen, Huss, & Ziegenhain, 1994). When he was 7 years old, he attempted to commit suicide. Other case studies of chronic suicidal behaviors have associated disorganized/unresolved attachments, dissociative cognitive functioning, and suicidal behaviors (Greenfield, 2012). Citing the dissociative state associated with self-harm behaviors, clinicians have used attachment-targeted treatment plans to address self-harm behaviors such as self-mutilation, suicidal behaviors, and eating disorders (Farber, 2008; Ewing, Levy, Boamah-White, Kobak, & Diamond, 2014).

Women diagnosed with Anorexia have been classified primarily with dismissing or unresolved adult attachment states (Delvecchio, Di Riso, Salcuni, Lis, & George, 2014; Zachirsson & Kulbotten, 2013). When combining multiple types of eating disorders, clinical samples of adults with eating disorders show high frequencies of adult disorganized attachment representations compared to non-clinical samples (Barone & Guiducci, 2008). Regarding intergenerational effects, mothers of daughters with eating disorders score significantly more unresolved adult attachment representations than mothers whose daughters do not show an eating disorder (Pace, Cavanna, Guiducci, & Bizzi, 2015).

While research has shown the link between parent-child problematic relationships and severe criminal behavior (e.g. Meloy, 2003, Smallbone & Dadds, 1998), few studies have specifically looked at the link between disorganized attachment representations and severe criminal behavior. Nonetheless, one study closely examined behaviors reflect disorganized attachments (such as variability in distress behaviors and dissociation). In that study, both sexual and violent offenders scored higher on all indices of dissociation compared to the non-offending control group, even though there were no significant differences in the self-reported attachment representations between offenders and non-offenders (Baker & Beech, 2004). Researchers have suggested that early disorganized attachment may be account for the relation between adverse childhood experiences and adult sexual offending (Grady, Levenson, & Bolder, 2016).

Drug dependent adolescents score higher than control group adolescents on fearful attachment scales (Schindler, Thomasius, Sack, Gemeinhardt, Kustner, & Eckert, 2007), with the severity of drug use being linked to fearful attachment ratings (Schindler et al., 2007). Individuals classified as disorganized in early childhood are more likely than those with organized attachment representations o exhibit post-traumatic stress symptomatology after exposure to violent activity representations (MacDonald et al., 2008). Veterans with deployment-related trauma show strong correlations between unresolved adult attachment styles and PTSD (Harari, Bakermans-Kranenburg, Kloet, Geuze, Vermetten, & Westenber, 2008), and unresolved adult attachment is the strongest predictor of combat-related PTSD (Nye, Katzman, Bell, Kilpatrick, Brainard, & Haaland, 2019).

Although these findings are congruent with the research on children with organized-insecure and disorganized attachment representations, important considerations are needed. First, some of the overlapping adult clinical outcomes are conceptually broad and cover a multitude of behavioral indices (such as internalizing and externalizing symptomatology). Second, much of research has combined organized-insecure children with those who show a disorganized attachment representation, limiting the generalizability of research outcomes to disorganized babies exclusively. Although attachment styles may be repaired or damaged, there is an underlying foundation in which the individual reacts, responds, and interprets their environment resulting in distinct behavioral differences. We commonly see babies with a secure attachment style showing positive interpersonal skills and emotion regulation through the lifespan, while babies showing a disorganized attachment style with dissociative-related outcomes such as social problems and identity disorders. Nevertheless, we can't ignore the research that observes instability across the lifespan, specifically among babies that show a disorganized attachment representation. The next section discusses this observed instability under the context of lawful discontinuity.

#### Attachment Stability

Bowlby did not have access to the explosion of longitudinal data of the last 4 decades, but he did conceptualize a developmental pathway for the internal working model. As was his style to rely on interdisciplinary approaches, Bowlby referenced Waddington's (1957) take on epigenetics to understand the developmental trajectory of attachment (Bowlby, 1973). Like epigenetics, he proposed, change would occur from two sources: pressures from within the organism and pressures from the environment. Internal

working models, he thought, would adapt, showing sensitivity to the environment (specifically the familial environment) in the early years of life, but that adaptability would diminish throughout childhood and early adolescence. Change would diminish for two reasons, First, Bowlby postulated this is because environmental pressures tend to remain the same and persist (supporting attachment stability). Second, pressures from within the person include self-regulative processes. Individuals tend to seek out familiar environments and interpret their surroundings from a familiar lens (Bowlby, 1973), thus maintaining and perpetuating attachment organization into the future

Addressing the self-regulatory nature of developmental internal working models, Bowlby analogized internalized working models to trains traveling on their intended tracks. Just as a train remains on its pathway regardless of a cross in the track or pause at a station, internal working models have the same homeorhetic property (Bowlby, 1973). In terms of the railway analogy, experiences of loss or being threatened with separation or abandonment throughout development act like junctions of the track, where a train may be diverted from the mainline to a branch. Bowlby clarified that most often, these diversions (albeit potentially observable in temporary personality or behavior changes) are typically neither lengthy nor severe. Just as the train can return to the main line easily, so can the internal working model to its previously developed state (Bowlby, 1973). Conversely, Bowlby acknowledged that at times a diversion (typically in the form of a traumatic stressor) can be either long, severe, or repeated. Just as it may become more difficult or impossible for the train to return to its mainline, so may the internal working model not return as well (Bowlby, 1973).

#### *Developing Attachment Representations*

Bowlby's train analogy of the adaptive yet homeorhetic nature of internal working models lends credence to a lawful discontinuity view of changes in attachment, as opposed to mere instability; specifically, in two ways. First, while Bowlby's contention of attachment development suggested that 12 months is enough time to acquire enough 'data' to form an internal working model, he firmly stated that these models show continued development across early childhood (Bowlby, 1969). The default, adaptive internal working model is one where a child's caregiver is responsive, sensitive, and providing a mutually satisfactory interpersonal dynamic. Following Bowlby's model, it is through severe and repeated 'attachment injuries' from infancy to early childhood that the developing internal working model may show changes when assessed from one time point to another. Therefore, instability viewed from infancy to early childhood is lawfully discontinuous given the changes in 'mental data' or maternal behavior the child experiences during this critical period of attachment development as the child adapts their internal working model to all the data available to them.

Research studies examining stability across infancy have yielded varying results. One-year stability rates (ranging from 12 months to 44 months) have ranged from 53% to 78% agreement across 4-way attachment classifications (Meins, Bureau, & Fernyhough, 2017; ECCRN-ECCRN, 2007; Thompson, Lamb, & Estes, 1982; Owen, Easterbrooks, Chase-Lansdale, & Goldberg, 1984). It is important to note that these stability rates in infancy reflect research on low-risk, typically middle-class families; the securely attached infants drive the observed stability found across these studies.

In contrast, disorganized attachment representations lack a coherent internal working model due to the inconsistent and severe maternal behavior they experience

preventing them from developing a coherent expectation from an attachment figure. Thus, it is plausible that while individuals remain in the developing phase of attachment (infancy to early childhood) and have a disorganized attachment representation, changes in the environment that point towards an organized, coherent attachment strategy would promote positive lawful discontinuity, while consistency in the maladaptive environment that promote the disorganized attachment representation would promote lawful continuity. For instance, a study of low-income mother-child dyads using a traditional classification of disorganization found just 13% stability from 12 to 18-month classification (Vondra, Hommerding, & Shaw, 1999). Similarly, Researchers examining the low-risk large ECCRN sample found only 20% stability in disorganized dyads from 15 to 36-months (ECCRN, 2001). Conversely, in a study of a high-risk sample of maltreated infants, stability in disorganized attachment representations was much more stable, as one would expect. Results showed 66.7% stability from 12 months to 18 months, 81.3% from 18 months to 24 months, and 80% stability from 12 months to 24 months (Barnett, Ganiban, & Cicchetti, 2003).

#### *Longitudinal Attachment Representations*

The second way Bowlby's adaptive and homeorhetic contention of internal working models lends support to the idea of lawful discontinuity of attachment is in the examination of lifespan attachment stability. As Bowlby suggested, sensitivity to environmental changes continues throughout childhood and early adolescence, although that sensitivity greatly diminishes as the child ages out of childhood. When examining the stability of attachment representations across childhood, a small, low risk sample showed modest stability from infancy into early childhood at 56% (Meins, Bureau, &

Fernyhough, 2017). When examining stability from mid to late childhood, research has shown considerable stability ranging from 60% (Grossman & Grossman, 1991) to 74% (Ammaniti, Van IJzendoorn, Speranza, & Tambelli, 2000).

Thanks to the arduous work of longitudinal researchers, the stability of attachment has been assessed across diverse samples. A 20-year study on lower to middle class families using the three-way classification of attachment showed 72% stability from infancy to early adulthood (Waters et al., 2000). Secure versus Insecure classifications showed 77% stability from infancy to early adulthood in a small study of unconventional families (Hamilton, 2000). Some longitudinal studies did not replicate stability from early childhood to early adulthood (Grossmann, Grossmann, & Kindler, 2005; Lewis, Feiring, & Rosenthal, 2000; Weinfield, Sroufe, & Egeland, 2000). However these studies used alternative methods of assessing early attachment rather than the traditional Strange Situation Paradigm. Two meta-analyses on the subject suggest moderate levels of long-term stability in attachment classifications (Fraley, 2002; Pinquit, Feubner, & Ahnert, 2013).

When examining longitudinal continuity in high risk populations, one study found little stability at 38% from infancy to adulthood (Weinfeld et al., 2000). When examining disorganization specifically, infant disorganization was found to be significantly, albeit weakly associated with preoccupied and unresolved AAI states of mind (Groh, Roisman, Booth-LaForce, Fraley, Owen, Cox, & Burchinal, 2014). There is also considerable stability (86%) when looking at infant disorganization to one of the three insecure adult attachment representations (Weinfeld, Whaley, & Egeland, 2004).

The research so far fails to test Bowlby's predictions regarding attachment change in two ways. First, these studies select a single time point classification of attachment in infancy or early childhood to predict longitudinal stability. As Bowlby suggested, while you can assess an internal working model after the age of 12 months, it is still developing through early childhood. Therefore, it is possible that a baby will show different attachment representations at different ages in infancy/early childhood, especially under the context of changing maternal behavior. Second, identifying the continuity or discontinuity in attachment representations from one time point to another is important, yet equally as important are the conditions in the pathway between the two time points that contributed to the change. The next section discusses research that has examined these pathways and how Bowlby's hypotheses and the prototype theory (Fraley, 2002; Fraley, 2011) aid in the understanding of these lawful changes in attachment.

#### Lawful Patterns of Discontinuity

Bowlby's hypothesis viewed internal working models that derive from attachment as a collection of 'mental data' that result in automatic fixed action plans. Individuals reflexively use these fixed action plans to predict future interpersonal expectations, evaluate self-efficacy, and anticipate the responsiveness and sensitivity of future attachment figures (Bowlby, 1969). Bowlby conceptualized change in attachment representations as analogous to homeorhetic trains on an established set pathway, where change in course across development results from conscious modification of the internal working model or lengthy, severe, or repeated traumatic stressors.

Changing patterns in attachment across infancy and early childhood have lawful discontinuity related to maternal risk factors. When compared to stable secure dyads,

ABC attachment classifications change toward greater insecurity under conditions of aggressive mother behavior, lower maternal education, more maternal reported negative and stressful life events, more punitive and controlling mothers, and lower levels of maternal sensitivity (Frodi, Grolnick, & Bridges, 1985; Meins et al., 2017; 2001; Edwards, Eiden, & Leonard, 2004; Egeland & Farber, 1984; Bar-Haim, Sutton, Fox, & Marvin, 2000). Demographically, girls are more likely than boys to change from secure to insecure (Meins et al., 2017; ECCRN, 2001) as well as families with higher income-to-needs ratios and mothers with less education (ECCRN, 2001). Regarding childcare, children who spend at least 10 hours/week in childcare are more likely than children who are home with their mothers to change from secure to insecure attachment (ECCRN, 2001). Changes from avoidance to security is largely associated with mothers who have a live-in partner compared to mothers that live alone, while changes from resistance to security are seen among mothers who remained in the 'No Relationship' status during the two-time assessments. (Egeland & Farber, 1984). Socio-cognitively, changes from secure to insecure are associated with marginally lower levels of perspective symbolic play, while those who remain insecure have higher levels of stressful life events and lower levels of perspective symbolic play (Meins et al., 2017).

Changing from insecurity to security has been associated with increasing competence among young mothers, increasingly sensitive mothers, and non-punitive parental behaviors (Egeland & Farber, 1984; Frodi, Grolnick, & Bridges, 1985; ECCRN, 2001). Socio-demographically, changes to attachment security was are associated with dyads from higher socioeconomic statuses and mothers with fewer life stressful events (Meins et al., 2017). In a unique sample of rural Appalachian mother-child dyads,

changing from insecure to secure was associated with consistent caregiving relationships and higher maternal social support (Fish, 2004). Across the lifespan, changes from infant/early childhood security to non-autonomous adult attachment representations is strongly associated with developmental trauma (Main, Hesse, Kaplan, 2005), while the shift from infant security to early adulthood insecurity is associated with maternal depression (Weinfield et al., 2004).

Despite this array of research on lawful discontinuity, these studies are limited in that they do not include infants with disorganized attachments, or they group infants with disorganized attachment together with infants with organized-insecure attachment representations. To my knowledge, only one study has specifically examined lawful discontinuity in the context of disorganization. As predicted, one study found that changes from organization to disorganization were associated with more disruptive life events and maternal related inconsistencies of emotion regulation in a low-income sample (Vondra et al., 1999).

#### *Sequelae of Lawful Discontinuity*

Despite the abundance of studies that show attachment is not fully continuous from infancy to early childhood, research is scarce on the consequences of this discontinuity in attachment across development. However, several studies have examined lawful discontinuity by looking at the concurrent infant attachment classification and subsequent maternal behaviors. Recalling that maternal sensitivity is the hallmark for developing secure attachment representation, research has looked at how changes in maternal sensitivity (and other maternal metrics) interacts with infant attachment to predict childhood outcomes.

When children who are insecurely attached experience increasingly positive levels of maternal behavior, their insecurity has more positive outcomes than might otherwise be expected. More favorable outcomes are observed among infants who are insecure in infancy and mothers increase their sensitivity compared to infants who are secure, and mothers decrease their sensitivity (Belsky & Fearon, 2002b). Infants classified as insecure (specifically insecure-resistant) whose mothers experience an increase in maternal sensitivity during early childhood show more attentive and positive friendship skills in dyadic preschool-aged friendships (McElwain et al., 2003) than other insecure children whose mothers do not show a comparable increase in sensitivity. Children classified as insecurely attached in infancy who receive increasing levels of maternal care between 4, 5, and 6 years show fewer externalizing behaviors compared to insecure infants who receive the same or worse quality of maternal parenting (ECCRN, 2006).

Again, a major limitation of these findings is the grouping of children with disorganized attachment representations with organized-insecure attachments. Additional research is warranted examining disorganization as its own category. Under the lens of lawful discontinuity and its associated outcomes, children with disorganized attachment systems would be more likely to show change under changing environmental conditions than children with organized attachments. Secondly, these few studies did not measure attachment continuity between two measurements of attachment. Rather they used predictable outcomes as a proxy for changing attachments.

To this point, we have thoroughly examined the distinct differences in the maternal behavior or 'mental data' available to disorganized versus organized attached

children, showing that because the consistency and predictability of these data is distinctly different, we should not expect the same lawful continuity between the two groups. This was supported in the stability discussion of prior attachment literature. There are also some similarities in the outcomes associated with disorganized and organized-insecure, albeit most outcomes show disorganized attachments as a precursor to severe, dissociative developmental pathologies. Yet, most of these studies look at a single classification of attachment to predict these outcomes and as Bowlby firmly stated, attachment is a developing construct across infancy and early childhood. This makes looking at the prototype of attachment from a lawful continuous/discontinuous perspective critical. The next section discusses these considerations and its application to both disorganized attachment and lawful discontinuity.

#### Remarks

Decades of research have developed a strong foundation for understanding the continuity and discontinuity of attachment, yet there are methodological considerations that should be addressed to produce innovative, provoking, and meaningful attachment research. First, as evidenced by this comprehensive review of attachment research, disorganization is commonly collapsed together with organized insecure attachment styles. Some researchers are no doubt grouping these categories to gain greater statistical power (e.g. Levendosky, Bogat, Huth-Bocks, Rosenblum, & Von Eye, 2011), while others may be taking a secure versus non-secure approach. However as discussed in prior sections, disorganization is distinctively different than all other organized attachment representations in that there is no coherent, internal working model to reflexively revert to in times of need. While children with organized attachment representations have

acquired sufficient ‘mental data’ that has good ‘model fit’ (albeit not always with positive model outcomes), children with a disorganized attachment representation are likely to acquire ‘mental data’ that resembles ‘noise’, has very poor model fit, or contains extreme outliers of maternal behavior. From this, disorganization is distinctly different in both precursors and developmental trajectories compared to organized insecure representations, and thus should be examined separately. Given their lack of a coherent attachment strategy or foundation, we should expect lawful discontinuity as they experience changing conditions compared to peers with an organized attachment representation.

A second methodological consideration is that most attachment researchers use early childhood attachment representations to predict single-point developmental outcomes. As seen in Fearon & Belsky’s research (2011), there is merit to looking at attachment outcomes beyond a single-time point assessment. For instance, at times children with early avoidant insecure attachment and those with disorganized attachment representations show similar behavioral outcomes -- such as externalizing behaviors. When looking at the growth trajectories of externalizing behavior across childhood, disorganized children showed a growing trajectory despite children with avoidant attachment representations showing higher initial externalizing scores (Fearon & Belsky, 2011). More research is warranted looking at how attachment predicts growth trajectories of behaviors, especially amongst disorganized children.

A third methodological limitation of the prior research is that the attachment measure used rarely reflects more than one time point of attachment assessment. Using a single-time-in-point attachment measure, especially in infancy/early childhood, ignores

the developing aspect of the internal working model. This is especially pertinent for disorganized dyads where even in high-risk samples prone to disorganized attachment representations, infants are often classified with a secure representation in early infancy yet present as disorganized by 18-20 months (Egeland & Sroufe, 1981; Lyons-Ruth et al., 1991). Some research has found that attachment at early childhood (24 months and 36-months) predicts problem behaviors but infant attachment (15-months) does not (McCarthy et al., 2003). Longitudinally, the 36-month assessment has been stronger stability to corresponding AAI dimensions than the 15-month assessment (Groh et al., 2014).

Finally, given the cognitive nature of internal working models and the abstract and unconscious utilization of the attachment representation across the lifespan, attachment measures are expectedly imperfect. In terms of inter-rater reliability, the most commonly used measures range in the strength of their reliability: Strange Situation – 94% (Ainsworth & Bell, 1970), 82% - (ECCRN dataset, Spieker & Crittenden, 2009), 89% and 93% (Raby, Steele, Carlson, & Sroufe, 2015); MacArthur Attachment – 77% (ECCRN dataset, Spieker & Crittenden, 2009); Preschool Assessment of Attachment – 59% (ECCRN dataset, Spieker & Crittenden, 2009) Attachment Q-Sort – 77% (ECCRN dataset, Birmingham, Bub, & Vaughn, 2016); Adult Attachment Interview (AAI) – 81% and 87% (Raby et al., 2015). While at times these reliability scores are strong, they are nonetheless imperfect, and this should be considered when interpreting research on lawful discontinuity.

To summarize, disorganized attachment systems developed across infancy and early childhood are qualitatively different from organized insecure or secure attachment

systems. These disorganized attachments typically arise from severely inconsistent or fear-inducing maternal behaviors, making it difficult for children to develop a model for expected attachment behavior. The lack of a coherent, attachment organization puts infants at risk for developing a dissociative internal working model. However, to fully understand this risk, the development and changes in ‘mental data’ of disorganized children is critical. Looking at the *development* of the attachment representation should provide a richer, more predictable view of the lawful continuity/discontinuity and associated outcomes of children with a disorganized attachment. Future research needs to examine these lawful discontinuous with greater attention to the limitations I have addressed in this review: including the need to treat disorganization and organized-insecure attachment representations separately and the need to create a developing assessment of attachment representation across infancy and early childhood.

## CHAPTER 3

## EXPANDED ANALYSES

## Supplementary Tables

**Table 8.** Latent growth curve regression estimates for teacher rated internalizing behaviors.

	Intercept			Linear			Quadratic		
	<i>B</i>	S.E.	<i>p</i>	<i>B</i>	S.E.	<i>p</i>	<i>B</i>	S.E.	<i>p</i>
Main Effects of Patterns									
DO	0.54	0.50	0.283	0.38	0.43	0.378	-0.06	0.08	0.441
OD	-0.13	0.50	0.801	1.33	0.42	0.002	-0.22	0.08	0.009
DD	1.19	0.97	0.219	-0.57	0.85	0.505	0.13	0.16	0.420
Main Effects of Patterns with Covariants									
DO	1.00	0.52	0.052	-0.38	0.45	0.410	0.07	0.09	0.369
OD	0.15	0.51	0.764	0.65	0.45	0.147	-0.09	0.09	0.328
DD	1.24	0.98	0.21	1.24	0.98	0.153	-1.23	0.86	0.153
Interactive Effects of Patterns x Gender									
Males									
DO	0.73	0.74	0.323	-0.30	0.71	0.672	0.08	0.14	0.575
OD	1.28	0.76	0.093	1.24	0.73	0.090	-0.19	0.14	0.190
DD	1.48	1.33	0.266	-0.93	1.28	0.471	0.20	0.25	0.423
Females									
DO	1.28	0.72	0.074	-0.52	0.59	0.380	0.09	0.11	0.400
OD	-0.57	0.69	0.415	0.24	0.57	0.672	-0.01	0.11	0.900
DD	1.06	1.41	0.450	-1.59	1.48	0.165	0.33	0.22	0.130

*Note.*  $N = 1,060$ ,  $n^{OO} = 761$ ,  $n^{OD} = 132$ ,  $n^{DO} = 134$ ,  $n^{DD} = 33$ .

**Table 9.** Latent growth curve regression weights from adjusted intercept models for internalizing Symptoms.

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Main Effects of Patterns						
DO	1.00	0.77*	0.82*	0.69	0.80	1.06
OD	0.15	0.65	0.90*	1.14**	1.26**	1.19*
DD	1.24	0.47	0.31	0.38	0.47	1.29
Interactive Effects of Patterns x Gender						
Males						
DO	0.73	0.56	0.73	0.59	0.81	1.14
OD	1.28	2.18***	2.47***	2.97***	3.02***	2.70**
DD	1.48	0.91	0.69	0.93	0.92	1.57
Females						
DO	1.28	0.94	0.89	0.73	0.77	1.01
OD	-0.57	-0.36	-0.14	-0.07	0.08	0.19
DD	1.06	0.05	-0.03	-0.19	0.07	1.15

*Note:* \* $p > .05$ , \*\* $p > .01$ , \*\*\* $p > .001$ . Attachment patterns were dummy coded (reference category = 'OO').  $N = 1,060$ ,  $n^{OO} = 761$ ,  $n^{OD} = 132$ ,  $n^{DO} = 134$ ,  $n^{DD} = 33$ .

**Table 10.** Latent growth curve regression estimates for teacher rated externalizing behaviors using only 36-month attachment after removing security.

	Intercept			Linear			Quadratic		
	<i>B</i>	S.E.	<i>p</i>	<i>B</i>	S.E.	<i>p</i>	<i>B</i>	S.E.	<i>p</i>
Main Effects of Patterns									
	1.82	1.68	0.282	0.16	0.90	0.863	-0.04	0.20	0.835
Interactive Effects of Patterns x Gender									
Males	4.55	2.20	0.038	-0.20	1.32	0.878	0.01	0.29	0.969
Females	-1.43	2.04	0.481	0.79	1.20	0.512	-0.13	0.26	0.606

*Note:* \* $p > .05$ , \*\* $p > .01$ , \*\*\* $p > .001$ . Attachment patterns were dummy coded (reference category = 'D' at 36-months). N = 399.

**Table 11.** Latent growth curve regression estimates for teacher rated externalizing behaviors for adjusted intercept models using only 36-month attachment after removing security.

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Main Effects of Patterns						
	1.82	1.92	1.82	2.11	2.29	2.26
Interactive Effects of Patterns x Gender						
Males	4.55*	4.37*	4.00*	4.51*	4.42	4.39
Females	-1.43	-0.87	-0.62	-0.27	0.02	-0.20

*Note:* \* $p > .05$ , \*\* $p > .01$ , \*\*\* $p > .001$ . Attachment patterns were dummy coded (reference category = 'D' at 36-months). N = 399.

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