Youth Psychopathic Behaviors:

The Long-Term Outcomes of Mother-Infant Attachment Across 14 Years

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Date of Submission:

10-1-2020

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Abstract

Infants with insecure attachment styles are at risk of developing psychopathic behaviors in adolescence and adulthood. In this study, we test the infant attachment styles measured with the Strange Situation Procedure as a predictor of youth psychopathic behaviors measured in three dimensions: remorselessness, unemotionality, and callousness, among 1,149 families in the Eunice Kennedy Shriver National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (SECCYD). Propensity scores for the four attachment groups were estimated with iterative tree-based regression models. After accounting for the potential confounding effects of demographic characteristics and child temperament with the inverse probability of treatment weighting, weighted generalized linear models revealed the association between insecure/avoidant attachment style measured at one year after childbirth and higher levels of remorselessness, unemotionality, and callousness at 15 years. These findings provide insights into the long-term outcomes for attachment relationships established in early life.

Keywords: attachment, Strange Situation Procedure, psychopathic behaviors, inverse probability of treatment weighting.

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A central characteristic of psychopathy is emotional insensitivity and lack of social relatedness. Adolescent psychopathic behaviors have been linked with lagged aggression and violence after accounting for previous violence, self-control, peer and parenting influences (Meldrum et al., 2018). Biological risks factors for psychopathic behaviors include neural dysfunction – particularly in the amygdala and frontal lobe – and genetic contributions (Blair et al., 2006). Considerable data also suggested that experience with socioeconomic adversities, maternal depressive symptoms, parental distress, and hostile parenting in early life were associated with higher levels of childhood psychopathic behaviors, whereas parental warmth was associated with lower levels of child callous-unemotional traits, the affective aspect of childhood psychopathic traits (Barker et al., 2011; Bégin et al., 2021; Fontaine et al., 2018). To understand the developmental origins of the affective aspect of psychopathic behaviors among children and adolescents, increasing attention has been paid to the roles of early caregiving experiences and attachment representations in concurrent or later affective psychopathy and callous-unemotional behaviors (Buck, 2015; Wagner et al., 2015).

Attachment theory posits that infants organize their experiences with caregivers and develop a framework called the “internal working model”, through which lens they observe, interpret, and react to the environment (Bowlby, 1969/1982). From the perspective of attachment theory, insecurely attached individuals display low willingness to help and low compassion (Mikulincer et al., 2005), suggesting that secure attachment relationships may protect against the development of psychopathic behaviors. Indeed, Christian et al. (2017) found associations between self-report attachment dimensions with behavioral and affective psychopathy among the

U.S. and Australian adults. These findings revealed the associations between self-report adult attachment styles in general relationships and psychopathic behaviors, but we do not yet understand the role that parent-infant attachment plays in later psychopathic behaviors.

In the developmental literature, meta-analytical evidence has supported the association between externalizing psychopathology and attachment insecurity, as measured by the Strange Situation Procedure (Groh et al., 2017). Particularly, infants who were classified as insecure-avoidant and insecure-disorganized manifested higher levels of externalizing behaviors, which include aggression, oppositional problems, conduct problems, and hostility. However, insecure-resistant infants did not display significantly higher levels of externalizing behaviors, based on data from 3,568 children in 35 studies (Groh et al., 2017). Attachment insecurity may serve as a risk factor for psychopathic behaviors. Specifically, avoidant infants may display the highest level of psychopathic behaviors due to a lower level of emphasis/desire in developing meaningful interpersonal relationships.

Relatedly, early caregiving experiences, particularly maternal sensitivity, predicted later callous-unemotional behaviors through shaping children's representation of family functioning (Wagner et al., 2015). Such findings suggest that attachment relationships in the first few years of life may provide the foundation for the long-term development of psychopathic behaviors. Attachment insecurity also predicted a lower level of generosity among preschoolers, especially when they were with a disliked other or when the generosity became costly (Paulus et al., 2015). Moreover, callous-unemotional behaviors have been cross-sectionally associated with attachment representation among both adolescents in the community sample (Buck, 2015) and a clinical sample of young boys (Pasalich et al., 2012). However, most studies on adolescent callous-unemotional behaviors overwhelmingly rely on their self-report on both attachment and

callous-unemotional behaviors. Therefore, the findings might be attributable to common method bias. Longitudinal evidence on the association between early attachment style observed during infancy and adolescent psychopathic behaviors is warranted.

The current study aims to understand the associations between infant attachment styles measured with the Strange Situation Procedure and adolescent psychopathic behaviors 14 years after. Strange Situation Procedure is a semi-naturalistic laboratory procedure to assess individual differences in infant attachment and has become the gold standard measurement (Ainsworth et al., 1978). Since the development of Strange Situation Procedure, a large body of research has examined the developmental significance of early attachment in later socio-emotional adjustment (Groh et al., 2012). We hypothesize that infants with insecure attachment display a higher level of psychopathic behaviors during adolescence.

Methods

Sample

Data were drawn from the NICHD Study of Early Child Care and Youth Development (SECCYD). Participating families ($N = 1,364$) were recruited at ten sites across the United States. They were followed from one month after the childbirth to 15 years. *NICHD* (2004) provided details on recruitment and sampling procedures of the larger-scale SECCYD. The current study used data primarily from Phases 1 and 4 at three time points (target child at six months, 15 months, and 15 years of age). A subsample of 1,149 adolescents who provided data in Strange Situation Procedures at 15 months was included in this study. Half of infants (50.57%; $n = 581$) were males. Most infants were White (81.46%; $n = 936$) and Black (11.92%; $n = 137$), with remaining being Asian and Pacific Islander (1.65%; $n = 19$), American Indian, Eskimo, Aleutian (0.35%; $n = 4$), or Other (4.61%; $n = 53$), as reported by their mothers. Most infants

were first (44.13%; $n = 507$), second (35.51%; $n = 408$), third (15.06%; $n = 173$), or fourth born (4.26%; $n = 49$) in the family. At childbirth, 37.25% of mothers and 38.12% of fathers received a bachelor's degree or higher. Half of the families (48.22%) reported household income scored above three on the income-to-needs ratio (indicating middle class), whereas 19.93% and 12.71% of families scored below two (indicating low income) and one (indicating poverty), respectively.

Measures

Mother-Child Attachment. At 15 months, mother-infant dyads participated in the *Strange Situation Procedure* (Ainsworth et al., 1978). A team of three coders with at least four years of prior experienced coding Strange Situations double-coded all videos, after receiving additional training using the master-coded tapes (including tapes coded by Mary Main) and passing the University of Minnesota Attachment Test Tapes for ABC classifications. Each infant was classified into one of the four groups. The group conferenced on all disagreements and the final codes were assigned upon consensus. The interrater agreement was 83% ($\kappa = .69$). The full description of the procedures was published in NICHD Early Child Care Research Network (1997). Some specific behaviors of children during the Strange Situation Procedure were considered for the classification. Specifically, coders watched for four types of behaviors (i.e., proximity seeking, contact maintaining, resistance, and avoidance) and rated each on in the reunion episodes. Moreover, children's exploration behaviors and attachment behaviors, particularly during the reunions, were taken into important consideration to determine the classification of children into one of the four attachment groups: Secure (B), insecure-avoidant (A), insecure-resistant (C), and insecure-disorganized (D).

Specifically, securely attached infants may or may not cry when the mother leaves the room. They prefer to stay with their mother than with the stranger. When their mothers are

present, they feel comfortable exploring the environment and use their mothers as the secure base. If secure infants are distressed when separating from their mothers, they can be easily comforted when mothers come back (reunion) and display proximity-seeking behaviors. If secure infants are not crying or highly distressed when the mother leaves the room, they are still happy when mothers come back and prefer to stay in contact with their mothers.

By contrast, insecure-avoidant infants seem not to care when the mothers leave the room, they do not show preference to their mother compared with the stranger. When the mother comes back, they show avoidance of contact. Insecure-resistant infants are highly distressed when separated from their mothers. They do not feel comfortable exploring the environment. They are also hard to comfort during the reunion, displaying ambivalent and resistant behaviors. Insecure-disorganized infants do not behave consistently. Their goals and rationale of their behaviors are harder to decipher.

Adolescent Affective Psychopathic Behaviors. At 15 years, the adolescents reported the affective (callous-unemotional) aspect of their psychopathic behaviors on the *Inventory of Youth Psychopathy Traits* (Andershed et al., 2002), using a 1-to-4 scale (1 = *does not apply at all*, 4 = *applies very well*). The 15 items measured three dimensions of affective psychopathic behaviors: remorselessness (5 items; $\alpha = .69$; e.g. “To feel guilt and regret when you have done something wrong is a waste of time.”), unemotionality (5 items; $\alpha = .66$; e.g. “What scares others usually doesn’t scare me.”), and callousness (5 items; $\alpha = .61$; e.g. “When other people have problems, it is often their own fault, therefore, one should not help them.”). A sum score was computed for each dimension. The sum scores ranged from 4 to 20 for all three dimensions.

Covariate: Infant Temperament. Mothers reported infant temperament on 59 items from the *Revised Infant Temperament Questionnaire* (Carey and McDevitt, 1978) on a 6-point

Likert scale (1 = almost never, 6 = almost always). A composite score of physical motion [e.g., “*My baby moves about much (kicks, grabs, squirms) during diapering and dressing*”], approach/withdrawal [e.g., “*My baby's initial reaction is withdrawal (turns head, spits out) when consistency, flavor, or temperature of solid foods is changed.*”], adaptability [e.g., “*My baby adjusts within 10 min. to new surroundings (home, store, play area)*”], intensity [e.g., “*My baby reacts strongly to foods, whether positively (smacks lips, laughs, squeals) or negatively (cries)*”], mood [e.g., “*My baby makes happy sounds (coos, smiles, laughs) when being diapered or dressed*”], persistence [e.g., “*My baby resists changes in feeding schedule (1 hour or more) even after two tries*”], rhythmicity [e.g., “*My baby accepts regular procedures (hair brushing, face washing, etc.) at any time without protest*”], and sensory threshold [e.g., “*My baby reacts mildly (just blinks or startles briefly) to bright light such as flash bulb or letting sunlight in by pulling up shade*”] was obtained by taking an average of the responses on the 59 items, with higher scores representing more difficult temperament. The scale showed good internal consistency ($\alpha = .71$).

Other Covariates. Infant sex, race, family socioeconomic status, and child temperament were considered as the potential confounding variables for the associations between infant attachment and adolescent psychopathic behaviors (Buck, 2015; Planalp & Braungart-Rieker, 2013). At 1 month after childbirth, mothers reported the family demographic characteristics, including mother’s age, infant race, mother’s and father’s years of education, infant’s birth order. At 15 months, mothers reported on parents’ cohabitation/marital status and household income. Based on the sizes and locations of the families, researchers computed the income-to-needs ratios.

Analytic Plan

To isolate the effect of attachment styles from that of infant sex, race, family socioeconomic status, and child temperament, such differences need to be taken into account when analyzing whether infants with different attachment styles displayed group differences in psychopathic behaviors when they became 15 years old. Traditionally, in the analytic models, these covariates are accounted for as control variables to reduce the imbalances in covariates across different groups. The propensity score methods improve upon the traditional methods for numerous reasons. Propensity score methods use a single summary score to help reduce the often-high dimensionality of covariates into one dimension, help avoid extrapolating beyond the range of observed data, and help reduce the bias associated with model misspecifications (McCaffrey et al., 2013). Thus, we used the *mnp*s (multinomial propensity scores) function in the *twang* package (McCaffrey et al., 2013) – a toolkit for weighting and analysis of nonequivalent groups – to estimate the propensity scores for the four attachment groups with the generalized boosted model. This method helps avoid the overfitting problem when estimating the propensity scores with high dimensional data (Friedman et al., 2002). We used inverse probability weighting to balance the demographic characteristics and infant temperament across the four attachment groups, thereby accounting for the confounding when comparing the future psychopathic behaviors of infants of different attachment styles.

Missing data were imputed 500 times with *mice* package (Van Buuren & Groothuis-Oudshoorn, 2010). The increased number of imputations allow for more stable estimation and increase power (Graham et al., 2007). Based on the inspection of histograms, the normality assumption does not always hold, therefore the Predictive Mean Matching method (PMM; Little & Rubin, 2002) was used to create 500 imputed datasets given its freedom on distribution assumptions. Using the inverse of propensity scores as the weights (weights ceilinged at 20 to

improve stability of the estimation), we performed three weighted generalized linear models with 500 imputed datasets to compare the psychopathic behaviors among adolescents who had secure ($n = 710$), insecure-avoidant ($n = 160$), insecure-resistant ($n = 102$), and insecure-disorganized ($n = 177$) mother-infant attachment. We used Rubin's rule to pool the model results.

Results

Means, standard deviations, missing rates, and correlations among study variables and demographic variables are presented in Table 1. Results of Little's MCAR test indicated that the missing mechanism was not MCAR $\chi^2(140) = 552.44, p < .001$. We used a series of t-tests and chi-square tests to compare the demographic characteristics between those who did and did not provide data on the *Inventory of Youth Psychopathy Traits*. Infants with older mothers and more highly educated parents were more likely to provide data at 15 years old [mother age: $t(462.88) = 4.06, p < .001$; mother years of education: $t(431.08) = 2.65, p = .008$; father years of education: $t(411.27) = 2.59, p = .010$]. Particularly, infant attachment styles were not associated with the missingness of *Inventory of Youth Psychopathy Traits* at 15 years ($\chi^2(3) = 1.78, p = .62$).

The propensity scores for each case were estimated with the generalized boosted model. To examine the balance on the covariates across different attachment groups, we present the group means and the balance table before and after weighting in Table 2. Table 2 also shows the standardized mean differences among all groups for each of the covariates. Figure 1A presents the propensity distribution for the attachment groups. We also used the multiple linear regression model to test the associations between covariates and adolescents' psychopathic behaviors. After accounting for all other sociodemographic covariates, boys displayed higher levels of callousness, remorselessness, and unemotionality ($B = 2.68, SE = 0.16, t = 16.69, p < .001$ for callousness; $B = 1.16, SE = 0.18, t = 6.39, p < .001$ for remorselessness; $B = 2.39, SE = 0.19, t =$

12.79, $p < .001$ for unemotionality). Adolescents whose parents were married or cohabiting at 15 months after their birth showed lower levels of remorselessness ($B = -0.72$, $SE = 0.32$, $t = -2.28$, $p = .023$). Having three or more older siblings in the family was associated with higher risks for adolescent unemotionality ($B = 0.99$, $SE = 0.43$, $t = 2.30$, $p = .022$).

Table 3 shows the weighted generalized linear model results of attachment styles predicting youth psychopathic behaviors. Compared with securely attached infants, insecure-avoidant infants displayed higher levels of callousness ($B = 0.65$, $SE = 0.31$, $t(862.92) = 2.09$, $p = .037$), remorselessness ($B = 0.67$, $SE = 0.32$, $t(847.92) = 2.14$, $p = .033$), and unemotionality ($B = 0.67$, $SE = 0.32$, $t(857.92) = 2.10$, $p = .037$) at age 15. Insecure-resistant infants showed higher level of remorselessness at age 15 ($B = 0.72$, $SE = 0.33$, $t(847.92) = 2.16$, $p = .031$). Adolescents who were insecure-disorganized infants did not display different levels of psychopathic behaviors compared with adolescents who were securely attached to mothers as infants ($ps > .30$).

Discussion

The current study contributes to understanding the emergence of adolescent psychopathic behaviors from the perspective of attachment theory. Particularly, we found that mother-infant attachment styles observed at 15 months were associated with youths' self-reported callousness, remorselessness, and unemotionality at 15 years, after accounting for the potential selection effects and confounding of child temperament and demographic characteristics. The findings highlight the potential risks of developing psychopathic behaviors for those who form an insecure-avoidant attachment with their mothers early in life.

These findings were in line with prior findings in the adult literature on general attachment styles: in both Australian (Mean age = 37.59) and U.S. (Mean age = 39.63)

community samples, avoidant attachment styles were associated with the affective domains of psychopathic traits, namely meanness and callousness (Christian et al., 2017). Moreover, using a cross-sectional structural equation model, Walsh et al. (2019) found that for both male and female young adults, affective domains of psychopathy predicted avoidant attachment in close relationships.

The current study also contributed to the broader literature in the development of psychopathy, which highlighted various biological and environmental risks factors, including brain dysfunction, genes, socioeconomic adversities, maternal depressive symptoms, parental distress, and hostile parenting in early life. The insecure-resistant attachment might be another risk factor. In our study, insecure-avoidant infants manifested consistently higher levels of callousness, remorselessness, and unemotionality. Despite the relatively large sample size, we did not find higher adolescent psychopathic behaviors for infants classified as disorganized.

The findings were partly consistent with parent-infant attachment literature. The meta-analytical findings that summarized five decades of data on attachment security and externalizing psychopathology showed that across 34 studies, attachment avoidance and disorganization as measured by the Strange Situation Procedure were associated with greater risks of displaying externalizing behaviors (Groh et al., 2017). By contrast, the insecure-resistant attachment was not associated with externalizing behaviors (Groh et al., 2017). In the current study, we found that insecure-resistant infants displayed higher levels of remorselessness. Although psychopathic behaviors and externalizing problems are both disinhibitory in nature, the cognitive-affective processes were distinct (Baskin-Sommers, & Newman, 2013). Therefore, more research is needed to further investigate the role of attachment security in psychopathic behaviors.

The findings should be interpreted considering the following limitations. First, we did not examine the mechanisms linking insecure-avoidant attachment in infancy and adolescent psychopathic behaviors. Future research is encouraged to investigate the potential protective factors that break the link between attachment insecurity and psychopathic behaviors. Second, we focused on attachment relationships with only one parent and did not consider the father's (or another caregiver's) role in developing secure attachment relationships with infants. Infants can form multiple attachment relationships early in their lives (Brown et al., 2010). Particularly, fathers may play important roles in children's socioemotional development through the activation parenting and a high level of positive engagement (Paquette & Dumont, 2010; Yan et al., 2018). The full picture can only be captured by examining the complete family system (Cox & Paley, 2003). Third, each subscale of psychopathic behaviors was measured with only five items, resulting relatively low internal reliability (.60 – .70). Finally, the sample disproportionally contained White families and families with higher socioeconomic status, which limits the generalizability to populations other than the recruited sample (Bornstein et al., 2013).

Early life experiences set the stage for lifespan development. Particularly, based on the experiences with caregivers, infants may establish the cognitive models that they employ to interpret and respond to future events and interactions in the social world (Johnson et al., 2007). From a developmental psychopathology perspective, the early beliefs and cognitive tendencies may trigger the feedback loops and canalization processes that consolidate these tendencies into more stable behavioral and psychopathological traits (Cicchetti & Rogosch, 2002). For instance, both fathers and mothers may display a lower level of parental sensitivity with avoidant infants (Planalp & Braungart-Rieker, 2013). The current study highlighted that insecure-avoidant attachment styles in infancy might be a promising factor to further investigate to understand the

development of youth psychopathic behaviors. Timely identification of risk and protective factors may inform and provide golden opportunities for prevention and early intervention to reduce rates of psychopathic behaviors among youths.

Conflict of Interest Statement

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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Table 1

Means, Standard Deviations (SD), Missing Rates (%), and Bivariate Correlations Among Key Study Variables

Variables	<i>M</i>	<i>SD</i>	Missing (%)	1	2	3	4	5	6	7	8	9	10	11
Callousness @ 15 years	9.37	2.71	24.37											
Remorselessness @ 15 years	9.09	2.79	25.67	.49**										
Unemotionality @ 15 years	10.73	2.99	24.8	.58**	.53**									
Mother Age @ Childbirth	28.4	5.59	0	-.07*	-.17**	-.10**								
Mother Years of Education	14.38	2.47	0	-.10**	-.18**	-.13**	.53**							
Father Years of Education	14.63	2.69	7.31	-.08*	-.17**	-.11**	.43**	.64**						
Infant temperament @ 6 months	3.17	0.4	1.22	.02	.06	.00	-.18**	-.13**	-.09**					
Income-to-needs ratio @ 15 months	3.63	2.88	0	-.06	-.14**	-.08*	.43**	.50**	.49**	-.14**				
Child Sex (1 = boys)	0.51	0.5	0	.50**	.22**	.41**	-.02	-.03	.00	-.04	-.03			
Married or Cohabiting @ 15 months	0.86	0.35	0	-.10**	-.17**	-.09**	.30**	.25**	.22**	-.11**	.33**	.01		
Child Race (1 = Black)	0.12	0.32	0	.03	.14**	.03	-.24**	-.20**	-.20**	.17**	-.25**	-.01	-.40**	
Child Race (1 = White)	0.81	0.39	0	-.07*	-.14**	-.06	.26**	.20**	.15**	-.19**	.22**	.02	.37**	-.77**

Note: * $p < .05$, ** $p < .01$.

Table 2

Covariates Balances Before and After Matching

Covariates	Group Means or Proportions				Standardized Mean Differences (SMD) <i>Before</i> Weighting			Standardized Mean Differences (SMD) <i>After</i> Weighting		
					B vs. A	B vs. C	B vs. D	B vs. A	B vs. C	B vs. D
Attachment Styles	B	A	C	D						
<i>N</i>	710	160	102	177						
Mother Age @ Childbirth	28.63	27.42	28.94	28.02	0.22	0.05	0.11	0.05	0.00	0.04
Child Sex: Boys	49%	58%	57%	45%	0.17	0.15	0.10	0.06	0.11	0.04
Mother Years of Education	14.52	13.94	14.83	14	0.23	0.13	0.21	0.05	0.01	0.00
Father Years of Education	14.75	11.75	14.73	13.03	1.11	0.01	0.64	0.45	0.45	0.40
% Father Education Missing	4%	16%	2%	1%	0.41	0.14	0.16	0.03	0.10	0.02
Child Race: White	83%	76%	88%	78%	0.18	0.14	0.12	0.02	0.22	0.00
Child Race: Black	10%	18%	9%	15%	0.25	0.04	0.16	0.02	0.12	0.04
Infant temperament @ 6 months	3.18	3.07	3.13	3.15	0.26	0.12	0.06	0.19	0.03	0.06
% Temperament Missing	1%	3%	1%	1%	0.14	0.00	0.01	0.08	0.06	0.01
Birth Order: 2 nd	37%	29%	43%	30%	0.16	0.12	0.15	0.09	0.02	0.07
Birth Order: 3 rd	15%	10%	14%	19%	0.15	0.05	0.09	0.14	0.12	0.02
Birth Order: 4 th or later	5%	7%	6%	3%	0.10	0.03	0.08	0.05	0.01	0.09
Married or Cohabiting @15 months	88%	77%	92%	82%	0.31	0.13	0.15	0.00	0.04	0.00
Income-to-needs ratio @15 months	3.77	3	4.03	3.41	0.27	0.09	0.12	0.07	0.04	0.03

Note: Attachment styles: B = secure, A = insecure-avoidant, C = insecure-resistant, D = insecure-disorganized. Bolded font denotes statistical significance in the standardized mean differences ($p < .05$).

Table 3

Weighted Generalized Linear Model Results of Attachment Styles Predicting Youth Psychopathic Behaviors

Attachment Styles	<i>B</i>	<i>SE</i>	<i>t</i>	<i>df</i>	<i>p</i>
<i>Callousness</i>					
(Intercept)	9.23	0.13	73.84***	862.92	<.001
Insecure-Avoidant (A)	0.65	0.31	2.09*	862.92	.037
Insecure-Resistant (C)	0.53	0.36	1.49	862.92	.137
Insecure-Disorganized (D)	0.23	0.28	0.81	862.92	.421
<i>Remorselessness</i>					
(Intercept)	8.92	0.12	72.76***	847.92	<.001
Insecure-Avoidant (A)	0.67	0.32	2.14*	847.92	.033
Insecure-Resistant (C)	0.72	0.33	2.16*	847.92	.031
Insecure-Disorganized (D)	0.27	0.28	0.97	847.92	.332
<i>Unemotionality</i>					
(Intercept)	10.57	0.13	80.02***	857.92	<.001
Insecure-Avoidant (A)	0.67	0.32	2.10*	857.92	.037
Insecure-Resistant (C)	-0.03	0.39	-0.08	857.92	.940
Insecure-Disorganized (D)	0.27	0.29	0.93	857.92	.354

Note: Reference group = Secure attachment (B). * $p < .05$, *** $p < .001$.

Figure 1. A) Distribution of propensity scores by attachment styles at 15 months. B) Group differences in callousness at 15 years by attachment styles at 15 months. C) Group differences in remorselessness at 15 years by attachment styles at 15 months. D) Group differences in unemotionality at 15 years by attachment styles at 15 months.

Note: Attachment styles: B = secure, A = insecure-avoidant, C = insecure-resistant, D = insecure-disorganized. * $p < .05$.