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The Predictive Utility of Emotional Deficits and Callous-Unemotional traits for Important Antisocial Outcomes in Juvenile Justice-Involved Youth

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Abstract

The current study investigated the predictive utility of callous-unemotional (CU) traits and emotional facilitation to distress (EFD) for multiple antisocial outcomes in a sample of juvenile justice-involved males. Although CU traits and EFD did not generally interact to predict antisocial outcomes, CU traits were a consistent predictor of total, proactive, and reactive forms of aggression over 18 months. Similarly, CU traits and time interacted to predict total and violent self-reported offending, such that CU traits were positively associated with both outcomes, but this association weakened over the 18 month timeframe. Racial and ethnic differences only emerged for the prediction of days to any arrest or a violent arrest. Specifically, different factors appear to be important of the prediction of any arrest across racial/ethnic groups, whereas being Black was associated with fewer days to arrest, despite self-reporting similar levels of violent offending. Last, a joint trajectory model for CU traits and EFD was not estimated due to a lack of stability in EFD. However, the majority of the sample exhibited average or increasing levels of CU traits over the 18 month timeframe, highlighting the importance of examining not only the factors that can result in CU traits, but also the factors that can lead to increases in CU traits over time in justice-involved youth.

Keywords: callous-unemotional traits, delinquency, aggression, recidivism, emotional deficits

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Developmental Models of Psychopathy

Since Hervey Cleckley (1976) first attempted to define psychopathy in adults, clinical research has aimed to clarify the cognitive style, emotional characteristics, and behavioral patterns that characterize this construct. Indeed, many of the characteristics that Cleckley (1976) outlined are cornerstones of different areas of research seeking to define psychopathy (e.g., unresponsiveness in general interpersonal relations, poor judgment, and failure to learn by experience). Although a considerable amount of research has focused on adult psychopathy (Skeem, Polaschek, Patrick, & Lilienfeld, 2011), the field has developed downward extensions of psychopathy for children and adolescents in the past several decades. Importantly, by focusing on the interpersonal (e.g., callous use of others, unresponsiveness in interpersonal relations) and emotional (e.g., general poverty in major emotional reactions, lack of empathy or remorse) components of psychopathy, this research has helped to define and understand one of the several paths through which persons can develop serious patterns of antisocial behavior (Cleckley, 1976; Frick, 2009; Frick & Viding, 2009; Hare, 1993).

The downward extension of psychopathy with the largest body of evidence for identifying a distinct pathway to antisocial behavior is that of callous-unemotional (CU) traits. (Frick, 2009; Frick, Ray, Thornton, & Kahn, 2014a; 2014b, Frick & Viding, 2009). That is, CU traits include lack of guilt or remorse, lack of empathy, lack of concern for performance in important activities, and deficient or shallow affect (Frick & Moffitt, 2010; Frick, et al., 2014a). A growing body of research has indicated that CU traits designate an important subgroup of antisocial individuals (Frick, 2009; Frick & Dickens, 2006; Frick et al., 2014a; Frick & White,

2008). Specifically, a number of studies have reported significant associations between CU traits and various types of delinquency such as overall delinquency (Campbell, Porter, & Santor, 2004; Lexcen, Vincent, & Grisso, 2004; Marsee, Silverthorn, & Frick, 2005), self-reported delinquency, as well as a history of violent and non-violent offenses (Murrie, Cornell, Kaplan, McConville, & Levy-Elkon, 2004; Salekin, Leistico, Neumann, DiCicco, & Duros, 2004). Moreover, CU traits have demonstrated utility in predicting future delinquency with follow-up periods ranging from one to seven years (Frick, Cornell, Barry, Bodin, & Dane, 2003; Frick, Stickle, Dandreaux, Farrell, & Kimonis, 2005; Pardini, Obradovic, & Loeber, 2006; Piatigorsky & Hinshaw, 2004). Further, antisocial youth with CU traits engage in more severe and violent antisocial behavior than their low-CU trait counterparts. For example, several studies reported that youth with CU traits demonstrate more frequent, severe, and violent antisocial behavior and crimes (Andershed, Gustafson, Kerr, & Stattin, 2002; Brandt, Kennedy, Patrick, & Crutin, 1997; Forth, Hart, & Hare, 1990; Gretton, Hare, & Catchpole, 2004; Kruh, Frick, & Clements, 2005; Salekin, Ziegler, Larrea, Anthony, & Bennet, 2003). Further, incarcerated adolescents high on CU traits show shorter times to both non-violent and violent recidivism (Brandt et al., 1997; Catchpole & Gretton, 2003; Lawing, Frick, & Cruise, 2010). Taken together, this body of research suggests that individuals with developmentally inappropriate levels of CU traits represent an important subgroup within antisocial youth, who demonstrate more delinquency, especially violent delinquency, than individuals with developmentally normative levels of CU traits.

Callous-Unemotional Traits and Responsiveness to Emotions

Given Cleckley's emphasis on emotional deficits at the core of psychopathy, much of the adult literature has attempted to clarify the nature of emotional deficits through various

psychophysiological paradigms (e.g., skin conductance reactivity, heart rate reactivity; Verona, Patrick, Curtin, Bradley, & Lang, 2004). For example, individuals with low levels of psychopathy exhibit a greater reflex eye blink response to a sudden, intense acoustic probe when viewing unpleasant images than when viewing pleasant images (Fowles & Dindo, 2006; Patrick Bradley, & Lang, 1993; Patrick, Cuthbert, & Lang, 1994). However, individuals with high levels of psychopathy, whether in the general population or incarcerated, demonstrate an attenuated startle potentiation when viewing negative emotional images (Levenston, Patrick, Bradley, & Lang, 2000; Patrick et al., 1993). Importantly, this startle reflex modulation has been consistently associated with the CU dimension of psychopathy but not with other dimensions of this construct (Fowles & Dindo, 2006; Patrick et al., 1993; Vaidyanathan, Hall, Patrick, & Bernat, 2011).

Extending this work earlier in development, CU traits appear to be associated with deficits in emotional responsiveness from early childhood. Specifically, infants at 5 weeks of age who prefer to look at a red ball versus an administrator's face were more likely to exhibit CU traits at 2.5 years of age (Bedford, Pickles, Sharp, Wright, & Hill, in press). Similarly, children who were identified as exhibiting behavior problems as well as significant levels of CU traits at 36 months showed less negative reactivity during a still-face paradigm at 6 months of age (Willoughby, Waschbusch, Moore, & Proper, 2011). These findings indicate that early in life, children who later exhibit significant levels of CU traits do not demonstrate the typical affective reactions to others, particularly mothers, compared to other children with behavioral problems (Willoughby et al, 2011).

The deficits in emotional responsiveness exhibited by children and adolescents with CU traits have been studied in a number of ways later in development. Specifically, children and

adolescents with significant levels of CU traits often report feeling less fear or anxiety than other antisocial youth. For example, youth with elevated CU traits report lower levels of anxiety, fear, and subjective arousal to unpleasant pictures when controlling for Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD) symptoms (Barry et al., 2000; Sharp, VanGoozen, & Goodyer, 2006). Further, youth with CU traits exhibit unique neural responses to emotions compared to other antisocial youth. That is, several studies reported that youth with significant levels of CU traits and conduct problems demonstrate less activation in the right amygdala in response to fearful faces compared to both healthy controls (Jones, Laurens, Herba, Barker, & Viding, 2009) and children with ADHD (Marsh et al., 2008). Importantly, the reduced amygdala response holds when fearful faces are experienced at a preattentive level, which is below conscious awareness (Viding et al., 2012). Further, recent research examining neural activation has expanded to examine other structures beyond the amygdala involved in empathic processing. For example, children and adolescents with elevated CU traits and ODD/CD exhibited lower responsiveness in the amygdala and left rostral anterior cingulate cortex (ACC) while viewing images of injuries to another person in pain (Marsh et al., 2013).

In addition to unique responses at behavioral and neural levels, individuals with CU traits also demonstrate differential patterns of responsiveness to emotions at autonomic and endocrine levels. Specifically, children with elevated CU traits have exhibited lower skin conductance reactivity to distress cues in others (Blair, 1999) and to baby cries (Isen et al., 2010; Wang, Baker, Gao, Raine & Lozano, 2012). Two additional studies have indicated that youth with conduct problems and significant levels of CU traits exhibited lower magnitude in heart rate changes following viewing of emotionally evocative (Anastassiou-Hadjicharalambous & Warden, 2008) and empathy inducing film clips (de Wied, van Boxtel, Matthys, & Meeus, 2012)

compared to children with conduct problems and low levels of CU traits and normal controls. Similarly, several studies have shown that CU traits are associated with reduced cortisol levels and reactivity, a stress hormone produced by the hypothalamic-pituitary-adrenal (HPA) axis (Holi, Auvinen-Lintunen, Lindberg, Tani, &Virkkunen, 2006; Loney, Butler, Lima, Counts, & Eckel, 2006). Moreover, youth with ADHD and elevated CU traits exhibited a blunted cortisol response after an experimental social stress induction controlling for comorbid behavioral problems (Stadler et al., 2011).

One line of research for studying the emotional responsiveness of children with elevated CU traits has used paradigms that assess the attentional orienting response to pictures of different emotional content. Specifically, evaluation of emotional stimuli is thought to take place through unconscious appraisal processes, and involuntary emotional responses have been demonstrated both behaviorally (e.g., freezing, facial expressions) and psychophysiologically (e.g., autonomic, endocrine) in humans and animals (Fox, 2010; LeDoux, 1995; Ohman, 1993). That is, persons generally show a facilitated attentional orienting response to emotionally salient stimuli, whether threat or distress in others. For example, an image of a snarling dog or a hurt kitten grabs attention quicker than an image of a spoon. This facilitated response is posited to be driven by a subcortical pathway which includes the amygdala and leads to the automatic processing of emotionally salient stimuli that are important for survival (LeDoux, 1995). That is, orienting to dangerous stimuli allows for quick responses to avoid potentially harmful events and orienting to others' distress is critical for social bonding to others (Blair, 1995; 2005; Kochanska, 1993; 2002).

One way that this attentional orienting to emotionally salient stimuli has been studied is through the emotional dot probe task (MacLeod, Mathews, & Tata, 1986). The emotional dot

probe task presents a series of picture pairs of varied emotional content, specifically neutral (e.g., spoon), negative (e.g., snarling dog), distress (e.g., crying child), and positive emotions (e.g., kittens; Kimonis, Frick, Fazekas, & Loney, 2006). The dot probe task determines the response latencies to probes after emotional stimuli compared to response latencies to probes following neutral stimuli (Fox, 2010; MacLeod, Mathews, & Tata, 1986). This paradigm was originally developed to assess enhanced attentional orienting to threatening stimuli in individuals with anxiety (Fox, 2010). However, it has also been used to assess reduced speed in attentional orienting to emotional stimuli in children and adolescent with elevated CU traits (Kimonis et al., 2006; Kimonis, Frick, Muñoz & Aucoin, 2007; 2008).

Several studies using this paradigm have reported that youth with conduct problems or aggression who show elevated CU traits exhibit a very unique pattern of emotional responses on this task. First, Kimonis, Frick, Fazekas, and Loney (2006) used this paradigm in sample of 50 non-referred boys and girls (*Mean* age = 9.30, *SD* = 2.00). They reported a significant interaction between CU traits and conduct problems in predicting the response to pictures of others or animals in distress. That is, in children with high levels of conduct problems, there was a strong negative correlation between CU traits and facilitation to pictures of distress, indicating that those children with both elevated levels of conduct problems and CU traits showed less facilitation but those children high on conduct problems but with lower levels of CU traits showed greater facilitation (Kimonis et al., 2006). Importantly, this attentional facilitation deficit exhibited for those with high levels of conduct problems and CU traits was consistent across both boys and girls and for Caucasian youth (70% of sample) but not for minority youth (30% of sample). These findings were replicated in a sample of 88 ethnically diverse detained boys, which included African American (60%), Caucasian (23%), Hispanic (5%), Native American

(2%), and Other (2%) youth (*Mean* age = 15.57, *SD* = 1.28; Kimonis, Frick, Muñoz, & Aucoin, 2008). That is, CU traits and level of aggression again interacted to predict facilitation responses to distress but in this older detained sample, there were no moderating effects of race. In summary, CU traits have been associated with a pattern of emotional hypo-responsiveness across multiple ages and types of samples and using multiple paradigms for studying the emotional response. As a result, these emotional deficits have played a critical role in many theories for how CU traits develop.

Theories for the Development of Callous Unemotional Traits. Kochanska (1993) posited that a critical process in the socialization of children is the ability to experience emotional discomfort, guilt, and anxiety following a transgression. This discomfort and guilt that arise after a transgression are thought to help inhibit actions that have been prohibited by authority figures (Kochanska, 1993; 2002; Kochanska, Forman, Aksan, & Dunbar, 2005). Kochanska's theory of conscience development and prosocial behavior has implications for the development of CU traits, such that children who do not react with emotional discomfort and anxiety following transgressions may have impairments in conscience development (Kochanska, 1993; 2002). Similarly, Blair (1995; 2005) has posited that before perspective-taking abilities are functional in young children, children experience an aversive emotional reaction when seeing non-verbal signals of distress in others (e.g., seeing another child cry) that are critical for moral socialization of emotions, inhibition of violent actions, as well as learning to distinguish moral and conventional transgressions. That is, early negative arousal experiences brought on by others' distress cues following a transgression (e.g., taking a child's toy, hitting a child) are learned to be avoided by inhibition of negative behaviors through a process of aversive conditioning (Blair, 1995). As such, children who experience less negative arousal to emotional

distress cues would not experience the conditioning required for the development of empathic concern for others (Blair, 1995, 2005).

Thus, Kochanska's (1993) theory of conscience development and Blair's (1995; 2005) model for the development of empathetic concern provide mechanisms for how deficits in emotional responsiveness can lead to the core features of CU traits (i.e., deficient empathy and guilt). Although the importance of emotional under-responsiveness for causal theories of CU traits is relatively well-accepted, it is also possible that these emotional deficits are crucial for understanding many of the problems displayed by children and adolescents with CU traits.

Emotional Responsiveness and Outcomes for Children with Callous Unemotional Traits

Specifically, it is possible that the lack of emotional response to certain emotional stimuli, especially to cues of distress in others, may be the primary reason for why children and adolescents with CU traits behave more aggressively. As a result, it is possible that measures of emotional responsiveness may help to predict which persons with CU traits are most likely to act in an aggressive and violent manner. In support of this, Ortiz and Raine (2004) conducted a meta-analysis showing that antisocial and aggressive behavior was strongly negatively associated (d = -.760, p < .001) with heart rate change during various types of stressor tasks, with 10 effect sizes from 9 studies (n = 578; Ortiz & Raine, 2004). Unfortunately, this meta-analysis did not measure CU traits and, as a result, it was not clear whether or not the reduced emotional responsiveness added to the prediction of antisocial and aggressive behavior over and above the level of CU traits.

Kimonis, Frick, Muñoz, and Aucoin (2007) provided data from a cross-sectional study that would be consistent with this possibility. That is, within an ethnically diverse sample of 88 detained boys ages 13-18 years (M = 15.57, SD = 1.28), CU traits were significantly associated

with self-reported violent delinquency and aggression, consistent with the large body of research linking CU traits to more severe and aggressive antisocial behavior. However, there were significant interactions between CU traits and reduced emotional responsiveness to distress (as measured by the emotional dot-probe paradigm) in statistically predicting violent delinquency and aggression, with this being significant for proactive aggression and approaching significance (p = .06) for reactive aggression. There was also a significant interaction between CU traits and emotional responsiveness in their association with the odds of the adolescent having a previous arrest for violence based on a review of his official court records. The form of the interaction was the same for each of these outcomes. Specifically, the positive association between CU traits and aggression/violence was only present at lower levels of facilitation to distress. That is, it was the combination of both low levels of facilitation to distress and high levels of CU traits that was associated with highest levels of aggression and violence.

The results of this study supports the possibility that considering both the level of CU traits and the child's emotional responsiveness to distress cues in others may aid in predicting important outcomes for adolescents with elevated CU traits. That is, CU traits were not associated with greater levels of aggression and violence unless they co-occurred with significant deficits in emotional responsiveness. Such findings could have important implications for estimating the risk for future problems in children and adolescent with CU traits. Assessing risk for future problematic outcomes, such as aggression and violence towards others, these youth take on added importance, given that elevated CU traits is now considered in the diagnosis of Conduct Disorder in 5th Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013). That is, persons who show severe and stable patterns of antisocial behavior and who meet the criteria of Conduct Disorder can also be

designated with the specifier "with Limited Prosocial Emotions" if they also show elevated levels of CU traits. Thus, children and adolescents with elevated CU traits are now recognized as having an important mental health condition and this makes developing tools to determine the types and intensity of treatment that is warranted an important research focus.

However, the results of Kimonis et al. (2007) need to be replicated to determine how robust these findings may be. Of particular importance, this Kimonis et al. study was cross-sectional in nature. This limits the interpretations that can be made from the results in a number of important ways. Specifically, the relative contributions of CU traits and emotional responsiveness for predicting *future* aggression and violence, once baseline levels of aggression are controlled, needs to be tested in longitudinal studies. Further, it is not clear how stable the pattern emotional responsiveness may be, especially when measured using the dot-probe task. Of relevance to the predictive utility of this task, past research suggests that the stability of emotional responsiveness can vary greatly across individuals and that more stable patterns show greater prediction of later outcomes (Degnan et al., 2011; Stifter, Putnam, & Jahromi, 2008). Thus, it may be that the prediction of aggressive outcomes in those with elevated CU traits is even greater in adolescents who show more stable patterns of emotional under-responsiveness.

Finally, it will be important to determine how generalizable the findings are across different racial/ethnic groups. Although the Kimonis et al. (2007) study utilized an ethnically diverse sample (68% African American, 23 % Caucasian, 5% Hispanic, 2% Native American, and 2% Other), the relatively small sample size prevented robust tests of the generalizability of results across different racial/ethnic groups. Further, a meta-analysis of studies testing the association between measures of psychopathy, which include CU traits, and antisocial behavior in adolescents reported that the association tended to be weaker in African-American youth

(Edens, Campbell, & Weir, 2007). These authors suggested that African-American youth may be seen as being more callous by others or self-report being more callous and unemotional as a response to perceived discrimination and unfair treatment from others. Thus, behavioral indicators of CU traits may be less indicative greater levels of antisocial tendencies in some racial/ethnic groups and, as a result, the reduced emotional responsiveness deficit may provide more utility in identifying those at risk for violence and aggression by not relying solely on outward behavioral manifestations.

Statement of the Problem

In summary, there is a consistent body of research indicating that individuals with psychopathy and youth with developmentally inappropriate levels of callous-unemotional (CU) traits exhibit unique patterns of emotional responding. These differential patterns of responding to emotional stimuli have been demonstrated using a number of different paradigms. This research has largely been used to explain how these emotional deficits could play a role in the development of CU traits. However, there is also evidence to suggest that these emotional deficits may help to predict and explain some of the negative outcomes related to CU traits. For example, one cross-sectional study of detained adolescent boys found that CU traits and facilitation to distress predicted violent arrests as well as different forms of self-reported aggression and violent delinquency (Kimonis et al., 2007). Specifically, those with low levels of facilitation to distress and elevated CU traits showed the highest levels of aggression and violent delinquency.

The current study advanced the findings of Kimonis et al. (2007) in a number of ways, using a large racially and ethnically diverse sample of justice-involved adolescents that were followed every six months for a period of 1.5 years. First, I tested the actual prediction of future

levels of aggression and violence by CU traits, emotional responsiveness to distress, and their interaction. Second, the large racially and ethnically diverse sample allowed me to test the possibility that the incremental utility of emotional deficits for predicting aggressive outcomes, relative to CU traits, would be greater for certain racial/ethnic groups than others. Third, the longitudinal analyses also allowed me to test the stability of emotional deficits and to determine if more stable patterns of emotional deficits were more predictive of aggressive outcomes than deficits measured at one time point.

Hypotheses

1. I first tested whether, consistent with prior research, CU traits would be positively associated with concurrent and later antisocial and aggressive outcomes.

1a. I also tested whether emotional facilitation moderated the association between CU traits and antisocial outcomes. Specifically, I predicted that at low levels of emotional facilitation, CU traits would be positively associated with antisocial outcomes; whereas at high levels of emotional facilitation, CU traits would have a non-significant or negative association with antisocial outcomes.

2. I then tested whether the predicted interaction between CU traits and emotional facilitation differed across different racial/ethnic groups. Specifically, I tested the prediction that the interaction between CU traits and emotional facilitation would be stronger, and possibly limited to the Black participants, given past work suggesting that the behavioral manifestations of CU traits alone may be less predictive in Black samples.

3. Finally, I tested whether more stable trajectories of CU traits and emotional facilitation would be useful in identifying differences in antisocial outcomes across time. I predicted that adolescents with stable deficits in emotional facilitation (i.e., consistently low

levels of response facilitation to emotional pictures across testing times) combined with high levels of CU traits would show the highest levels of aggression and violence across the study period.

Methods

Participants

Participants were 1,216 adolescent boys drawn from the juvenile justice systems of Jefferson Parish, LA (n = 151); Orange County, CA (n = 532); and Philadelphia, PA (n = 533) to participate in the Crossroads Study. The participants were reassessed every 6 months and data from baseline and the 6 month (n = 1,161; 95.48% retention), 12 month (n = 1,141; 93.83% retention), and 18 month (n = 1,139, 93.67% retention) follow-ups were utilized to test the study hypotheses. To be eligible for the Crossroads Study, juveniles had to be first-time male offenders, be English speakers between the ages of 13 to 17 at the time of arrest, and have an eligible offense. It is important to note that although participants were required to have their first official charge in the three sites' court systems, they may have had offenses in other jurisdictions or have had prior offenses for which they were not charged. Eligible charges were mid-range offenses, such as theft of goods, simple battery, and vandalism.

Across all three sites, 72.32% of individuals eligible to participate enrolled in the study. Participants' mean age was 15.29 years (SD = 1.29) at baseline and the sample was predominately White Latino (n = 562, 46.2%) and Black (n = 463, 38.1%), followed by White Non-Latino (n = 191, 15.7%). Participants' average intelligence was lower than that of the general population (full scale IQ = 88.50 [SD = 11.87] as assessed by the Wechsler Abbreviated Scale of Intelligence [WASI-II; Wechsler, 1999] using the vocabulary and matrix reasoning sub-tests). To account for participants' level of exposure to the community, a proportion score was

calculated to indicate the proportion of time spent between each follow up interview in a facility that restricted access to the community (e.g., secure mental hospital, juvenile detention, adult jail). Participants' proportion of time spent in a facility was documented through life calendars in which they stated where they were living during each month since the previous interview. If a participant lived in more than one place during each month, the place in which they spent the most time was designated the predominant location. Thus, the total number of months in which participants listed a facility as their predominant location was utilized to create a proportion score at each follow up. The proportion score was very positively skewed and kurtotic (see Table 1) as a relatively small number of participants spent time in facilities at each time point (6 month n = 65, 5.46%; 12 month n = 113, 9.65%; 18 month n = 133, 11.43%).

Measures – Key Predictor Variables

Callous-Unemotional Traits. CU traits were assessed at all four time-points using the *Inventory of Callous-Unemotional traits* (ICU; Kimonis et al., 2008), a 24-item instrument that utilizes a four-point Likert scale, 0 (*Not at all true*) to 3 (*Definitely true*) to indicate how accurate each statement describes them. Half of the items are worded to describe callous and unemotional characteristics (e.g., "I seem very cold and uncaring to others") and half are worded in the opposite direction (e.g., "I am concerned about the feelings of others"). CU traits as measured by the ICU have been associated with restricted emotional responses to others' distress on self-report (e.g., measures of affective empathy; Jones, Happe, Gilbert, Burnett, & Viding, 2010), laboratory (e.g., reduced attentional orienting to pictures of others in distress; Kimonis et al., 2006) and biological (e.g., less amygdala activation to fearful faces; Viding et al., 2012) measures. The total ICU score has also been consistently associated with antisocial behavior (e.g., Essau, Sasagawa, & Frick, 2006; Fanti, Frick, & Georgiou, 2009; Kimonis et al., 2008;

Table 1

Psychometric Properties of the Main Study Variables

					Skewness		Kurtosis	
	N	*M*	*SD*	α	Skew	S.E	Kurtosis	S.E
Age_{t0}	1,216	15.29	1.29	-	-.25	.07	-.99	.14
Age_{t1}	1,164	15.82	1.33	-	-.19	.07	-.83	.14
Age_{t2}	1,142	16.32	1.29	-	-.20	.07	-.93	.15
Age_{t3}	1,139	16.83	1.32	-	-.19	.07	-.83	.15
CU $Traits_{t0}$	1,216	26.27	8.08	.76	.07	.07	.08	.14
CU $Traits_{t1}$	1,164	25.52	8.24	.78	.04	.07	-.12	.14
CU $Traits_{t2}$	1,141	25.17	8.47	.79	.02	.07	-.21	.15
CU $Traits_{t3}$	1,139	24.47	8.44	.79	.06	.07	-.00	.15
EFD_{t0}	1,079	-20.15	51.90	.81	-.01	.07	3.04	.15
EFD_{t2}	939	-14.44	46.79	.83	.45	.08	3.53	.16
EFD_{t3}	911	-17.04	42.80	.71	.64	.08	3.10	.16
$Facility_{t1}$	1,191	.03	.13	-	5.36	.07	30.09	.14
$Facility_{t2}$	1,171	.06	.20	-	3.71	.07	12.84	.14
$Facility_{t3}$	1,163	.08	.24	-	3.00	.07	7.65	.14
Total $Agg._{t0}$	1,216	9.81	11.08	.92	2.37	.07	8.15	.14
Total $Agg._{t1}$	1,164	8.45	11.41	.93	3.09	.07	13.32	.14
Total $Agg._{t2}$	1,141	7.50	9.81	.91	2.52	.07	8.31	.15
Total $Agg._{t3}$	1,139	6.62	9.98	.93	4.00	.07	25.35	.15
Proactive $Agg._{t0}$	1,216	2.82	4.75	.87	3.28	.07	14.87	.14
Proactive $Agg._{t1}$	1,164	2.49	5.00	.90	4.13	.07	22.23	.14
Proactive $Agg._{t2}$	1,141	2.08	3.97	.84	3.37	.07	14.06	.15
Proactive $Agg._{t3}$	1,139	1.80	4.30	.90	5.95	.07	51.60	.15
Reactive $Agg._{t0}$	1,215	6.99	7.05	.86	1.73	.07	3.97	.14
Reactive $Agg._{t1}$	1,164	5.96	7.02	.88	2.22	.07	7.23	.14
Reactive $Agg._{t2}$	1,141	5.42	6.52	.87	1.95	.07	4.75	.15
Reactive $Agg._{t3}$	1,139	4.82	6.29	.87	2.57	.07	10.24	.15
Total SRO_{t0}	1,216	14.31	12.92	.82	1.83	.07	3.99	.14
Total SRO_{t1}	1,164	5.78	9.43	.81	2.74	.07	9.61	.14
Total SRO_{t2}	1,141	5.00	9.25	.83	3.02	.07	10.57	.15
Total SRO_{t3}	1,139	4.19	8.24	.81	3.55	.07	16.15	.15
Violent SRO_{t0}	1,216	13.95	10.96	.60	1.92	.07	4.94	.14
Violent SRO_{t1}	1,164	5.93	9.08	.54	2.33	.07	8.08	.14
Violent SRO_{t2}	1,141	4.90	8.84	.57	2.73	.07	10.07	.15
Violent SRO_{t3}	1,139	4.19	7.95	.53	2.71	.07	9.88	.15
Days to Arrest	1,193	567.04	251.03	-	-1.12	.07	-.45	.14
Days to Vio. Arrest	1,195	685.15	139.37	-	-3.49	.07	11.26	.14

Note: CU Traits = Callous-Unemotional Traits; EFD = Emotional Facilitation to Distress; Facility = Proportion of time sent in Facility; SRO = Self-Reported Offending. Subscripts $_{t0}$ = baseline, $_{t1}$ = 6 months, $_{t2}$ = 12 months, $_{t3}$ = 18 months.

Roose, Bijttebier, Decoene, Claes, & Frick, 2010) and negatively associated with prosocial behavior (Eremsoy, Karanci, & Berument, 2011) in adolescent samples. Within the current sample, the internal consistency for the ICU was adequate across the four time-points (Cronbach's α ranged from .76 - .79) and the means and standard deviations exhibited in Table 1 are similar to those demonstrated in other juvenile justice involved youth samples (e.g., Kimonis et al. 2006).

Emotional Facilitation to Distress. Emotional facilitation to distress were assessed through the emotional pictures dot probe task (Kimonis et al., 2006), which is designed to indirectly assess emotional reactivity by examining the preconscious mechanisms responsible for detecting and directing attentional resources toward relevant stimuli (Fox, 2010; MacLeod, Mathews, & Tata, 1986; Ohman, 1993). The emotions dot probe task was administered at the baseline interview, as well as at the 12 month and 18 month follow-ups. This measure was developed by Loney (2003) using slides taken from the International Affective Picture System (IAPS; Lang , Bradley, & Cuthbert, 1997) as well as additional slides for distress and neutral content that has been evaluated and validated by parents and youth in an independent sample (Kimonis et al., 2006). That is, the dot probe task taps distressing (e.g., child crying), positive (e.g., kittens), and neutral (e.g., spoon) content by assessing response latencies to probes after emotional or neutral images. The dot probe task consists of one block of practice stimuli of 16 picture pairs, followed by four test blocks with 24 picture pairs in each block. That is, each picture pair includes three non-overlapping sequential components: (1) a fixation cross appearing in the center of the screen for 500 ms, (2) a simultaneous presentation of two picture stimuli that are centered and located above and below the location of the previous fixation cross for 250 ms, and (3) an asterisk (i.e., dot probe) that appears either in the top or bottom picture location. Participants are instructed

that the objective of the task is to select a key on the keyboard that corresponds to the location on the screen (i.e., "I" key for up and "M" key for down) where the dot probe appears, as quickly as possible. Participants are instructed to only use their right hand when completing the task. The time from when the probe appears to when the youth presses the one of the corresponding keys to the location of the probe is recorded in milliseconds and used in the calculation of facilitation indices, if the participant responded correctly. That is, the task records whether the participant indicated correctly the location of the dot probe, as well as the response latency to the probe. If the participant does not respond within 5,000 ms to the probe, the response is coded as incorrect and the latency is recorded as 5,000 ms. Therefore, incorrect responses are not to be included in the calculation of facilitation indices, as incorrect responses indicate lack of attention to the specific stimulus pair, which is consistent with previous uses of the task (Kimonis et al., 2006; Kimonis et al., 2007; Kimonis et al., 2008; Kimonis, Frick, Cauffman, Goldweber, & Skeem, 2012; Muñoz Centifanti, Kimonis, Frick, & Aucoin, 2013). Further, response times less than 100 ms are also not included in the facilitation indices as they are considered to be outliers resulting from program error.

Three potential picture pairings are presented: neutral–neutral, distress–neutral, and positive–neutral. The dot probe does not counterbalance for slides with human content, race/ethnicity of the individuals in the images, nor for color saturation. Specifically, 97% (n = 40) of the distress pictures contain humans and only one distress picture contains an animal as the primary subject. Of the human content distress pictures, 41.5% (n = 17) contain White Non-Latino individuals as the primary subject, with 29.3% (n = 12) contain Black individuals, 14.6% (n = 6) contain White Latino individuals, and 12.2% (n = 5) contain Asian individuals. On the other hand, the neutral pictures predominantly feature inanimate objects (e.g., spoon, tractor, and dresser), with smaller

numbers of humans and animals. That is, 94.7% (n = 216) neutral pictures contain inanimate objects, 4.8% (n = 11) contain humans, and 1 picture contained an animal. Of the human content neutral pictures, 81.8% (n = 9) contain White Non-Latino individuals, and 18.2% (n = 2) contained Black individuals. However, an equal number of emotional and neutral stimuli are replaced versus not replaced by dot probes across the test blocks. Further, the location of picture stimuli are counterbalanced across trials for an equal number of emotional and neutral stimuli appearing in both locations across the four test blocks. Importantly, the calculation of an attentional facilitation index is done by subtracting the average latency to responding to dot probes replacing distress picture stimuli from the average latency to responding to dot probes replacing neutral stimuli from neutral–neutral picture parings using only probes from the same location (MacLeod and Mathews, 1988). That is, $Facilitation = \frac{1}{2} * [(Neutral\ Only/Probe\ Up - Distress\ Up/Probe\ Up) + (Neutral\ Only/Probe\ Down - Distress\ Down/Probe\ Down)]$. Specifically, this index controls for individual differences in reaction time for each location by providing a measurement of emotional processing that is relative to the individual's average speed of responding to emotionally neutral pictures at that location. As such, the emotional facilitation index provides a measurement of how quickly allocation of attention to emotional stimuli occurs compared to neutral stimuli from the same location. Thus, given that emotionally salient picture stimuli are expected to facilitate this allocation of attention, normative responses are expected to be quicker to probes replacing distressing stimuli as an individual's attention orients towards this distressing stimuli (Kimonis et al., 2006; Kimonis et al., 2007). As such, normative responding to distressing emotional stimuli would result in shorter mean response times (i.e., latencies) as indicated by higher scores on the facilitation index. Any facilitation scores that were more than three standard deviations above or below the

mean facilitation indices were removed from analyses, as these are thought to represent extreme outliers.

The emotions dot probe task has successfully been utilized in other samples of justice-involved youth, such that emotional facilitation deficits have been positively associated with CU traits for youth with high rates of aggression and high exposure to community violence (Kimonis et al., 2007) and for adolescents high on CU traits but low on anxiety (Kimonis, Frick, Cauffman, Goldweber, & Skeem, 2012). In the current sample, the number of participants who were able to complete the dot-probe task varies from the other self-report measures as many of the facilities (e.g., detention centers, state juvenile facilities, and local adult jails) did not allow researchers to utilize the interviewing laptop, which administers the dot probe task. Within the current sample, the emotional facilitation to distress score demonstrated adequate internal consistency at each time point (Cronbach's α ranged from .71 - .83). Further, the emotional facilitation to distress (EFD) scores were typically negative, indicating slower responding to distressing stimuli, and was kurtotic (see Table 1). The mean and distribution of the EFD scores was similar to other studies utilizing the emotional dot probe task in justice-involved youth, in that the mean was negative and demonstrated a large standard deviation (Kimonis et al., 2007; Kimonis et al., 2012).

Measures – Antisocial Outcomes

Aggression. Aggression was assessed at all four time-points using the *Peer Conflict Scale* (PCS; Marsee et al., 2011), a 40-item instrument that utilizes a four-point Likert scale, 0 (*Not at all true*) to 3 (*Definitely true*) to indicate how accurate each statement describes them. The PCS assesses the forms and functions of aggression with 10 items for each dimension of aggression (i.e., Proactive overt, Proactive relational, Reactive overt, Reactive relational). The PCS has

demonstrated a four-factor structure which represents the four dimensions of aggression in community, detained, and residential samples (Marsee et al., 2011). Aggression as measured by the PCS has been found to identify distinct groups of adolescents, such as a moderately high reactive aggression group and a second group who exhibit both high reactive and high proactive aggression (Marsee et al., 2014). Similar groups have been found in a sample of detained boys and boys who self-reported both high levels of both proactive and reactive aggression demonstrated more aggressive responses without provocation during a laboratory provocation task, whereas detained boys who reported high levels of reactive aggression only exhibited an increase in aggressive responses to low provocation levels (Munoz, Frick, Kimonis, & Aucoin, 2008). Importantly both proactive and reactive forms of aggression have been positively associated with arrest history and violent delinquency (Marsee et al., 2011). However, proactive forms of aggression have been positively associated with CU traits and positive expectations for aggression, whereas reactive forms of aggression have been more associated with emotional dysregulation (Marsee & Frick, 2007). The total aggression scale, total proactive aggression (e.g., "I start fights to get what I want"), and total reactive aggression scales (e.g., "When I am teased, I will hurt someone or break something") were utilized in the current study. The total aggression score exhibited excellent internal consistency across the four time-points (Cronbach's α ranged from .91 - .93). Similarly, the total proactive (Cronbach's α ranged from .84 - .90) and reactive scores (Cronbach's α ranged from .86 - .88) demonstrated good internal consistency across the four time-points. All aggression scores were generally positively skewed and kurtotic (see Table 1).

Delinquency. The adolescents' report of their history of delinquent behavior was assessed using the Self-Report of Offending scale at all four time-points (SRO; Huizinga, Esbensen, & Weihar,

1991). Participants indicate whether (yes or no) they had ever engaged in any of 24 different types of crime at the baseline interview (e.g., shoplifting, assault, and burglary). At each of the follow-up interviews, participants indicate whether (yes or no) they had engaged in the 24 different types of crime in the past 6 months. The scores from the SRO are correlated with important factors such as official reports of offending (Thornberry & Krohn, 2000). Total offense (total SRO) and total violent (violent SRO) offense variety percentage scores [(number of offenses endorsed / number of possible offenses) * 100] were calculated for each time point to indicate the number of different kinds of offenses and violent offenses participants had committed by the time of the interview. For example, the average Total SRO at baseline indicates that 14.31% of the 24 possible crimes were endorsed, or that 3.43 total crimes were endorsed on average by participants at baseline. Similarly, Violent SRO at baseline indicates that 13.95% of the 10 possible crimes were endorsed, or 1.39 violent crimes were endorsed on average by participants at baseline. Thus, the percentage scores are not equivalent across the two outcomes, as there is a greater number of possible crimes for Total SRO (n = 24) compared to Violent SRO (n = 10). Given that the baseline interview asked whether the participant had ever committed a crime, the means and standard deviations for both total and violent self-reported offending are greater at baseline (t_0) than at follow up interviews (t_1, t_2, t_3). However, the total self-report offending scale demonstrated good internal consistency (Cronbach's α ranged from .81 - .83) across all four time points, whereas the violent self-report offending subscale performed poorly to adequately (Cronbach's α ranged from .53 - .60) across the four time points.

Recidivism. Information about each participant's legal history was obtained from the respective juvenile justice systems formal and informal processing divisions. That is, if participants were initially informally processed, diversion case files were obtained; whereas probation files were

obtained for participants who were initially referred or those who were initially diverted and later referred to probation. Also, for participants who reached age 17 during the study period, adult court records were also reviewed. Official records included any charges during the follow-up period. From official records, a variable calculated the days to first arrest from the participant's baseline interview. Similarly, a variable calculated the days to a violent arrest from the participant's baseline interview. If the participant was arrested between the initial charge which made him eligible for the study and the baseline interview, this was not counted as a new arrest. In order to perform the planned analyses, individuals who did not have any arrest during the time frame were coded as the maximum number of days between a baseline interview and an 18 month interview (726 days). Given that the majority of the sample did not have a new arrest through the 18 month follow up (Any Arrest n = 377, 31%) and a much smaller amount had a violent arrest (Violent Arrest n = 108, 8.9%) the means and standard deviations are negatively skewed and days to violent arrest is kurtotic.

Procedures

Institutional Review Board approval was obtained at each participating university, as well as from the city of Philadelphia. Following determination that the youth met inclusionary criteria based on official records, researchers contacted and provided a description of the study to eligible youth and his parent or legal guardian. The parent or legal guardian provided consent either over the phone, which was recorded, or at the time of the interview. During the consent process, researchers informed the parent that the youth would receive an incentive for participation that would increase by $15 for each follow-up interview (i.e., $50.00 at baseline, $65.00 at 6-month follow-up, $80.00 at 12-month follow-up, and $95.00 at 18-month follow-up) and that participation in the study would in no way influence the youth's treatment by the

juvenile court. Participants provided assent at the interview. If a participant reached the age of 18 during the study, consent from the participant was obtained before continuing with participation. The parent and youth were informed that the research project had obtained a Certificate of Confidentiality from the Department of Justice, which allowed the research information to be protected from being subpoenaed for use in legal proceedings.

Participants' baseline interview was conducted within eight weeks of the initial processing decision from the respective juvenile justice systems, and follow-up interviews were conducted every six months for a total of four time points (baseline, 6 months, 12 months, and 18 months). Interviews were conducted at a location convenient for the youth, often his home, a nearby restaurant, or library in the community, or at the universities conducting the research. Interviewers attempted to provide as much privacy to the participant as possible by utilizing response cards for standardized measures, which allowed the participant to say a number as opposed to a full verbal response. The interview was administered from a laptop with an interviewing program that included all of the items and measures for convenience and standardized administration. If the participant was incarcerated in a facility that did not allow researchers to utilize the interviewing laptop, a paper version of the interview was administered and behavioral measures (e.g., the dot probe task) were not completed. To avoid comprehension problems related to low reading ability, interviewers read all interview questions aloud to the participant.

Analytic Plan

Preliminary analyses tested the stability coefficients for CU traits and emotional facilitation to distress (EFD). Then, zero-order correlations tested the association between the main study variables and demographic characteristics at baseline. Following these preliminary analyses,

zero-order correlations tested the associations among the main predictors (CU traits, EFD), aggression, delinquency, and official charges at the three follow-up time points.

To address the first hypothesis multilevel modeling of CU traits, EFD, and time, as well as their interactions were conducted. First, all main predictor variables and covariates were centered before being entered into multilevel model regressions. Age, race/ethnicity (White Latino as the comparison group), IQ, and proportion of time spent in facility were covariates for all multilevel model regressions. Proportion of time spent in facility was included as a covariate to account for time not spent in the community, which would possibly restrict the potential number of crimes that could be committed by the participant. Further, a multilevel model of CU traits, EFD, and whether EFD moderates the association between CU traits and the continuous aggression (i.e., total aggression, proactive aggression, reactive aggression) and delinquency (i.e., total delinquency, violent delinquency) outcomes across time was tested. That is, a three-way interaction between CU traits, EFD, and time allows for comparison of how similar CU traits, EFD, and the CU traits x EFD interaction are associated with antisocial outcomes across time. The form of the interactions was examined by utilizing the online interactive calculation and graphic tools for hierarchical linear modeling of two- and three-way interactions (www.quantpsy.org/interact/) using simple slopes as recommended by Preacher, Curran, and Bauer (2006). To assess this same hypotheses using official charges, Cox regression analyses with baseline predictors were conducted to assess whether CU traits and EFD are useful in the prediction of recidivism (i.e., any arrest, violent arrest), and whether EFD moderated the association between CU traits and recidivism.

To address the second hypothesis, the multilevel models conducted to address Hypothesis 1 were modified to assess whether CU traits and EFD demonstrated similar patterns of

association with antisocial outcomes across race/ethnicity. Specifically, race/ethnicity was included as a level 2 variable in the multilevel modeling as it is a group level variable, whereas CU traits, EFD, and time are level 1 variables. Importantly, dummy coding of race allowed for comparisons across groups, such that holding White Latino males as the comparison group provided as test as to how CU traits and EFD functioned in the prediction of antisocial behavior within both Black males and White Non-Latino males compared to White Latino males. Interactions were explored by examining the three-way interaction of CU traits, EFD, and time within each race/ethnic group and graphing the interaction at each time-point as recommended by Preacher et al. (2006). Further, dummy coding was utilized in the Cox regression analyses for the prediction of any arrest and violent arrest. That is, a three-way interaction between CU traits, EFD, and race/ethnicity can provide information as to their associations with recidivism across the racial/ethnic groups in the sample. Similar to the multilevel models, if the three-way interaction is significant, the two-way interaction between CU traits and EFD was examined within each racial/ethnic group and cumulative survival and hazard curves were plotted for each racial/ethnic group.

To address the third hypothesis, latent class growth analyses was conducted to first identify distinct trajectories for CU traits and EFD across the four and three time points, respectively. Latent class growth analyses are a special case of growth mixture modeling where the growth factor variances within each class are constrained to be zero (Muthén & Muthén, 2000). However, when there are no predictors or outcomes associated with a latent growth analyses, the results are equivalent to a growth mixture model. Empirical fit indices and correspondence with a priori expectations derived from theory previously reviewed will guide identification of the most parsimonious model of both individual and joint trajectories (Frick, Kimonis, Dandreaux,

& Farell, 2003; Fontaine, McCrory, Boivin, Moffitt, & Viding, 2011). Five fit indices are presented for each model solution, the Akaike's Information Criterion (AIC), the Bayesian Information Criterion (BIC), the Adjusted BIC (ABIC), Entropy, and the Lo-Mendell-Rubin likelihood ratio test (LMR). Lower estimated numbers for the AIC, BIC, and ABIC reflect better fitting models (Nylund, Asparouhov, & Muthén, 2007). As Entropy values approach 1, there is a clearer delineation of classes (Celeux & Soromenho, 1996). Last, the LMR likelihood ratio test compares improvement between neighboring class models (e.g., 2-class model to 3-class model, 3-class model to 4-class model) and provides a *p* value to indicate improvement in the fit by the inclusion of an additional class (Nylund et al., 2007).

The key trajectory of interest for testing this last hypothesis would be a group that is predicted to emerge that is in a stable high CU trajectory and a stable low EFD trajectory. If a joint trajectory model is identified, the posterior probabilities of trajectory group membership would be utilized to predict the continuous antisocial outcomes (i.e., aggression and self-reported offending). Last, separate analyses would use dummy coding to assess whether between group differences for antisocial behavioral outcomes as identified by different joint trajectories of CU traits and emotional facilitation vary as a function of racial/ethnic group.

Results

Preliminary Analyses

The distribution of the main study variables are provided in Table 1. Although the predictor variables were generally normally distributed, the majority (e.g., total aggression, total SRO, days to arrest) of the outcome variables were positively skewed and kurtotic. Given the extent of the skew and kurtosis of the outcome variables, the normality assumptions of the planned multilevel analyses were violated. Therefore, the aggression (total, proactive, and

reactive aggression) and delinquency (total SRO, violent SRO) scores utilized in the preliminary (i.e., zero-order correlations) and primary (i.e., multilevel modeling) analyses were transformed via a logarithm transformation [e.g., logarithm of (Total Aggression score + 1)] to reduce the positive skew and kurtosis. However, the days to any arrest and violent arrest were not transformed as Cox regression analyses are non-parametric and do not have an underlying normality assumption (Tabachnick & Fidell, 2007). The psychometric properties of the non-transformed and logarithm transformed aggression and delinquency outcomes are presented in Table 2. The logarithm transformed outcome variables exhibit more normal distributions and therefore would not violate the normality assumptions of the planned analyses (see Table 2).

Table 2

Psychometric properties of Aggression and Delinquency Outcomes for Multilevel Regressions Before and After Log Transformations

				Skewness		Kurtosis	
	N	*M*	*SD*	Skew	S.E	Kurtosis	S.E
Total Agg.	4,660	8.12	10.67	2.95	.04	13.01	.07
Total $Agg._{LT}$	4,660	.722	.47	-.02	.04	-.82	.07
Proactive Agg.	4,660	2.31	4.55	4.16	.04	24.86	.07
Proactive $Agg._{LT}$	4,660	.32	.37	1.01	.04	.21	.07
Reactive Agg.	4,660	5.82	6.78	2.07	.04	6.13	.07
Reactive $Agg._{LT}$	4,660	.63	.44	-.05	.04	-1.03	.07
Total SRO	4,660	7.43	10.97	2.44	.04	7.29	.07
Total SRO_{LT}	4,660	.60	.55	.20	.04	-1.29	.07
Violent SRO	4,660	7.35	10.11	2.12	.04	6.30	.07
Violent SRO_{LT}	4,660	.56	.59	.21	.04	-1.68	.07

Note: SRO = Self-Reported Offending; $_{LT}$ = variable has been Log10 transformed.

As such, only the logarithm transformed variables were utilized in all of the following analyses (i.e., zero-order correlations, multilevel modeling). The means and standard deviations for delinquency scores (i.e., total SRO, violent SRO) are slightly greater at baseline compared to follow-ups as the questions referred to delinquency ever committed, whereas follow-ups focused on the prior 6 months (see Table 1). The stability coefficients for CU traits and EFD are

presented in Table 3. The stability coefficients for CU traits ranged from .512 (baseline associated with 18 months) to .670 (12 months associated with 18 months), whereas there were no significant stability coefficients for EFD at any time point.

Table 3

Stability Coefficients for CU traits and Emotional Facilitation to Distress

	1	2	3	4	5	6	7
1. CU Traits$_{t0}$	-						
2. CU Traits$_{t1}$	.627***	-					
3. CU Traits$_{t2}$	.565***	.664***	-				
4. CU Traits$_{t3}$	.512***	.611***	.670***	-			
5. EFD$_{t0}$	-.009	-.007	-.013	-.010	-		
6. EFD$_{t2}$	-.017	-.035	-.048	-.025	.034	-	
7. EFD$_{t3}$	-.019	-.013	-.013	.015	.050	-.032	-

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. CU Traits = Callous-Unemotional Traits; EFD = Emotional Facilitation to Distress. Subscripts $_{t0}$ = baseline, $_{t1}$ = 6 months, $_{t2}$ = 12 months, $_{t3}$ = 18 months.

The zero-order correlations between the main study variables and demographic variables at baseline are provided in Table 4. Age at first contact with the juvenile justice system was positively associated with self-reported total offending and days to a violent arrest. Interestingly, IQ was negatively associated with CU traits, whereas it was positively associated with self-reported total offending and days to any arrest. Black participants reported lower levels of CU traits, as well as less self-reported total offending, but reported more violent offending. Being a White Non-Latino participant was positively associated with more self-reported total offending but negatively associated with violent offending, and was not associated with CU traits or forms of aggression. On the other hand, being a White Latino participant was positively associated with CU traits and days to a violent arrest, but was not associated with forms of aggression. Although EFD did not exhibit any significant associations with any variables, CU traits were

Table 4

Zero-order Correlations among Main Study Variables and Demographics at Baseline

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	-													
2. IQ	**.058**	-												
3. Black	**-.089**	**-.138**	-											
4. White NL	**.085**	**.266**	**-.338**	-										
5. White Latino	.025	**-.059**	**-.727**	**-.400**	-									
6. CU Traits	-.018	**-.073**	**-.076**	-.047	**.109**	-								
7. EFD	-.005	-.024	.057	-.035	-.030	-.009	-							
8. Total Agg.	.011	-.024	.050	.006	-.053	**.373**	.006	-						
9. Proactive Agg.	.010	-.036	.042	-.005	-.037	**.442**	.014	**.783**	-					
10. Reactive Agg.	-.001	-.027	.047	.007	-.051	**.314**	.010	**.968**	**.639**	-				
11. Total SRO	**.173**	**.074**	**-.073**	**.057**	.030	**.325**	.022	**444**	**.361**	**428**	-			
12. Violent SRO	.044	-.023	**.096**	**-.072**	-.042	**.245**	.050	**431**	**.303**	**437**	**718**	-		
13. Days to A. A.	.015	**.095**	-.056	**.074**	.001	**-.111**	-.016	**-.122**	**-.092**	**-.124**	**-.155**	**-.156**	-	
14. Days to V. A.	**.077**	.049	**-.097**	.034	**.070**	-.050	.002	**-.065**	-.033	**-.068**	-.033	**-.066**	**.453**	-

Note: Bolded values indicate $p < .05$. White NL = White Non-Latino; CU Traits = Callous-Unemotional Traits; EFD = Emotional Facilitation to Distress; SRO = Self-Reported Offending; Days to A. A. = Days to Any Arrest; Days to V. A. = Days to Violent Arrest. Black, White NL, and White Latino are all dummy coded variables for which 1 represents self-identifying as the race/ethnicity. All Aggression and Self-Reported Offending variables were log10 transformed.

positively associated with all forms of aggression and self-reported offending, and negatively associated with days to any arrest.

The zero-order correlations between CU traits and EFD (at each time-point) and forms of aggression, self-reported offending, and days to arrests at each of the follow-up periods (i.e., 6 months, 12 months, and 18 months) are presented in Table 5. CU traits at all time-points were positively associated with total aggression, proactive aggression, reactive aggression, as well as self-reported total and violent offending. CU traits at all four time-points were negatively associated with days to any arrest and days to a violent arrest (with the exception of CU traits at baseline and 18 months). That is, of participants who were arrested during the 18 month follow-up timeframe, participants with higher levels of CU traits had fewer days to any arrest or a violent arrest. On the other hand, EFD was not associated with any of the outcomes at any time point.

Hypothesis 1: Does Emotional Facilitation Moderate the Association between CU Traits and Antisocial Outcomes?

Aggression Outcomes. First, the multilevel regression model was developed to assess the three-way interaction between CU traits, EFD, and time. That is, SPSS 21 (IBM, 2012) was utilized to estimate the fixed effects of the intercept, omnibus race/ethnicity variable (which provides for an omnibus test and automatically converts to dummy coded variables to estimate individual fixed effects[1]), age, IQ, proportion of time spent in a facility, time, CU traits, EFD,

1. An alternative set of analyses were conducted in which the race variables (both the variable for the omnibus test and dummy coded variables) were replaced with variables for the three sites. The exact same analyses (i.e., multilevel regressions, Cox regressions) were conducted for both hypotheses 1 and 2, utilizing these site variables and none of the findings and conclusions changed based on their inclusion of the site variables as opposed to race variables. Importantly, the site dummy coded variables did not exhibit the exact same values as the race dummy coded variables when utilized as covariates (hypothesis 1) or moderators (hypothesis 2), indicating that race and site were not completely interchangeable variables.

Table 5

Associations between CU Traits and Emotional Facilitation to Distress with Outcome Variables at 6 months, 12 months, and 18 months

	CU Traits$_{t0}$	CU Traits$_{t1}$	CU Traits$_{t2}$	CU Traits$_{t3}$	EFD$_{t0}$	EFD$_{t2}$	EFD$_{t3}$
Total Aggression$_{t1}$	.332***	.385***	.334***	.277***	-.026	-.032	.033
Total Aggression$_{t2}$	.323***	.310***	.378***	.313***	-.039	-.033	.029
Total Aggression$_{t3}$	.298***	.303***	.323***	.390***	-.010	-.041	.006
Proactive Aggression$_{t1}$	.344***	.423***	.333***	.305***	.017	-.020	.058
Proactive Aggression$_{t2}$	.332***	.331***	.398***	.354***	-.019	-.007	.046
Proactive Aggression$_{t3}$	.272***	.286***	.337***	.432***	.003	-.019	.012
Reactive Aggression$_{t1}$	.305***	.343***	.306***	.247***	-.030	-.017	.022
Reactive Aggression$_{t2}$	.294***	.272***	.332***	.273***	-.032	-.035	.014
Reactive Aggression$_{t3}$	.289***	.282***	.287***	.345***	-.011	-.043	<.001
Total SRO$_{t1}$	.352***	.338***	.331***	.283***	-.022	.008	.029
Total SRO$_{t2}$	.295***	.286***	.329***	.264***	-.030	-.018	.008
Total SRO$_{t3}$	.207***	.225***	.249***	.248***	-.025	-.030	-.035
Violent SRO$_{t1}$	.265***	.267***	.269***	.226***	-.019	.004	.038
Violent SRO$_{t2}$	.237***	.244***	.276***	.216***	-.017	-.022	.009
Violent SRO$_{t3}$	.181***	.193***	.204***	.190***	-.001	-.028	-.032
Days to Any Arrest	-.111***	-.135***	-.163***	-.117***	-.016	.003	-.001
Days to Violent Arrest	-.050	-.061*	-.087**	-.029	.002	-.020	.029

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. CU Traits = Callous-Unemotional Traits; EFD = Emotional Facilitation to Distress; SRO = Self-Reported Offending. Subscripts $_{t0}$ = baseline, $_{t1}$ = 6 months, $_{t2}$ = 12 months, $_{t3}$ = 18 months. All Aggression and Self-Reported Offending variables were log10 transformed.

CU traits by EFD interaction, CU traits by time interaction, EFD by time interaction, and CU traits by EFD by time interaction. Further, this multilevel model estimated the random effect of the intercept, and included a repeated effect for time, which accounts for within subject variance because there is a meaningful relationship across measurements of time within individuals. Given that this repeated effect for time is necessary due to the repeated measurements within individuals, the covariance type was also specified to be autoregressive with a lag of one, which indicates that each individuals' response is associated with their previous response. All of the models were estimated using maximum likelihood estimation.

The estimates for the fixed effects of the models for total aggression, proactive aggression, and reactive aggression are presented in Table 6. First, only main effects emerged in the prediction of both total and proactive aggression. For both total and proactive aggression, only proportion of time spent in a facility and CU traits were positively associated, whereas time was negatively associated with total and proactive aggression. That is, although total and proactive aggression appear to decrease over time, proportion of time spent in a facility and CU traits are positively associated with total and proactive aggression. Similarly, only main effects emerged in the prediction of reactive aggression, including a main effect for race/ethnicity. That is, the race/ethnicity omnibus test was significant [$F(2, 1036.108) = 3.207$, $p = .041$] which allows for the differences in estimates between White Non-Latino participants, Black participants and White Latino participants (the comparison group) to be examined.

Specifically, White Non-Latino participants reported more reactive aggression than White Latino participants. Similar to the other forms of aggression, proportion of time spent in a facility and CU traits were positively associated, and time was negatively associated with reactive aggression[2]. Thus, CU traits were positively associated with all forms of aggression as

Table 6

Multilevel Model Regressions with Three-way Interaction between CU Traits, Emotional Facilitation to Distress, and Time predicting Aggression Outcomes.

	Total Aggression			Proactive Aggression			Reactive Aggression		
	Est.	S.E.	*p*	Est.	S.E.	*p*	Est.	S.E.	*p*
Intercept	**.757**	.043	**< .001**	**.334**	.034	**< .001**	**.660**	.041	**< .001**
White NL	.070	.036	.055	.028	.027	.299	**.079**	.034	**.022**
Black	.045	.027	.097	.018	.020	.360	.044	.026	.086
Age	-.004	.009	.617	.011	.007	.108	-.010	.009	.247
IQ	< .001	.001	.896	-.001	.001	.420	< .001	.001	.893
Facility	**.244**	.054	**< .001**	**.121**	.041	**.003**	**.246**	.051	**< .001**
Time	**-.039**	.014	**.006**	**-.037**	.011	**.001**	**-.028**	.013	**.037**
CU Traits	**.017**	.004	**< .001**	**.016**	.003	**< .001**	**.014**	.004	**.001**
EFD	< .001	.004	.614	.001	.001	.340	< .001	.001	.716
CU x EFD	< .001	< .001	.905	< .001	< .001	.869	< .001	< .001	.837
CU x Time	.001	.002	.755	< -.001	.001	.916	< .001	.002	.789
EFD x Time	< -.001	< .001	.523	< -.001	< .001	.309	< -.001	< .001	.625
CU x EFD x Time	< -.001	< .001	.711	< -.001	< .001	.732	< -.001	< .001	.626

Note: White NL = White Non-Latino; CU = Callous-Unemotional; EFD = Emotional Facilitation to Distress; Facility = Proportion of time sent in Facility; Est. = Estimate; S.E. = Standard Error. Bold values are significant at $p < .05$ level. Aggression outcomes were Log10 transformed.

2. The multilevel regression models for proactive and reactive aggression were repeated accounting for the other form of aggression. First, the same multilevel regression model for proactive aggression was conducted and included reactive aggression as a covariate. Similar to prior analyses, only main effects emerged for the prediction of proactive aggression. Specifically, only reactive aggression ($\beta = .425$, $p < .001$) and CU traits ($\beta = .010$, $p = .001$) were positively associated, and time ($\beta = -.025$, $p = .011$) was negatively associated with proactive aggression. Second, the multilevel model for reactive aggression was conducted and included proactive aggression as a covariate. Similar to the prior analyses, only main effects emerged for the prediction of reactive aggression. However, no racial/ethnic differences emerged in this analysis. Further, only proportion of time spent in a facility ($\beta = .178$, $p < .001$) and proactive aggression ($\beta = .658$, $p < .001$) were positively associated, and age ($\beta = -.017$, $p = .015$) was negatively associated with reactive aggression. That is, when accounting for the association between proactive and reactive aggression, CU traits were no longer associated with reactive aggression.

hypothesized, but the predicted three-way interaction between CU traits, EFD, and time did not emerge for any aggression outcome.

Delinquency Outcomes. The same multilevel regression model was utilized to test whether the predicted three-way interaction between CU traits, EFD, and time was found for both total and violent self-reported offending. The fixed effects for these two multilevel regressions are presented in Table 7. For total self-reported offending, proportion of time spent in a facility and CU traits had a positive association and time exhibited a negative association, but these associations were modified by a CU by time interaction, which is explored in Figure 1. Although CU traits continue to exhibit a positive significant association with total self-reported offending over the 18 month timeframe, this association decreases in strength over time (i.e., β = .028 at baseline, β = .013 at 18 months). For violent self-reported offending, age was negatively associated with more violent offending. Further, proportion of time spent in a facility and CU traits both had positive main effects, but a significant CU traits by time interaction was also found for violent self-reported offending. Similar to total offending, CU traits maintained a significant positive association with violent self-reported offending across the 18 month timeframe, but this association decreased in strength over time (i.e., β = .027 at baseline, β = .009 at 18 months, Figure 2).

Recidivism Outcomes. Centered baseline predictors of age, IQ, dummy coded race variables (White Latino as the comparison group), CU traits, EFD, and the interaction between CU traits and EFD were entered into hierarchical Cox regression analyses for predicting time to any arrest and violent arrest through 18 months. Table 8 provides the results from these Cox regression analyses. For days to any arrest, IQ [Hazard Ratio (HR) = .987, p = .013] was negatively associated and CU traits (HR = 1.023, p = .001) were positively associated with fewer

Table 7

Multilevel Model Regressions with Three-way Interaction between CU Traits, Emotional Facilitation to Distress, and Time predicting Delinquency Outcomes

	Total SRO			Violent SRO		
	Est.	S.E.	*p*	Est.	S.E.	*p*
Intercept	**.550**	.051	**< .001**	**.573**	.057	**< .001**
White NL	.038	.039	.322	.011	.041	.782
Black	-.053	.029	.068	-.010	.030	.746
Age	-.004	.010	.676	**-.037**	.010	**< .001**
IQ	.002	.001	.121	< .001	.001	.836
Facility	**.307**	.061	**< .001**	**.345**	.067	**< .001**
Time	**-.042**	.017	**.013**	-.031	.019	.107
CU Traits	**.028**	.005	**< .001**	**.027**	.006	**< .001**
EFD	.002	.001	.097	.001	.001	.398
CU x EFD	< .001	< .001	.390	< .001	< .001	.473
CU x Time	**-.005**	.002	**.014**	**-.006**	.002	**.014**
EFD x Time	-.001	< .001	.066	-.001	< .001	.279
CU x EFD x Time	< -.001	< .001	.329	< -.001	< .001	.404

Note: White NL = White Non-Latino; CU = Callous-Unemotional; EFD = Emotional Facilitation to Distress; Facility = Proportion of time sent in Facility; SRO = Self-Reported Offending; Est. = Estimate; S.E. = Standard Error. Bold values are significant at p < .05 level. Delinquency outcomes were Log10 transformed.

days to any arrest during the 18 month timeframe. However, contrary to hypotheses, there was no significant interaction between CU traits and EFD in the predictions of days to any arrest. The shape of the cumulative hazard curve at the mean of the covariates for days to any arrest is shown in Figure 3. For predicting days to a violent arrest, there was again no significant interaction between CU traits and EFD. However, younger (HR = .762, p = .001) participants and Black (HR = 1.815, p = .008) participants were more likely to have a violent arrest. The cumulative hazard curves for each race are provided in Figure 4 and show that Black participants showed an earlier time to a violent arrest during the 18 month time frame than both White Non-Latino participants and White Latino participants.

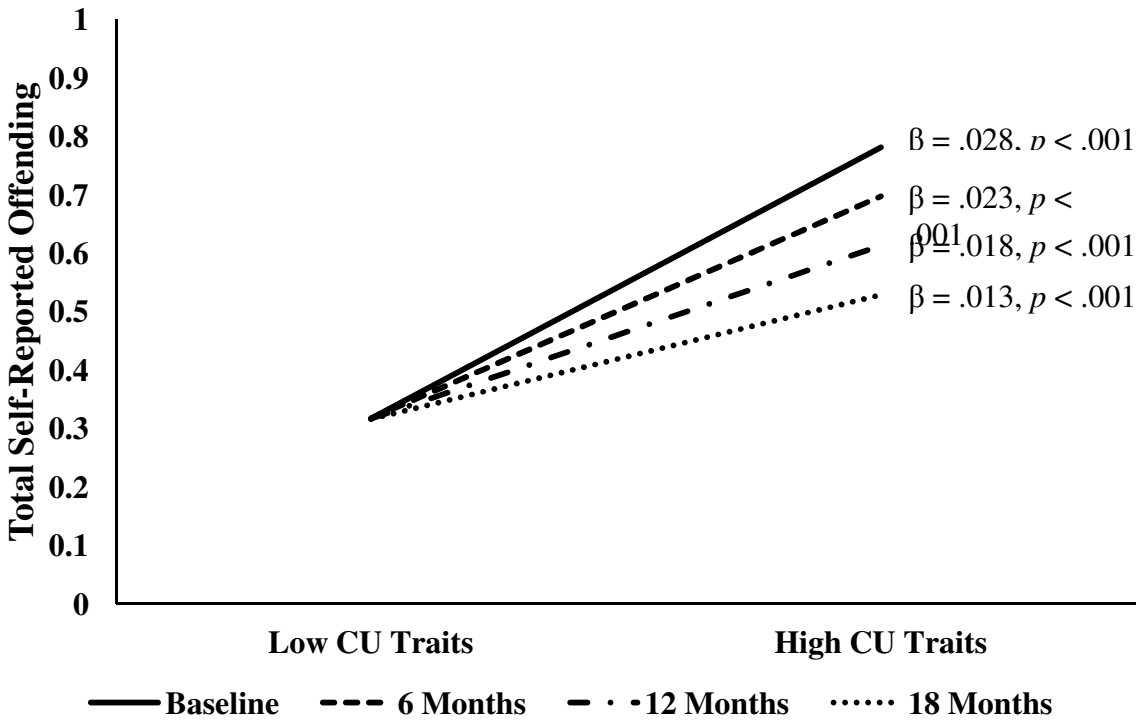

Figure 1. Interaction between CU traits and time predicting Log transformed Total Self-Reported Offending.

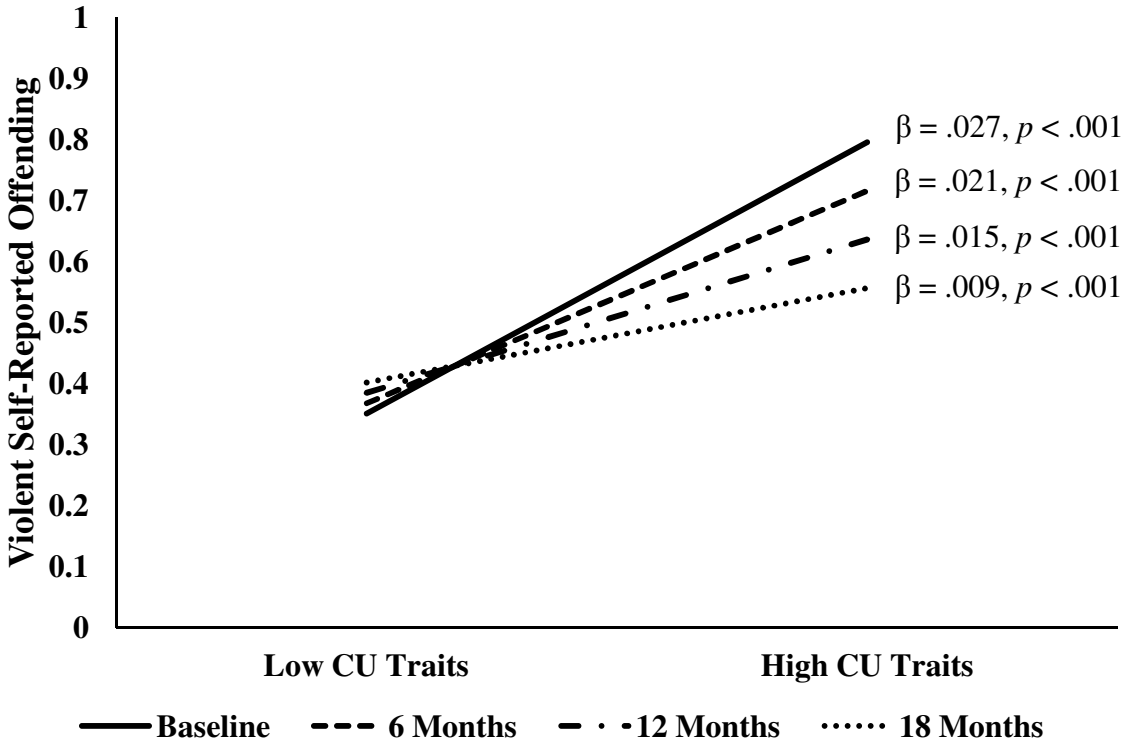

Figure 2. Interaction between CU traits and time predicting Log transformed Violent Self-Reported Offending.

Table 8

Cox Regression Analyses of Baseline Predictors of Days to Any Arrest and to a Violent Arrest through 18 months.

	Days to Any Arrest				Days to Violent Arrest			
	H.R.	B	S.E.	*p*	H.R.	B	S.E.	*p*
Age	.960	-.041	.044	.347	**.762**	**-.271**	.081	**.001**
IQ	**.987**	**-.013**	.005	**.013**	.991	-.009	.010	.342
White NL	.799	.224	.190	.238	1.120	.113	.352	.748
Black	1.109	.103	.121	.394	**1.815**	**.596**	.225	**.008**
CU Traits	**1.023**	**.023**	.007	**.001**	1.017	.017	.013	.171
EFD	1.001	.001	.001	.534	.999	-.001	.002	.615
CU x EFD	1.000	<.001	<.001	.652	1.000	<.001	<.001	.875

Note: White NL = White Non-Latino; CU = Callous-Unemotional; EFD = Emotional Facilitation to Distress; H.R. = Hazard Ratio. Bold values are significant at $p < .05$ level.

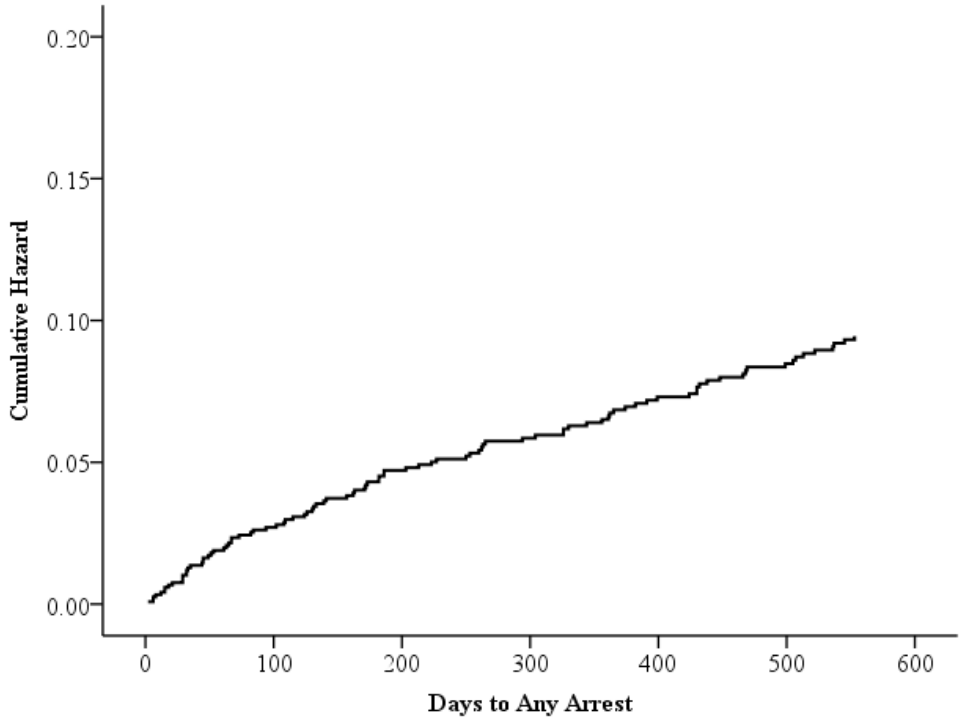

Figure 3. The Cumulative Hazard Curves at Mean of Covariates for Days to Any Arrest for all participants.

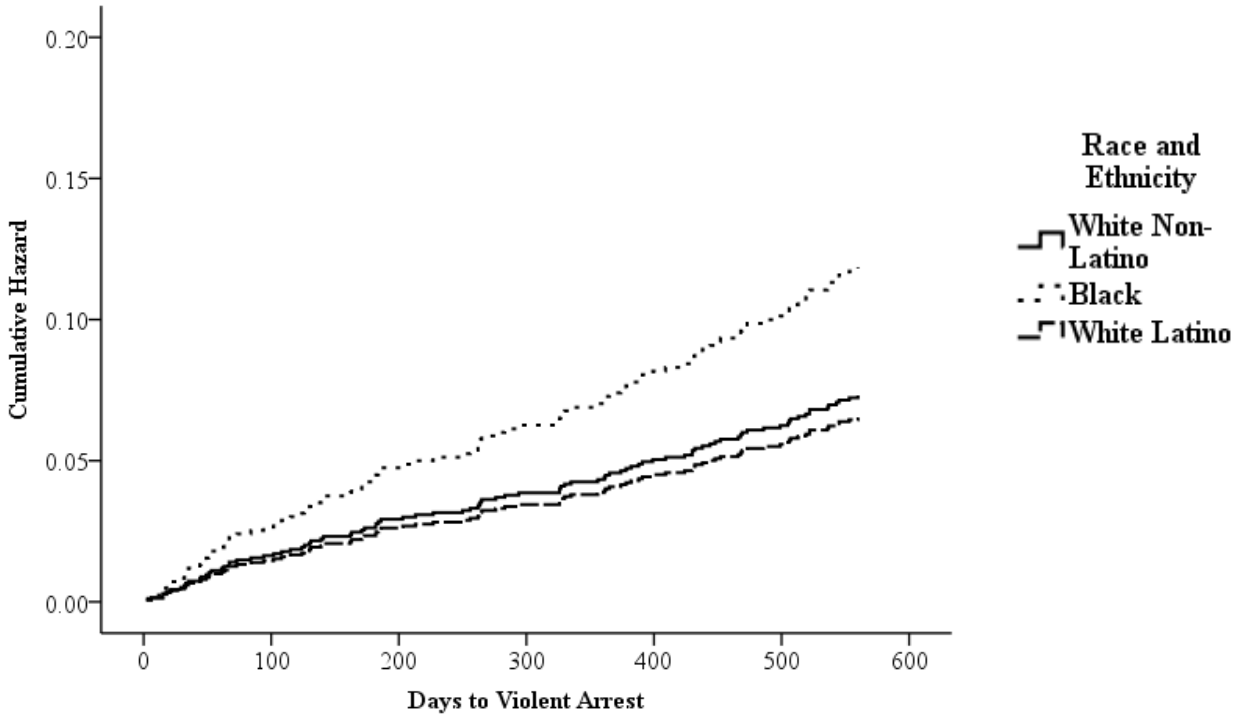

Figure 4. The Cumulative Hazard Curves at Mean of Covariates for Days to a Violent Arrest for each Race/Ethnic Group.

Hypothesis 2: Examining differences across race and ethnicity.

Aggression Outcomes. Similar to the multilevel regression models utilized to test Hypothesis 1, a multilevel model was developed to test the four-way interaction between CU traits, EFD, time, and race/ethnicity. That is, SPSS 21 (IBM, 2012) was utilized to estimate the fixed effects of the intercept, omnibus race/ethnicity variable, age, IQ, time, CU traits, and EFD, as well as the necessary interactions. The estimates for the fixed effects of the models for total aggression, proactive aggression, and reactive aggression are presented in Table 9. First, only main effects emerged for all three aggression outcomes. That is, proportion of time spent in a facility [($\beta = .250$, $p < .001$); ($\beta = .128$, $p = .002$)] and CU traits [($\beta = .019$, $p = .004$); ($\beta = .017$, $p = .001$)] were positively associated, and time [($\beta = -.044$, $p = .027$); ($\beta = -.042$, $p = .008$)] was negatively associated with both total and proactive aggression, respectively.

Table 9

Multilevel Model Regressions with Four-way Interaction between CU Traits, Emotional Facilitation to Distress, Time, and Race/Ethnicity predicting Aggression Outcomes.

	Total Aggression			Proactive Aggression			Reactive Aggression		
	Est.	S.E.	*p*	Est.	S.E.	*p*	Est.	S.E.	*p*
Intercept	**.769**	.056	**< .001**	**.347**	.043	**< .001**	**.672**	.053	**< .001**
White NL	.004	.101	.971	-.006	.080	.940	.015	.097	.876
Black	.046	.079	.557	.003	.062	.959	.039	.075	.599
Age	-.005	.009	.605	.011	.007	.110	-.010	.009	.248
IQ	< .001	.001	.872	-.001	.001	.489	< .001	.001	.889
Facility	**.250**	.054	**< .001**	**.128**	.041	**.002**	**.248**	.051	**< .001**
Time	**-.044**	.020	**.027**	**-.042**	.016	**.008**	-.033	.019	.081
CU Traits	**.019**	.006	**.004**	**.017**	.005	**.001**	**.016**	.006	**.012**
EFD	.001	.001	.306	.002	.001	.094	.001	.001	.422
CU x EFD	< .001	< .001	.738	< .001	< .001	.742	< .001	< .001	.714
CU x Time	< -.001	.002	.847	-.001	.002	.574	< -.001	.002	.898
EFD x Time	-.001	.001	.218	-.001	< .001	.082	-.001	.001	.291
CU x EFD x Time	< -.001	< .001	.722	< -.001	< .001	.722	< -.001	< .001	.679
Time x White NL	.025	.039	.518	.012	.031	.691	.025	.037	.500
Time x Black	< .001	.030	.998	.007	.024	.768	.002	.028	.944
CU x White NL	< .001	.013	.993	-.010	.010	.327	.001	.012	.928
CU x Black	.004	.010	.685	.001	.008	.882	-.004	.009	.684
EFD x White NL	-.003	.003	.277	-.004	.002	.076	-.002	.003	.485
EFD x Black	-.002	.002	.447	-.002	.002	.255	-.001	.002	.519
CU x EFD x White NL	< -.001	< .001	.526	< -.001	< .001	.358	< -.001	< .001	.817
CU x EFD x Black	< -.001	< .001	.966	< .001	< .001	.987	< -.001	< .001	.908
CU x Time x White NL	< -.001	.005	.928	.003	.004	.418	-.001	.005	.896
CU x Time x Black	.003	.004	.493	.001	.003	.791	.002	.004	.568
EFD x Time x White NL	.001	.001	.272	.001	.001	.103	.001	.001	.449
EFD x Time x Black	.001	.001	.327	.001	.001	.196	.001	.001	.350
CU x EFD x Time x White NL	< .001	< .001	.707	< .001	< .001	.430	< -.001	< .001	.968
CU x EFD x Time x Black	< -.001	< .001	.934	< -.001	< .001	.874	< .001	< .001	.993

Note: White NL = White Non-Latino; CU = Callous-Unemotional; EFD = Emotional Facilitation to Distress; Facility = Proportion of time spent in a Facility; Est. = Estimate; S.E. = Standard Error. Bold values are significant at $p < .05$ level.

In a similar vein, only proportion of time spent in a facility ($\beta = .248$, $p < .001$) and CU traits ($\beta = .016$, $p = .012$) were positively associated with reactive aggression. Contrary to predictions, no interactions including those for race/ethnicity emerged in predicting any form of aggression.

Delinquency Outcomes. The same multilevel regression model was utilized to test whether the four-way interaction between CU traits, EFD, time, and race/ethnicity was found for both total and violent self-reported offending. The fixed effects for these two multilevel regressions are presented in Table 10. Similar to the aggression outcomes, only main effects emerged in predicting total self-reported delinquency. Specifically, only proportion of time spent in a facility ($\beta = .302$, $p < .001$) and CU traits ($\beta = .032$, $p < .001$) were positively associated with total self-reported offending. On the other hand, main effects for age ($\beta = .036$, $p < .001$), proportion of time spent in a facility ($\beta = .352$, $p < .001$) and CU traits ($\beta = .034$, $p < .001$) emerged in the prediction of violent self-reported offending. Further, a CU traits by time interaction was found to predict violent self-reported offending. Examination of the form of this interaction was very similar to that found in hypothesis 1 (see Figure 2), such that CU traits remained significant across all four time-points but the association weakened over time (i.e., $\beta = .034$ at baseline, $\beta = .009$ at 18 months). Thus, contrary to predictions, no interactions including race/ethnicity emerged in predicting self-reported total or violent offending.

Recidivism Outcomes. Centered baseline predictors of age, IQ, dummy coded race variables (White Latino as the comparison group), CU traits, and EFD, and their two- and three-way interactions were entered into hierarchical Cox regression analyses for predicting days to any arrest and violent arrest through 18 months. Table 11 provides the results of these analyses. From these analyses, there was a significant CU traits by emotional facilitation by White Non-Latino interaction term (HR = .999, $p = .048$) for predicting any arrest. In contrast to any arrest, no interactions emerged in the prediction of a violent arrest for participants over the 18 month timeframe. However, age (HR = .764, $p < .001$) and being Black (HR = .494, $p = .004$) were negatively associated with having a violent arrest during the 18 month time frame. That is,

younger participants and White Latino participants (the comparison group) were more likely to have a fewer days to violent arrest during the 18 month timeframe.

Table 10

Multilevel Model Regressions with Four-way Interaction between CU Traits, Emotional Facilitation to Distress, Time, and Race/Ethnicity predicting Delinquency Outcomes.

	Total SRO			Violent SRO		
	Est.	S.E.	*p*	Est.	S.E.	*p*
Intercept	**.510**	.066	**< .001**	**.516**	.075	**< .001**
White NL	.126	.122	.301	.076	.140	.584
Black	-.003	.095	.975	.111	.108	.304
Age	-.003	.010	.721	**-.036**	.010	**< .001**
IQ	.002	.001	.135	< .001	.001	.842
Facility	**.302**	.061	**< .001**	**.352**	.067	**< .001**
Time	-.027	.024	.258	-.009	.028	.739
CU Traits	**.032**	.008	**< .001**	**.034**	.009	**< .001**
EFD	.001	.002	.623	.001	.002	.761
CU x EFD	< -.001	< .001	.975	< .001	< .001	.922
CU x Time	< -.001	.003	.304	**-.008**	.003	**< .001**
EFD x Time	< -.001	.001	.640	< -.001	.001	.814
CU x EFD x Time	< .001	< .001	.852	< .001	< .001	.984
Time x White NL	-.032	.047	.497	-.026	.054	.638
Time x Black	-.021	.036	.563	-.048	.042	.247
CU x White NL	-.006	.015	.673	-.002	.017	.904
CU x Black	-.009	.002	.447	-.018	.013	.183
EFD x White NL	.003	.003	.359	.001	.004	.882
EFD x Black	.001	.002	.773	< -.001	.003	.962
CU x EFD x White NL	< .001	< .001	.393	< -.001	< .001	.873
CU x EFD x Black	< .001	< .001	.535	< .001	< .001	.599
CU x Time x White NL	.004	.006	.537	.001	.007	.907
CU x Time x Black	.002	.004	.675	.006	.005	.221
EFD x Time x White NL	-.001	.001	.278	-.001	.001	.693
EFD x Time x Black	< -.001	.001	.708	< -.001	.001	.852
CU x EFD x Time x White NL	< -.001	< .001	.315	< .001	< .001	.957
CU x EFD x Time x Black	< -.001	< .001	.359	< -.001	< .001	.436

Note: White NL = White Non-Latino; CU = Callous-Unemotional; EFD = Emotional Facilitation to Distress; SRO = Self-Reported Offending; Est. = Estimate; S.E. = Standard Error. Bold values are significant at $p < .05$ level.

Table 11

Cox Regression Analyses with Three-way Interaction between Callous-Unemotional Traits, Emotional Facilitation to Distress and Race/Ethnicity for Predicting Days to Any Arrest and to a Violent Arrest through 18 months.

	Any Arrest				Violent Arrest			
	H.R.	B	S.E.	*p*	H.R.	B	S.E.	*p*
Age	.969	-.031	.044	.481	**.764**	**-.270**	.082	**.001**
IQ	**.988**	**-.012**	.005	**.017**	.992	-.008	.010	.383
White NL	1.262	.233	.200	.244	.890	-.117	.392	.766
Black	.879	-.128	.126	.309	**.494**	**-.706**	.244	**.004**
CU Traits	.980	-.020	.025	.438	.952	-.049	.047	.302
EFD	**1.013**	**.013**	.005	**.011**	.998	-.002	.008	.807
CU x EFD	1.001	.001	.001	.123	1.001	.001	.001	.324
CU x White NL	1.035	.035	.023	.136	1.056	.054	.044	.216
CU x Black	1.025	.024	.015	.115	.1047	.046	.030	.118
EFD x White NL	.991	-.009	.005	.057	1.003	.003	.007	.647
EFD x Black	**.994**	**-.006**	.002	**.008**	.997	-.003	.005	.457
CU x EFD x White NL	**.999**	**-.001**	<.001	**.048**	.999	-.001	.001	.276
CU x EFD x Black	1.000	<.001	<.001	.308	1.000	<.001	.001	.750

Note: White NL = White Non-Latino; CU = Callous-Unemotional; EFD = Emotional Facilitation to Distress; H.R. = Hazard Ratio. Bold values are significant at $p < .05$ level.

To explore the higher order interaction for any arrest, the interaction between CU traits and emotional facilitation to distress was examined for any arrest within each racial/ethnic group in Table 12. Interestingly, the interaction between CU traits and emotional facilitation was significant for White Non-Latino participants, but not significant for either Black or White Latino participants. Specifically, the cumulative hazard curves for all three race/ethnicities (Figure 5) show that the risk for any arrest for White Non-Latino participants slowly increases until risk plateaus at .20 around 500 days from baseline. That is, the risk for arrest in White Non-Latino participants' increased over time but did not go above a 25% chance of any arrest through the 18 month timeframe. Whereas for Black participants, their hazard curve showed that risk for any arrest continued to increase to around 40% throughout the timeframe. That is, Black participants were at the greatest risk for any arrest and that risk continued to increase for a longer

period of time. Interestingly, higher facilitation to distress (HR = 1.004, p = .017) was associated fewer days to any arrest for Black participants. The cumulative hazard curve for White Latino participants fell between White Non-Latino and Black participants, such that their risk plateaued around 35%. Further, CU traits were associated with fewer days to any arrest for White Latino participants (HR = 1.040, p < .001).

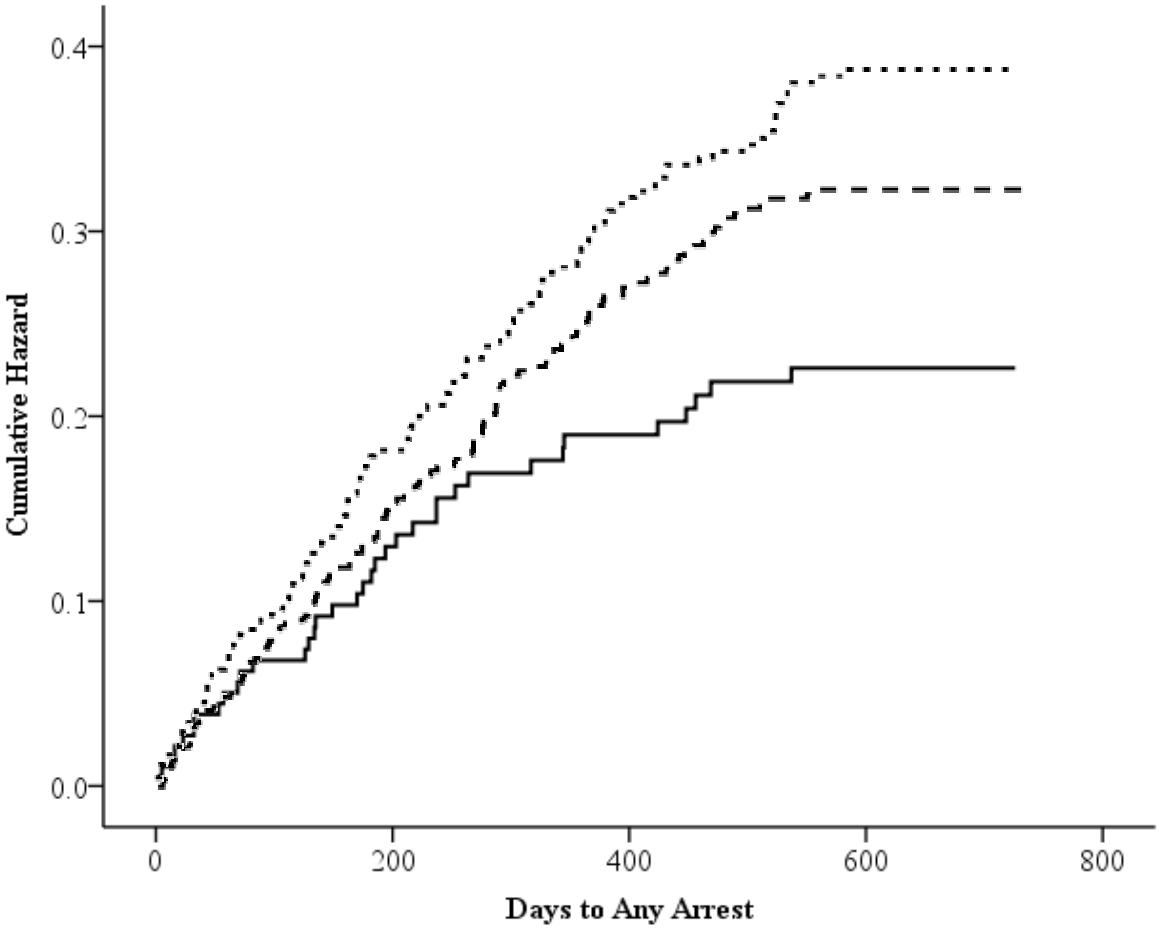

Figure 5. Cumulative Hazard Curve at Mean of Covariates for Days to Any Arrest for all Race/Ethnic groups.

Table 12

Cox Regression Analyses to Decompose the Three-way Interaction between Callous-Unemotional Traits, Emotional Facilitation to Distress, and Race/Ethnicity in Predicting Days to Any Arrest and to a Violent Arrest through 18 months.

	Any Arrest				Any Arrest				Any Arrest			
	White Non-Latino				Black				White Latino			
	H.R.	B	S.E.	*p*	H.R.	B	S.E.	*p*	H.R.	B	S.E.	*p*
Age	1.077	.074	.144	.608	.931	-.071	.069	.303	.986	-.014	.063	.823
IQ	**.970**	**.030**	.014	**.033**	.992	-.008	.008	.327	.989	-.011	.008	.157
CU Traits	1.004	.004	.021	.832	1.016	.016	.011	.144	**1.040**	**.039**	.011	**< .001**
EFD	1.005	.005	.004	.230	**1.004**	**.004**	.002	**.017**	.997	-.003	.039	.147
CU x EFD	**1.001**	**.001**	<.001	**.024**	1.000	<.001	<.001	.235	1.000	<.001	-.003	.665

Note: White NL = White Non-Latino; CU = Callous-Unemotional; EFD = Emotional Facilitation to Distress; H.R. = Hazard Ratio. Bold values are significant at $p < .05$ level.

Table 13

Fit Indices for Latent Class Growth Analyses for Callous-Unemotional Traits and Emotional Facilitation to Distress

	2-Class	3-Class	4-Class	5-Class
CU Traits				
AIC	30873.863	30865.132	30861.797	30859.713
BIC	30935.103	30941.682	30953.657	30966.882
ABIC	30896.986	30894.036	30896.481	30900.178
Entropy	.946	.808	.629	.663
LMR	15.718 (p = .002)	14.070 (p = .002)	8.917 (p = .670)[a]	7.743 (p = .517)

Note. CU Traits= Callous-Unemotional Traits; AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; ABIC = Adjusted Bayesian Information Criteria; LMRT = Lo-Mendel-Rubin Adjusted Likelihood Ratio Test. [a] Indicates that the latent variable covariance matrix was not positive definite for the classes within the model.

Hypothesis 3: Stability trajectories in identifying differences in antisocial outcomes over time.

Individual Trajectories: Callous-Unemotional Traits. First a Latent Class Growth Analysis (LCGA) was conducted for CU traits in MPlus 5 (Muthén & Muthén, 2007). That is, a LCGA null model (1 class model) of CU traits across the four time-points was estimated using maximum likelihood estimation. Following this initial null model, 2-, 3-, 4-, and 5-class model solutions were estimated for CU traits through the LCGA utilizing maximum likelihood estimation and robust standard errors. The fit indices for the LCGA models for CU traits are presented in Table 13.

For CU traits, the 2 class model improves upon the null model as indicated by the significant Lo-Mendell-Rubin likelihood ratio test (15.718, $p = .002$). Similarly, the 3-class model improves upon the 2-class model as indicated by the reduced AIC and ABIC, the relatively high entropy value, and the significant Lo-Mendell-Rubin likelihood ratio test (14.070, $p = .002$). However, the 4-class model solution indicates that the latent variable covariance matrix is not positive definite for the classes in the model, which suggests that the model cannot be interpreted. Further, all five of the fit indices reflect a lack of improvement in model fit for the 4-class model. Last, the 5-class model exhibited a lower AIC, but the BIC and ABIC were greater than the values for any other model. Moreover, the entropy value for the 5-class model was quite low (.663) and the Lo-Mendell-Rubin likelihood ratio test was not significant, indicating the addition of the 5^{th} class did not significantly improve model fit. Therefore, the 3-class model was examined further, based on the evaluation that the AIC and ABIC were reduced, the entropy value remained high emphasizing class distinction, and the significant LMR test.

The form of the three latent classes for CU traits is presented in Table 14 and Figure 15. The first class contains 25 participants (2.1%) and the average probability of belonging to the

class was good (.81). This first class was labeled the Decreasing class because at baseline the exhibited a high level of CU traits (Means Intercept = 38.903, $p < .001$) that decreased steadily over time (Means slope = -6.441, $p < .001$). Next, the second class comprises the majority of the sample (n = 1,145, 94.2%) and the average probability of belonging to the class was excellent (.936). The second class was labeled the Steady class due to the average level of CU traits exhibited at baseline (Means Intercept = 26.409, $p < .001$) with a relatively small decrease over time (Means Slope = -.677, $p < .001$). Last, the third class comprises 46 participants (3.8%) and the average probability for this class was adequate (.711). The third class was labeled the Increasing class because of the relatively low level of CU traits (Means Intercept = 19.033, $p < .001$) at baseline, but increasing slope (Means Slope = 3.500, $p < .001$) over the 18 months (See Figure 15).

Table 14

Form of the 3 Latent Growth Curve Classes for Callous-Unemotional Traits

Class	Class Counts	Proportion	Average Probabilities	Means Intercept	*p*	Means Slope	*p*
1	25	.021	.810	38.903	< .001	-6.441	< .001
2	1145	.942	.936	26.409	< .001	-.677	< .001
3	46	.038	.711	19.033	< .001	3.500	< .001

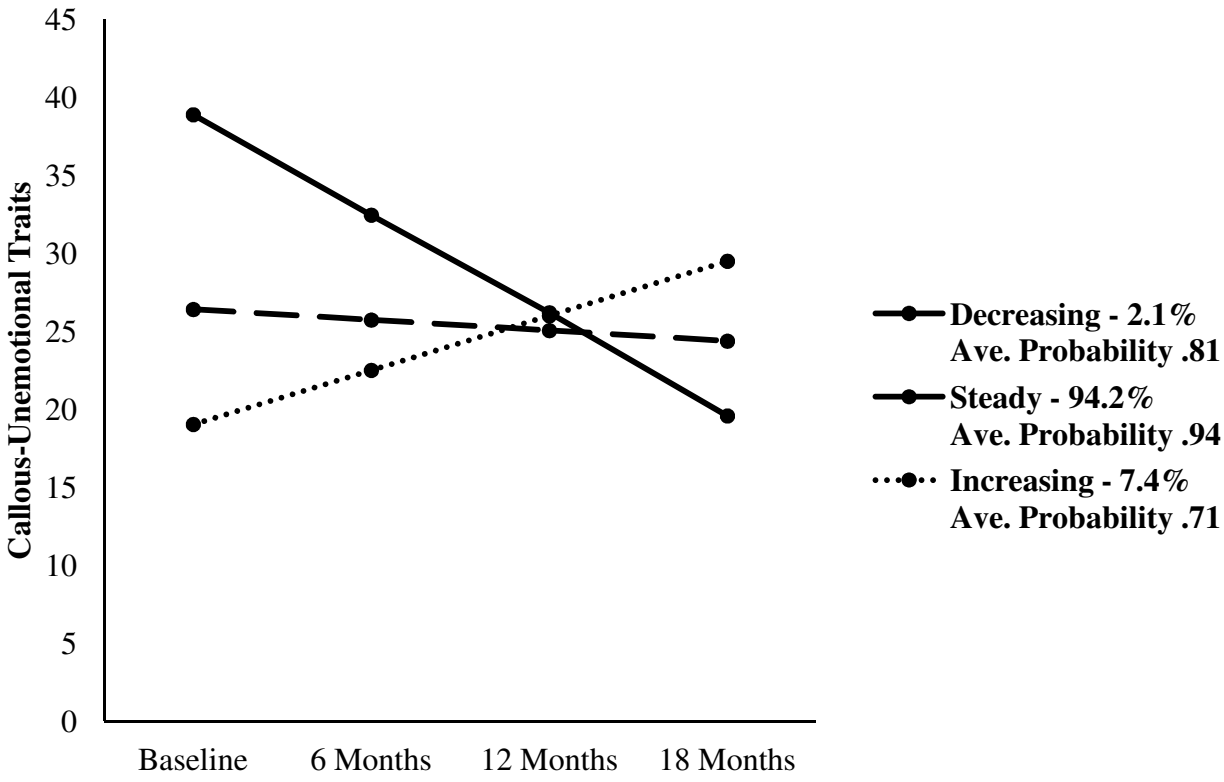

Figure 6. Forms of the Latent Growth Classes for Callous-Unemotional Traits across 18 months.

Individual Trajectories: Emotional Facilitation to Distress. A similar approach was utilized for determining trajectories for emotional facilitation to distress. First, a LCGA null model (1-class) was estimated for emotional facilitation to distress utilizing the three time-points and maximum likelihood estimation. The 1-class model exhibited a latent variable matrix that was not positive definite, indicating that the model should not be interpreted. Despite this caution in the null model, 2-, 3-, 4-, and 5-class models were estimated for emotional facilitation to distress utilizing LCGA. Unfortunately, all of the models estimated (1-, 2-, 3-, 4-, 5-class) for emotional facilitation to distress exhibit a latent variable covariance that is not positive definite for each of the classes estimated, indicating that model should not be interpreted or utilized for further analyses. This finding would be consistent with very low stability found for the

emotional facilitation to distress reported in Table 2. Therefore, the fit indices and form of the classes for emotional facilitation to distress were not examined further. Further, given that trajectories were identified for CU traits but not for emotional facilitation to distress, no further analyses testing a joint trajectory model were attempted.

Discussion

The current findings highlight the importance of CU traits in the prediction of concurrent and later antisocial outcomes in juvenile-justice involved samples. For Hypothesis 1, although no interactions emerged between CU traits and EFD, CU traits were a consistent positive predictor of antisocial outcomes. First, CU traits were positively associated with all forms of aggression (with the exception of reactive aggression when accounting for its association with proactive aggression, see footnote 2). Second, CU traits and time interacted in the prediction of total and violent self-reported offending over the 18 month timeframe. Such that, CU traits continue to have a positive, if decreasing in strength, association with both total and violent self-reported offending over 18 months. Third, CU traits were associated with fewer days to any arrest during the 18 month timeframe. However, the lack of association between CU traits and days to a violent arrest is interesting, given the evidence for a strong association between CU traits and violence found in other samples (Brandt et al., 1997; Catchpole & Gretton, 2003; Lawing et al., 2010; Murrie et al., 2004; Salekin et al., 2004). One possible reason for the failure to find associations in this study is the low base rate of violent arrests (i.e., 94 participants had a violent arrest, 7.7% of sample) in the current sample of first time juvenile offenders. This possibility would explain why CU traits were associated with aggression, which showed more variability in the sample, but not violent arrests.

A similar picture emerged for Hypothesis 2 in that CU traits were important for predicting aggression and delinquency, but that these associations are not moderated by EFD. That is, exploring differences between racial/ethnic groups did not provide any significant results except when examining recidivism as indicated by official records. For example, different predictors appear to be important in the prediction of days to any arrest for each racial/ethnic group. First, the only significant interaction between CU traits and EFD emerged in the prediction of days to arrest for White Non-Latino participants. Second, only EFD appeared to predict fewer days to arrest for Black participants, highlighting the possibility that it is both high and low levels of EFD that may be associated with antisocial outcomes. Last, CU traits were positively associated with any arrest, but only for White Latino participants. Importantly, these predictors were all from the baseline, thus it is unclear how these associations may have changed over time.

First, these findings must be considered in the context that despite evidence which suggests a lack of mean differences between racial/ethnic groups for psychopathy, the possibility that psychopathy and CU traits functions differently between racial/ethnic groups remains. For example, meta-analyses have generally found a lack of stable group mean differences between White and Black participants in adult (Cooke, Kosson, & Michie, 2001; Skeem, Edens, Camp, & Colwell, 2004) and adolescent (McCoy & Edens, 2006) samples. On the other hand, one meta-analysis examining the predictive utility of psychopathy for antisocial behavior found that the association between violent recidivism and psychopathy was weaker for non-White juveniles (Edens et al., 2007). Thus, although there has been some evidence to suggest that psychopathy and CU traits may be less useful in the prediction of antisocial outcomes in minority samples, the current findings suggest that this may not be the case. That is, CU traits are particularly important, regardless of racial/ethnic group, for the prediction of most concurrent and later

antisocial outcomes, including forms of aggression as well as total and violent self-reported offending.

Second, although CU traits remain important for the prediction of antisocial outcomes across time, the current findings suggest that this association weakens over time. This reduction in the strength of the association between CU traits and antisocial outcomes across time indicates that although CU traits remain important, other factors may also be important for the maintenance of antisocial behavior. For example, proportion of time spent in a facility was also positively associated antisocial outcomes, suggesting that participants who spent more time in facilities reported more antisocial behavior. Beyond CU traits and proportion of time spent in facilities, other factors such as affiliation with delinquent peers (Kimonis, Frick, & Barry, 2004; Warr, 2002), gang membership (Battin-Pearson, Thornberry, Hawkins, & Krohn, 1998; Gordon, Lahey, Kawai, Loeber, Stouthamer-Loeber & Farrington, 2004), impulse control (Loeber, 1990), and contextual factors such as neighborhood conditions (Ray, Frick, Thornton, Steinberg, & Cauffman, in press) may also play a role and/or influence CU traits in the maintenance of antisocial behavior. Thus, the current findings highlight the need to examine other factors alongside CU traits which may influence antisocial behavior in longitudinal settings, given that the association for CU traits appears to weaken over time.

Third, the only racial/ethnic differences found in the current study were found for official records. That is, in the current sample, being younger in age and being Black were found to be associated with fewer days to a violent arrest, although no racial differences were found for violent self-reported offending in either Hypothesis 1 or 2. Thus, the current findings may provide an example of disproportionate minority contact [Office of Juvenile Justice and Delinquency Prevention (OJJDP), 2009], which is defined as disproportionate representation of

minority youth who experience contact with the justice system relative to their representation in the general population (OJJDP, 2009, 2012; Pope, Lovell, & Hsia, 2002). Importantly, disproportionate minority contact has been found at almost all contact points of the juvenile justice system, including arrest, secure detention, and confinement (OJJDP, 2012).

Two major perspectives are reflected in examining disproportionate minority contact, one suggests a race-related selection bias in which the justice system is biased against minority offenders (Pope & Synder, 2003; Snyder & Sickmund, 1999); the other suggests that minority youth are those committing the most crime due to a variety of other factors (e.g., poverty, family dysfunction) and thus have more involvement with the justice system (Lovell & Pope, 1991; Pope & Synder, 2003). Although there is a variety of evidence that supports both of these perspectives (Pope et al., 2002), the current findings provide support for the first perspective of selection bias, but only for violent arrests. Specifically, no racial differences were found for self-reported violent offending, however, being Black was associated with fewer days to a violent arrest. That is, in the current sample, Black participants self-reported equivalent levels of violent crime, but Black participants were more likely to be arrested sooner for a violent offense. Given the major efforts put forth by OJJDP to reduce disproportionate minority contact, the current findings suggest that these efforts may have been more successful when considering any arrest, but those gains have not been achieved when considering violent arrests, at least within the current sample. Thus, the current findings highlight the need to investigate factors that influence self-reported offending as well as official contact with the juvenile justice system.

The majority of the planned analyses for Hypothesis 3 were unable to be tested due to not finding the predicted trajectories of CU traits or any trajectories for EFD. Although three trajectories were found for CU traits, none of the trajectories represented the predicted stable

high level of CU traits that was of primary interest. That is, two small groups were found to represent decreasing and increasing trajectories, whereas the vast majority of the sample reported CU traits that were approximately average and decreased relatively little over the 18 month timeframe. Although it was expected to find a stable high group in this juvenile-justice involved sample, the current findings suggest that the use of person-centered data-driven analyses do not identify a stable high group, and thus artificially forcing a high stable group would likely not accurately represent the data.

The trajectories found for CU traits in the current sample are similar in some respects to those found by Fontaine et al. (2011), such that they also found increasing (7.3%) and decreasing (13.4%) trajectories which were much smaller than the stable low (74.6%) trajectory group. However, the current findings differ in that the largest trajectory group had low stable levels of CU traits and the finding of a stable high trajectory of CU traits. Several differences between the current study and the Fontaine et al. (2011) study may explain some differences in the findings. The current study's participants were all adolescent males involved in the juvenile justice system, whereas the other sample was from the large (n = 9,578) Twins Early Development Study (TEDS) which was fairly representative of the population England and Wales. That is, predominantly White (94.4%) male and female participants were rated by teachers for their level of CU traits over a 5-year period at ages 7, 9, and 12 years old. Given the current study's findings for general lack of differences across racial/ethnic groups, it seems more likely that the wider assessment range, non-overlapping age ranges of between the two studies, as well as sample composition and size lend itself to the differences in findings. For example, given that the current sample's average level of CU traits is similar to other forensic samples (Kimonis et al., 2006), it may be that males involved in the juvenile justice system in general self-report

higher levels of CU traits, than found in mixed gender community samples such as the TEDS. Despite these methodological differences, the question remains as to why the current study did not find a stable high trajectory for CU traits, which could reflect inaccurate reporting from participants, or that the current sample lacks enough stable high CU participants to be detected by the trajectory analyses. Due to the ability to discern trajectories with relatively small percentages of the sample (e.g., 2.1% for the decreasing group) found in the current study, it seems more reasonable to suggest the possibility of inconsistent reporting of CU traits by participants.

Given the lack of stability for EFD, several questions arise about its utility. Previous studies have demonstrated that despite a general lack of zero-order correlations between EFD and other predictors or outcomes (Kimonis et al., 2006; Kimonis et al., 2007; Kimonis et al., 2008), EFD and CU traits interact in there associations with aggression and delinquency. Therefore, the absence of zero-order correlations between EFD and the antisocial outcomes was surprising but the lack of significant interactions between CU and EFD in the prediction of aggression and delinquency was unexpected. One possible reason for the low stability and lack of predictive association between the EFD and the antisocial outcomes is the current study was one of the first to use the emotional dot probe task to index EFD outside of a laboratory or laboratory-like setting. Specifically, the first study using the emotional dot probe task to measure EFD was conducted in a laboratory setting at a university (Kimonis et al., 2006). All of the following studies using the same task were conducted in juvenile justice facilities, often in a private room with only the administrator (Kimonis et al., 2007; Kimonis et al., 2008; Kimonis et al., 2012; Muñoz Centifanti et al., 2013). In comparison, the majority of interviews in the study occurred out in the community, often in participant's homes, local restaurants, coffee shops, or libraries.

Less frequently, interviews occurred at the university's completing the research (i.e., laboratory setting), or in private rooms in justices facilities (and only certain facilities allowed the use of the interviewing laptop). Although several steps were taken by research staff to ensure a private environment that provided confidentiality to the participant, there are many factors in community settings that may have influenced participants when taking the emotional dot probe task. For example, conducting the emotional dot probe task in settings where other auditory and visual stimuli (e.g., television, restaurant workers calling out order numbers, siblings) are greater than in a typical laboratory setting may have reduced the validity of the dot probe task. That is, given that the emotional dot probe task measures attentional bias to emotionally salient pictorial stimuli versus neutral pictorial stimuli, it is possible that conducting the task in non-laboratory settings (which may have more visual and auditory stimuli) distracts the participant from the task, which may influence responding to the task and thus the validity of the measure.

Beyond the setting in which the emotional dot probe test was administered influencing EFD scores, there are several other potential limitations of the task. The emotional dot probe task as currently constructed does not control for several potential issues and thus may not provide the most accurate assessment of emotional facilitation to pictorial stimuli. All of the potential issues with the emotional dot probe task occur because the emotional dot probe task is not a direct index of emotional facilitation. Specifically, there are numerous cognitive, affective, and motor processes that operate between an individual's perception of a stimuli and the motor response concerning the location of the dot probe (Kimonis et al., 2007; Vasey, El-Hag, & Daleidon, 1996). For example, research examining Event Related Potentials (ERPs) has demonstrated that humans process images different depending upon the content presented (Bradley, Hamby, Löw, & Lang, 2007; Cano, Class, & Polich, 2009; Tobimatsu, 2012). For example, ERP research has

demonstrated differential patterns of processing images containing faces compared to objects, even when pictorial stimuli are presented at a preattentive level (Tobimatsu, 2012). Similarly, facial detection and processing (e.g., human images in the dot probe) via the face-specific processing module is thought to be distinct from processing non-face objects (e.g., non-human neutral images in the dot probe) in that facial processing is more holistic and utilizes different neural resources (Dailey & Cottrell, 1999; Tsao & Livingstone, 2008). In addition, the emotional dot probe does not control for color saturation or picture complexity such that some pictures, particularly the distress (e.g., a crying child on the ground, individual being treated for injuries and put in an ambulance) pictures may be more intense in color saturation and variety as well as composition compared to neutral images that contain only objects (e.g., a spoon against a white background, tractor in a field). That is, there is evidence to suggest that emotional responses to pictorial stimuli are modulated by picture complexity or color (Cano et al., 2009; Schlochtermeier et al., 2013), such that there are stronger valence effects via function Magnetic Resonance Imaging (fMRI) for more complex photos compared to pictograms (Schlochtermeier et al., 2013). Similarly, differential patterns of ERPs have been demonstrated in comparing simple figure-ground compositions to complex scenes (Bradley et al., 2007). Finally, the emotional dot probe task does not control for possible ingroup and outgroup biases, given the unequal representation of racial/ethnic identities in the distressing pictorial stimuli (41.5% White Non-Latino individuals as the primary subject, 29.3% Black individuals, 14.6% White Latino individuals, and 12.2% Asian individuals). ERP research suggests that even though race may not be relevant to a tasks goal, it influences processing indicators such as the P200 or N200 (Dickter & Bartholow, 2007). For example, in a task in which race was not of relevance (gender categorization), processing appears to differ depending upon the participant's ingroup

membership, suggesting that attention to outgroup features influences processing (amplitude of P200; Dickter & Bartholow, 2007; Ito & Urland, 2003; 2005).

In addition to the variety of limitations surrounding the emotional dot-probe task, some aspects of the current study may limit the generalizability of the current findings. As noted previously, the current sample exhibited a relatively low base rate for violence both through self-report and official records of violent arrests. Thus, the restricted range of violence found in the current study may not extend to other at-risk or forensic samples. In a similar vein, the current sample is relatively unique as it followed participants with mid-level offenses (e.g., vandalism, theft of goods, simple battery) at their initiation into the juvenile justice system. That is, the current sample may be distinct from other justice-involved samples which do not select for a certain range of offenses or time of involvement in the justice system. Further, the current study was unable to detect if arrests occurred outside of the study jurisdictions. That is, the Cox regression analyses may not accurately reflect participants' arrest records if they experienced arrests outside of the study jurisdictions (i.e., Orange County, Philadelphia County, and Jefferson Parish). Last, the sample only included males and thus it is unclear as to whether CU traits would exhibit the same associations with antisocial outcomes found in the current study in a sample of juvenile justice-involved females.

Despite these limitations, particularly those concerning the emotional dot probe task, there are several strengths to the current study. That is, despite the unequal representation between the sample demographics and the racial/ethnic representations in the emotional dot probe task, the current study provides a racially and ethnically diverse sample for robust tests of differences between these groups. Further, given the disproportionate number of minority youth involved in the juvenile justice system (OJJDP, 2009), the current sample accurately reflects this trend while

still allowing for robust examination of racial/ethnic differences. Second, the use of multilevel modeling using repeated effects allows for more accurate modeling of the data in that it accounts for the inter-relatedness due to measurements within individuals across time. In a similar vein, the longitudinal nature of the current study allows for examination of the relationship between CU traits and antisocial outcomes across time in a sample that was initiating their involvement with the juvenile-justice system at the baseline interview. Third, the current study did not rely solely on the adolescent's self-report to assess antisocial outcomes but also included data from official records.

In summary, the current study highlights the utility of CU traits in the prediction of both self-report and official records of antisocial behaviors up to 18 months, which is consistent with a large body of research that has supported CU traits inclusion into the DSM-5 (Frick et al., 2014a, 2014b). These findings highlight the need for successful treatments of CU traits in adolescence. Although individuals with CU traits have been considered to be resistant to traditional treatments, recent work suggests that adolescents with CU traits do respond to intensive multi-component treatments that are tailored to their unique emotional, cognitive, and motivational styles (Butler, Baruch, Hickey, & Fonagy, 2011; Caldwell, Skeem, Salekin, & Van Rybroek, 2006; White, Frick, Lawing, & Bauer, 2012). The current findings highlight the importance of testing promising treatments for youth with CU traits, especially for youth involved in the juvenile justice system. Further, although no racial/ethnic differences were found in the prediction of self-reported antisocial behavior, different factors were found to be important in the prediction of being arrested during the 18 month timeframe. Specifically, CU traits were important in the prediction of all forms of aggression as well as self-reported total and violent offending, although this association weakened over time for both forms of self-reported

offending. A more nuanced picture emerged for the prediction of official records, such that different factors (CU traits and EFD interaction, EFD, and CU traits only) predicted any arrest for White Non-Latino, Black, and White Latino participants, respectively. Similarly, only being younger and being Black was associated with fewer days to a violent arrest. This collection of findings again highlights the importance of examining associations with both self-reported measures of antisocial behavior and official records. Last, the findings that the majority of the sample show average and increasing levels of CU traits across time suggests that research needs to not only consider factors that can result in CU traits, but also investigate factors that can lead to increases over time. One possibility is that youth's involvement with the juvenile justice system leads to more association with deviant peers (Dishion, McCord, & Poulin, 1999; Leve & Chamberlain, 2005) and more exposure to violence (Abram et al., 2004; Kimonis et al., 2008; Wasserman & McReynolds, 2011), both of which could increase the youth's level of callousness and disregard for others' feelings. If research supports this possibility, it could have important implications for how youth are processed in the juvenile justice system in order to minimize potential negative effects.

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Appendix

Project Report and Continuation Application

(Complete and return to IRB, GP 2001. Direct questions to IRB administrator Jessica Grande 280-6013 or IRB Chairman Bobby Laird at 280-5454)

THE UNIVERSITY of NEW ORLEANS
Committee for the Protection of Human Subjects in Research
GP 2076
Phone: 504-280-6013
Fax: 504-280-6049
humansubjects.uno.edu

IRB # 02Dec10 Current approval expires on: 11/1/2014

Review Type: Full Risk Factor: Minimal

PI: Paul Frick Department: Psychology Phone: 504-280-6012

Co-Investigators:

Project Title: Crossroads: Formal vs. Informal Processing in the Juvenile Justice System

Please read the entire application. Missing information will delay approval!

I. PROJECT FUNDED BY: John D. and Catherine T MacArthur Foundation UNO Proposal #

II. PROJECT STATUS: Check the appropriate box and complete the following:

- ☐ 1. Active, subject **enrollment continuing**; # of subjects enrolled:
- ☒ 2. Active, subject **enrollment complete**; work with subjects continues.
- ☐ 3. Active, **work with subjects complete**; data analysis in progress.
- ☐ 4. Project **stat postponed**. New start date:
- ☐ 5. **Project complete**. end date:
- ☐ 6. **Project cancelled**. No human subjects used.

III. PROTOCOL: Check one.

- ◉ Protocol continues as previously approved
- ○ Changes are requested* *List (on separate sheet) any changes to the approved protocol.*

IV. UNEXPECTED PROBLEMS: (did anything occur that increased risks to participants?)

Number of events since study inception: 0 since last report: 0

Have there been any **previously unreported** events? Y?N N

If such events occurred, describe them (on a separate sheet) and how they affect risks in your study.

V. CONSENT FORM AND BENEFIT RATIO

Does new knowledge or adverse events change the risk/benefit ratio ? Y?N N

Is a corresponding change in the consent form needed? Y/N N

VI. ATTACH A BRIEF, FACTUAL SUMMARY of project progress/results to show continued participation of subjects is justified; or to provide a final report on project findings.

VII. ATTACH CURRENT CONSENT FORM (only if subject enrollment is continuing); and check the appropriate blank:

- ◉ Form is unchanged since last approved
- ○ Approval of revision requested herewith; (identify changes)

(Electronic) Signature of Principal Investigator Paul Frick, Ph.D. Date October 23, 2014

IRB Action:

- ☐ Continuation approved; **Approval Expires:** Oct 26, 2015
- ☐ Continuation disapproved
- ☐ File closed

Signed: Robert D Laird Date Nov 11, 2014

Submit by Email Print Form

Vita

Laura C. Thornton was born in Tampa, Florida and raised in Fort Worth, Texas. She obtained her Bachelors of Science in Psychology from Southwestern University in 2009. Laura joined Distinguished University Professor Dr. Paul Frick's Developmental Psychopathology laboratory in 2010 and obtained her Master of Science in Psychology from the University of New Orleans in 2012. Upon graduation from the University of New Orleans, Laura will begin a post-doctoral fellowship at the Boys Town National Research Hospital's Center for Neurobehavioral Research.