

The Relation Between Callous-Unemotional Traits, Psychosocial Maturity, and Delinquent Behavior Among Justice-Involved Youth

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Callous-unemotional (CU) traits are a risk factor for severe and persistent patterns of juvenile delinquency. Given the influence of CU trait assessments in justice-system settings, it is important to determine whether the predictive utility of CU traits is conditional on the absence of protective psychosocial factors. Employing a sample of justice-involved male youth ($N = 1,216$, $M_{\text{age}} = 15.29$), this study examined whether psychosocial maturity (PSM) outweighs or attenuates the effect of CU traits on delinquency. Results indicated that youth with high CU traits or low PSM offended more during the year following their first arrest. Additionally, PSM moderated the relation between CU traits and offending, such that higher PSM was associated with less offending but only among low CU youth.

Callous-unemotional (CU) traits (e.g., lack of empathy, deficient guilt or remorse, and shallow affect) are a well-established risk factor for delinquent behavior (Frick, Ray, Thornton, & Kahn, 2014). Youth with elevated CU traits engage in more severe, violent, and persistent patterns of delinquency. Indeed, studies demonstrate that CU traits account for a significant portion of delinquency even after accounting for other known risk factors (Kahn, Byrd, & Pardini, 2013). CU traits are often measured in juvenile justice settings as a means of assessing an individual's risk of recidivism (Viljoen, McLachlan, & Vincent, 2010). Youth exhibiting high levels of CU traits are often more likely to receive

harsher sentences and less likely to receive rehabilitative treatment (for review, see Vincent, Kimonis, & Clark, 2016).

Given the practice of assessing CU traits in justice system settings, it is important to determine whether other factors attenuate the CU–delinquency association. Researchers have examined the interactive effects of CU traits and individual characteristics in hopes of identifying such moderating factors, such as intelligence or psychosocial maturity (PSM). Although the findings regarding the protective effects of cognitive abilities are mixed, there is some evidence that psychosocial factors can mitigate the effects of CU traits (Gao & Raine, 2010; Salekin, Lee, Schrum Dillard, & Kubak, 2010). One potential protective factor is PSM, a broad construct that encompasses the ability to self-regulate. Youth who are more psychosocially mature are better able to regulate their behavior, are less prone to engaging in delinquent acts (Cauffman & Steinberg, 2000), and are more likely to desist from antisocial behavior at earlier ages (Monahan, Steinberg, Cauffman,

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& Mulvey, 2013). Researchers have yet to examine whether PSM similarly reduces offending among youth with elevated CU traits. This study focuses on a sample of adolescent boys who encounter the juvenile justice system after their first arrest in order to examine the unique and interactive effects of CU traits and PSM on offending 1 year after their first arrest.

Callous-Unemotional Traits and Juvenile Offending

CU traits include a lack of remorse and guilt, shallow or superficial emotions, and a lack of concern about one's performance (Frick et al., 2014). These traits constitute the affective/interpersonal component of psychopathy (Cleckley, 1941; Hare & Neumann, 2008), a disorder often identified in adult criminals who display severe and chronic patterns of antisocial behavior (Leistico, Salekin, DeCoster, & Rogers, 2008; Skeem, Polaschek, Patrick, & Lilienfeld, 2011). Researchers studying juvenile offending have found that CU traits designate a particularly high-risk subgroup of antisocial youth. Compared to other youth, youth with high levels of CU traits are more likely to engage in violent, aggressive, and severe antisocial behavior, which in turn increases their likelihood of justice system involvement (Frick et al., 2014). Furthermore, youth with high levels of CU traits show a more stable pattern of delinquency such that their criminal behavior is more likely to persist into adulthood compared to other antisocial youth (McMahon, Witkiewitz, & Kotler, 2010). There are also judicial risks associated with having high levels of CU traits. Specifically, previous research indicates that the presence of CU traits may bias perceptions of amenability to treatment, dangerousness, and risk of recidivism (Prasad & Kimonis, 2018; Rockett, Murrie, & Boccaccini, 2007; Viljoen et al., 2010).

Given the use as well as the influence of assessments of CU traits in justice-system settings, it is important for researchers to determine whether the predictive utility of CU traits is conditional on the absence or presence of other psychosocial factors. Several studies have examined the effects of CU traits in concurrence with other criminogenic risk factors. Using data from the NICHD Study of Early Child Care and Youth Development, Flexon and Meldrum (2013) found that CU traits were associated with violent behavior even after adjusting for poor school attachment, ineffective parenting, low self-control, and violent peer behavior. Furthermore, at high levels of CU traits, the effects of low self-control and violent peer behavior were

reduced. In other words, low self-control and peer deviancy had less of a negative influence on the behavior of youth with elevated CU traits. However, the inferences potentially drawn from this study are limited due to the cross-sectional nature of the data. In particular, the researchers did not account for prior delinquent behavior, which substantially affects subsequent offending and psychological functioning. Furthermore, the study focused on community youth, which limits its implications to more policy-relevant groups of justice-system-involved youth.

Researchers have also examined the longitudinal associations between CU traits, criminogenic factors, and delinquent behavior. For example, Kahn et al. (2013) examined the relation between CU traits, a wide variety of risk factors (e.g., self-control, socioeconomic status [SES], peer deviancy, prior offending), and future offending among a diverse sample of young men. After accounting for these other risk factors, they found that elevated CU traits predicted greater number of arrests and criminal charges during adulthood. Because official records were used to measure offending, however, it remains unclear whether CU traits predicted offending in general or only offending that led to arrest. Despite the limitations of these studies, the findings highlight the robust relation between CU traits and delinquency. However, there is growing recognition that not all youth with high CU traits engage in delinquent behavior (Wall, Frick, Fanti, Kimonis, & Lordos, 2016). This is consistent with research on adults with psychopathy, in which some adults with these traits do not exhibit significant patterns of antisocial behavior, which has been labeled as "successful" psychopathy (Cleckley, 1941; Hall & Benning, 2006).

Callous-Unemotional Traits and Protective Factors

In their theoretical model of successful and unsuccessful psychopathy, Gao and Raine (2010) posited that some individuals with these traits can suppress their antisocial tendencies due to better cognitive (e.g., executive functioning and intelligence) and psychosocial (e.g., decision making and cognitive empathy) functioning. Empirical research on the association between CU traits and delinquency partially supports this idea, but studies that have examined the interaction of CU traits and cognitive factors have yielded mixed results. For example, in a sample of undergraduate college students, Wall, Sellbom, and Goodwin (2013) found that verbal intelligence reduced the strength of the

association between psychopathy and offending. Individuals who scored high on both psychopathy and intelligence assessments engaged in fewer offenses. In contrast, other studies examining psychopathy among delinquent male youth (ages 13–18) have found that the highest rates of violence were observed among juveniles with psychopathic tendencies and better cognitive skills (Hampton, Drabick, & Steinberg, 2014; Muñoz, Frick, Kimonis, & Aucoin, 2008).

Although much of the CU research involving protective factors focuses on cognitive abilities, there is promising evidence that psychosocial factors may mitigate the effects of CU traits on juvenile offending. Among a sample of male and female juvenile offenders, Salekin, Lee, et al. (2010) tested whether intelligence and motivation to change moderated the association between psychopathy and offending. Results indicated that intelligence did not act as a protective factor against future offending. However, the authors found an interaction between psychopathy and motivation to change. Specifically, individuals elevated on psychopathic traits who were highly motivated to change were less likely to offend, as compared with those low in motivation. The authors suggested that these findings are particularly important for interventions, in that practitioners should target psychosocial factors to change the behavior of offenders who are high in CU traits. The authors also suggested that their results support the premise that risk and protective factors should be considered and incorporated into risk assessments, judicial decision making, and rehabilitation.

Callous-Unemotional Traits Traits and Psychosocial Maturity

One psychosocial factor that may affect the relation between CU traits and offending is psychosocial maturity (PSM). PSM encompasses several aspects of development shown to influence adolescent decision making. PSM, as conceptualized by Steinberg and Cauffman (1996), consists of three components: responsibility, temperance, and perspective. Responsibility pertains to the development of positive self-conceptions during adolescence as well as the capacity for autonomous decision making and self-reliance. Temperance concerns an individual's ability to exhibit self-control, to evaluate a situation prior to acting, and to suppress aggressive tendencies. Finally, perspective comprises whether an adolescent considers a situation in light of its larger social and temporal context (e.g., how a decision might affect others or have consequences for

the future; Cauffman & Steinberg, 2000; Steinberg & Cauffman, 1996).

Although conceptually related to alternative measures of self-control, each component of PSM represents a distinct aspect of developmental growth. Although associated with one another, adolescents reporting strong abilities in one area may not necessarily show the same strengths across the other indicators. For example, Monahan et al. (2013) reported small-moderate correlations among the various components, with coefficients ranging from .09 to .41. A separate analysis used measures of both impulse control and future orientation and found that only future orientation accounted for ages differences in delayed discounting (i.e., a preference for future vs. immediate rewards; Steinberg et al., 2009). Moreover, the three components align well with the definition of self-control presented in Gottfredson and Hirschi's (1990) general theory of crime, which emphasizes aspects of considering one's behavior in the context of the future, exhibiting restraint, responding to conflict nonphysically, and demonstrating concern for others. PSM overlaps with measures of self-control and impulsivity, but serves as a more comprehensive assessment of an adolescent's developmental maturity and ability to make mature decisions (Cauffman & Steinberg, 2000; Ozkan, 2016).

The three components of PSM operate as dispositions that can vary across developmental stages and contexts rather than fixed abilities. Empirical research demonstrates that the components of PSM develop throughout adolescence and into adulthood (Steinberg & Monahan, 2007; Steinberg et al., 2009; Steinberg et al., 2018) and serve as key factors that account for desistance in crime (Monahan et al., 2013). As an adolescent strengthens his ability to quell impulses, to consider the consequences of his actions, and to make decisions autonomously, he becomes less likely to engage in crime.

Prior research has yet to examine whether PSM similarly reduces crime among high CU youth. Interestingly, several aspects of PSM are akin to the protective factors identified in the model of successful and unsuccessful psychopathy (Gao & Raine, 2010). Individuals with psychopathic traits have a deficit in emotional empathy or the ability to experience the pain and emotions of others (Ciucci, Baroncelli, Golmaryami, & Frick, 2015; Frick & Ray, 2014; Skeem et al., 2011). However, as suggested by Gao and Raine (2010), successful psychopaths may possess cognitive empathy, the ability to understand another's perspective without necessarily feeling emotional empathy. Cognitive empathy is

similar to social perspective taking or how much an adolescent is able to take another person's perspective into account (Cauffman & Steinberg, 2000). That is, some youth high in CU traits may have high cognitive empathy but not necessarily emotional empathy, and this ability to take a social perspective may buffer against the behavioral tendencies associated with CU traits. Similarly, temperance, like executive functioning (Gao & Raine, 2010), may help youth inhibit antisocial tendencies by allowing better regulation of behavior and enhanced ability to anticipate negative consequences of behavior.

Current Study

This study examines whether PSM, a protective psychosocial factor, either outweighs or attenuates the negative effect of CU traits on adolescents' antisocial behavior. Employing a large, ethnically diverse sample of male adolescents after their first arrest, we investigated the independent and interactive effects of CU traits and PSM on reoffending. Our first aim was to test the predictive utility of CU traits after accounting for youths' PSM. We hypothesized that both CU traits and PSM would be independently associated with reoffending. Based on past research, we expected that even after accounting for their previous offending, youth with elevated CU traits would offend more than other youth (Frick et al., 2014) and that psychosocially mature youth would offend less than other youth (Cauffman & Steinberg, 2000). Our second aim was to test whether PSM moderated the relation between CU traits and offending. Given the potential moderating effect of psychosocial factors (Gao & Raine, 2010; Salekin, Lee, et al., 2010), the inverse association between PSM and offending (Monahan et al., 2013), and the finding that PSM moderates the effect of other established risk factors (Fine, Wolff, et al., 2017), we expected to find that PSM would reduce the strength of the association between CU traits and offending.

Method

Participants

The sample included 1,216 adolescent offenders from the Crossroads Study, a longitudinal study that follows male youth after their first arrest. Participants were between 13 and 17 years old at the baseline interview ($M = 15.29$). The youth had been arrested for a range of nonfelony offenses, such as

vandalism (17.5%) and theft (16.7%). Youth were sampled from three sites: Philadelphia, Pennsylvania ($N = 533$); Jefferson Parish, Louisiana ($N = 151$); and Orange County, California ($N = 532$) so that results would be more generalizable to the general population of justice-system-involved youth. Of the initial 1,216 youth enrolled in the study, approximately 96% completed the 6-month interview and approximately 94% completed the 12-month interview. The sample was racially and ethnically diverse: Latino/Hispanic (46%), Black/African American (37%), White (15%), and self-identified other race (2%). Approximately 93% of the youth had complete data on all study measures ($N = 1,133$).

Procedures

The institutional review board (IRB) at all three institutions (blinded for review) approved the study procedures. Signed parental consent and youth assent were obtained for all participants before interviews were conducted, and participants were informed of the nature of the study and were told there was no penalty for not participating. Youth completed an interview after the disposition hearing for their first arrest, as well as follow-up interviews approximately 6 and 12 months after their initial interview. Face-to-face interviews with the youth ranged from 2 to 3 hr and were documented using a secure, computer-assisted program. Based on the sensitive nature of the sample, a privacy certificate was obtained from the Department of Justice, which protects participants' privacy by exempting both their identity and responses from subpoenas, court orders, and other types of involuntary disclosures. Participants were given a detailed explanation of the certificate before beginning each interview and were reminded again before sensitive questions, such as those about criminal involvement, were asked.

Measures

CU Traits

At baseline, participants were administered the Inventory of CU (ICU) Traits (Kimonis et al., 2008). The ICU is a 24-item self-report measure used to assess CU traits in children and adolescents. Participants self-rated items (e.g., "I do not care if I get into trouble" or "I try not to hurt others' feelings") on a 4-point Likert scale from 0 (*not at all true*) to 3 (*definitely true*). Positively worded items were

reverse coded to reflect the presence of a CU trait. The ICU total score has been supported in factor analyses conducted with both detained (Kimonis et al., 2008) and community (Essau, Sasagawa, & Frick, 2006) adolescent samples, and is positively correlated with antisocial behavior and negatively correlated with pro-social behavior in samples of community and detained adolescents (Essau et al., 2006; Kimonis et al., 2008). Consistent with prior literature, the ICU demonstrated adequate internal consistency ($\alpha = .76$). Scores on all 24 items were summed to create an additive index ($M = 26.28$, $SD = 8.08$, range = 0–55), with higher scores indicating greater levels of CU traits.

Psychosocial Maturity

PSM consists of three interrelated constructs assessed at baseline: temperance, perspective, and responsibility (Steinberg & Cauffman, 1996). In line with previous research (Dmitrieva, Monahan, Cauffman, & Steinberg, 2012; Fine et al., Fine, Wolff, et al., 2017; Monahan et al., 2013), the three aspects of PSM were assessed using six subscales across four measures: Temperance included measures of impulse control and suppression of aggression; perspective included measures of consideration of others and future orientation; and responsibility included measures of personal responsibility and resistance to peer influence.

The Weinberger Adjustment Inventory (Weinberger & Schwartz, 1990) included three subscales: impulse control (eight items; e.g., “I say the first thing that comes into my mind without thinking enough about it”), suppression of aggression (seven items; e.g., “People who get me angry better watch out”), and consideration of others (seven items; e.g., “Doing things to help other people is more important to me than almost anything else”). Participants assessed how accurately each statement matched their own behavior on a scale from 1 (*false*) to 5 (*true*). The Future Outlook Inventory (Cauffman & Woolard, 1999) was used to assess youths’ future orientation. Participants were asked to rank the degree to which eight statements (e.g., “I will keep working at difficult, boring tasks if I know they will help me get ahead later”) reflected how they usually act on a scale of 1 (*never true*) to 4 (*always true*). The 10-item Resistance to Peer Influence (Steinberg & Monahan, 2007) measure assessed the degree to which adolescents acted autonomously in interactions with their peers. Participants were read two conflicting statements (e.g., “Some people go along with their friends just to keep their friends happy”

and “Other people refuse to go along with what their friends want to do, even though they know it will make their friends unhappy”). They were then asked to choose the statement that most closely reflected their behavior, and then to rate the accuracy of the statement (i.e., “sort of true” or “really true”). Each item was scored on a 4-point scale. Finally, the PSM Inventory (Greenberger, Josselson, Knerr, & Knerr, 1975) included a 30-item, reverse-scored subscale that assessed personal responsibility (e.g., “If something more interesting comes along, I will usually stop any work I’m doing”) on a scale from 1 (*strongly disagree*) to 4 (*strongly agree*).

As with previous research (Dmitrieva et al., 2012; Fine, Wolff, et al., 2017; Monahan et al., 2013), each subscale was first z-scored, and then the z-scores were mean scored to create a composite index of PSM. Higher scores indicate youth are more psychosocially mature ($M = 0.00$, $SD = 0.60$, range = -1.77 to 1.68). Consistent with prior research, the confirmatory factor analysis that evaluated the structural validity of the PSM construct, including both the three-first-order factors (i.e., temperance, responsibility, and perspective) and the global PSM factor, fit the data well, $\chi^2(6) = 24.04$, $p < .001$; comparative fit index = .981, Tucker–Lewis index = .952, root mean square error of approximation = .052 (95% CI [0.031, 0.074]).

Self-Reported Offending

Involvement in criminal behavior was assessed using the Self-Report of Offending scale (Huizinga, Esbensen, & Weiher, 1991). At baseline, participants reported if they had committed 24 different criminal acts (ranging in severity from selling drugs to homicide), each coded no or yes, during the preceding 6 months. A baseline variety score was calculated to indicate the number of different types of crimes the youth had committed in the 6 months preceding their index arrest ($M = 1.51$, $SD = 2.14$, range = 0–17). During each of the two subsequent 6-month recall periods, youth were asked again if they had committed any of the 24 offenses. A reoffending variety score was calculated to assess the variety of offenses committed during the following 12 months ($M = 1.99$, $SD = 2.82$, range = 0–18). Variety scores were also calculated for nonviolent ($M = 1.16$, $SD = 1.98$, range = 0–11) and violent offenses ($M = 0.77$, $SD = 1.04$, range = 0–7). Variety scores are widely preferred in criminological research because they are less subject to recall bias than are self-reports of frequency of antisocial behavior (see Osgood, McMorris, & Potenza, 2002),

Table 1
Zero-Order Correlations Among Main Study Variables

Variable	1	2	3	4	5
1 Age	—				
2 IQ	.06	—			
3 Callous-unemotional traits	-.04	-.07*	—		
4 Psychosocial maturity	.12***	.13***	-.59***	—	
5 Self-reported offending at baseline	.17***	.09*	.36***	-.36***	—
6 Self-reported offending in next year	.02	.01	.31***	-.36***	.57***

* $p < .05$. *** $p < .001$.

they account for heterogeneity in crime types (Sweeten, 2012), and they are highly correlated with measures of both seriousness and frequency of antisocial behavior (see Monahan & Piquero, 2009).

Covariates

At baseline, youth self-reported general demographic information, including their age ($M = 15.31$, $SD = 1.29$) and race. Youth also reported on the highest level of education that their parents had received, which was used as a proxy for SES (Galobardes, Lynch, & Smith, 2007). Prior research supports its validity for use with adolescent samples (Lien, Friestad, & Klepp, 2001). Approximately 29.21% of the participants had at least one parent who had not graduated from high school, 32.22% had at least one parent who had graduated from high school, and 38.57% had at least one parent who earned more than a high school diploma. The Wechsler Abbreviated Scale of Intelligence (Wechsler, 1999) was also administered at baseline, and a full-scale IQ estimate ($M = 88.58$, $SD = 11.71$) was created by combining scores from the verbal ability scale and matrix reasoning. As intelligence is related to youth delinquency (Loeber et al., 2012), IQ was used as a covariate in all analyses.

Analytic Plan

Zero-order correlations were first calculated to examine the associations among the key study variables (Table 1). These were followed by negative binomial regression analyses to determine which independent variables contributed independently to the prediction of reoffending and to test the interaction between CU traits and PSM. Because self-reported offending is an overdispersed dependent variable (i.e., variance of the dependent variable exceeds its mean) with a large number of "0" values and a count variable with a skewed

distribution, negative binomial regression is preferred over ordinary least squares regression (Long, 1997; Long & Freese, 2003). In each analysis, results of likelihood-ratio tests indicated that the negative binomial regression was more appropriate than the traditional Poisson model. Site was used as a covariate because three groups are too few to adequately cluster the data (Maas & Hox, 2005). All models accounted for youth age, IQ, and baseline self-reported offending. Race, parent education, and site were also included as categorical covariates in our analyses. White youth, youth with parents who did not graduate from high school, and youth from California were selected as the reference groups because previous publications (Fine, Mahler, Steinberg, Frick, & Cauffman, 2017; Fine, Wolff, et al., 2017; Simmons, Steinberg, Frick, & Cauffman, 2018) using this dataset also used these groups. For each of these covariates, the results remain consistent if we select one of the other groups as the reference group.

There is some measurement overlap between items on the ICU traits (e.g., "I try not to hurt others' feelings"—reverse coded) and the consideration of others subscale of the PSM scale (e.g., "I try very hard not to hurt other people's feelings"). To ensure the similarity between CU traits and the consideration of others items did not impact the results, a second version of the PSM composite index was created by omitting these items. All models were reanalyzed and the results remained the same. As such, we report the models with the consideration of others items included.

Results

The first negative binomial regression model analyzed whether PSM or CU traits were associated with youth reoffending, after accounting for age, IQ, parental education, site, race, and baseline

Table 2
 Negative Binomial Regression for Predicting Self-Reported Offending in the Following Year

	Model 1			Model 2		
	IRR	SE	95% CI	IRR	SE	95% CI
Race ^a						
Black	0.89	.11	[0.70, 1.14]	0.88	.11	[0.69, 1.12]
Latino	0.89	.10	[0.72, 1.12]	0.89	.10	[0.71, 1.11]
Other	0.82	.20	[0.51, 1.31]	0.81	.19	[0.50, 1.29]
Site ^b						
Louisiana	0.81	.11	[0.62, 1.06]	0.82	.11	[0.63, 1.07]
Pennsylvania	0.92	.09	[0.76, 1.12]	0.93	.09	[0.77, 1.13]
Parental Education ^c						
High school graduate	0.99	.09	[0.82, 1.19]	1.01	.10	[0.84, 1.21]
More than high school education	1.06	.10	[0.87, 1.28]	1.07	.10	[0.88, 1.29]
Age	1.01	.03	[0.95, 1.07]	1.01	.03	[0.96, 1.07]
IQ	1.00	.00	[0.99, 1.01]	1.00	.00	[0.99, 1.01]
Baseline offending	1.18***	.02	[1.14, 1.22]	1.18***	.02	[1.14, 1.22]
CU traits	1.04***	.01	[1.03, 1.05]	1.04***	.01	[1.03, 1.05]
Psychosocial maturity (PSM)	0.75***	.03	[0.64, 0.88]	0.75***	.06	[0.64, 0.88]
CU Traits × PSM				1.02***	.01	[1.01, 1.04]
LR χ^2		329.15***			340.9***	
R^2_{Pseudo}		.08			.08	

Note. IRR = incidence-rate ratios; CU = callous-unemotional.

^aComparison group is White. ^bComparison group is California. ^cComparison group is "did not graduate from high school."

* $p < .05$. ** $p < .01$. *** $p < .001$.

self-reported offending (Table 2, Model 1). As hypothesized, higher CU traits were associated with more overall offending (incidence-rate ratio [IRR] = 1.04, $SE = .01$, 95% CI [1.03, 1.05], $p < .001$), whereas higher PSM was associated with less offending (IRR = 0.75, $SE = .03$, 95% CI [0.64, 0.88], $p < .001$). The interaction between CU traits and PSM was added in the second model (Table 2, Model 2). Results indicated that the interaction was significant (Figure 1; IRR = 1.02, $SE = .01$, 95% CI [1.01, 1.04], $p = .001$). Post hoc simple slopes analyses indicate that the slope for youth with high (+1 SD) CU traits was not significantly different from zero ($p = .31$). The slope for those with mean level of CU traits was significantly different from zero ($dydx = -.58$, $SE = .17$, CI [-0.90, -0.25], $p = .001$), as was the slope for those low (-1 SD) in CU traits ($dydx = -.72$, $SE = .19$, CI [-1.08, -0.35], $p = .001$). In other words, a one-unit increase in PSM was associated with a 0.58 unit decrease in offending for youth with average CU traits and a 0.72 unit decrease in offending for youth with low CU traits but no change in offending for those with high CU traits.

To examine whether the interaction between CU traits and PSM varied across self-reported offending type, we fit two additional models using nonviolent

(Table 3, Model 3) and violent offending (Table 3, Model 4) as outcomes. For nonviolent offending, results indicated that the interaction was significant (Figure 2; IRR = 1.03, $SE = .01$, 95% CI [1.02, 1.06], $p = .001$). Post hoc simple slopes analyses indicate that the slope for youth with high (+1 SD) CU traits was not significantly different from zero ($p = .90$). The slope for those with mean level of CU traits was significantly different from zero ($dydx = -.39$, $SE = .14$, CI [-0.67, -0.11], $p = .006$), as was the slope for those low (-1 SD) in CU traits ($dydx = -.54$, $SE = .17$, CI [-0.86, -0.21], $p = .001$). A one-unit increase in PSM was associated with a 0.39 unit decrease in offending for youth with average CU traits and a 0.54 unit decrease in offending for youth with low CU traits but no change in offending for those with high CU traits.

For violent offending, results indicated that the interaction was significant (Figure 3; IRR = 1.01, $SE = .01$, CI [1.00, 1.03], $p = .039$). Post hoc simple slopes analyses indicate that the slope for youth with high (+1 SD) CU traits was not significantly different from zero ($p = .09$). The slope for those with mean level of CU traits was also significantly different from zero ($dydx = -.20$, $SE = .06$, CI [-0.32, -0.08], $p = .002$), as was the slope for those low (-1 SD) in CU traits ($dydx = -.22$, $SE = .07$, CI

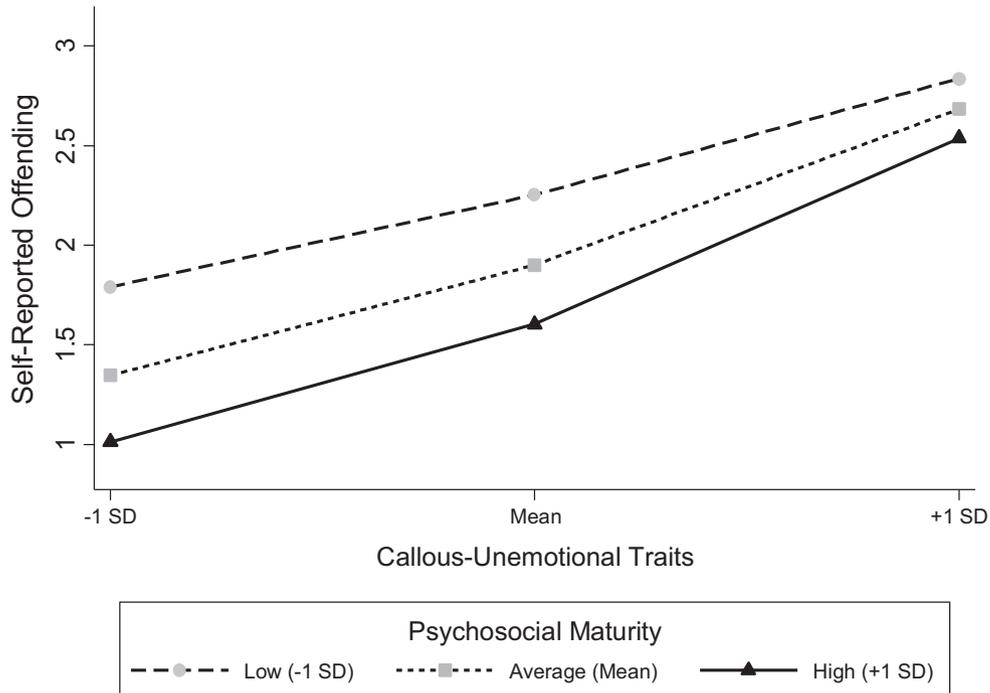


Figure 1. Interaction of callous-unemotional traits and psychosocial maturity predicting self-reported offending in the year following a first arrest.

Table 3
Negative Binomial Regression for Predicting Self-Reported Nonviolent and Violent Offending in the Following Year

	Model 3			Model 4		
	IRR	SE	95% CI	IRR	SE	95% CI
Race ^a						
Black	0.69*	.11	[0.51, 0.94]	1.19	.15	[0.93, 1.51]
Latino	0.75*	.11	[0.56, 1.00]	1.15	.13	[0.91, 1.44]
Other	0.56	.18	[0.29, 1.05]	1.28	.30	[0.81, 2.02]
Site ^b						
Louisiana	0.61**	.11	[0.43, 0.87]	1.15	.15	[0.90, 1.49]
Pennsylvania	0.83	.11	[0.64, 1.07]	1.07	.11	[0.88, 1.30]
Parental education ^c						
High school graduate	1.03	.13	[0.80, 1.31]	0.98	.09	[0.82, 1.18]
More than high school education	1.09	.14	[0.84, 1.39]	0.98	.09	[0.82, 1.17]
Age	1.09*	.04	[1.00, 1.17]	0.93**	.03	[0.88, 0.98]
IQ	1.00	.00	[0.99, 1.01]	1.00	.00	[0.99, 1.01]
Baseline offending	1.22***	.03	[1.16, 1.27]	1.11***	.01	[1.09, 1.14]
CU traits	1.06***	.01	[1.04, 1.07]	1.04***	.01	[1.02, 1.05]
Psychosocial maturity (PSM)	0.73**	.08	[0.60, 0.90]	0.77***	.06	[0.66, 0.90]
CU Traits × PSM	1.04***	.01	[1.02, 1.06]	1.01*	.01	[1.00, 1.03]
LR χ^2		288.72***			237.79***	
R ² _{Pseudo}		.09			.09	

Note. IRR = incidence-rate ratios; CU = callous-unemotional.
^aComparison group is White. ^bComparison group is California. ^cComparison group is “did not graduate from high school.”
 * $p < .05$. ** $p < .01$. *** $p < .001$.

[−0.35, −0.09], $p = .001$). A one-unit increase in PSM was associated with a 0.20 unit decrease in offending for youth with average CU traits and a

0.22 unit decrease in offending for youth with low CU traits but no change in offending for those with high CU traits.

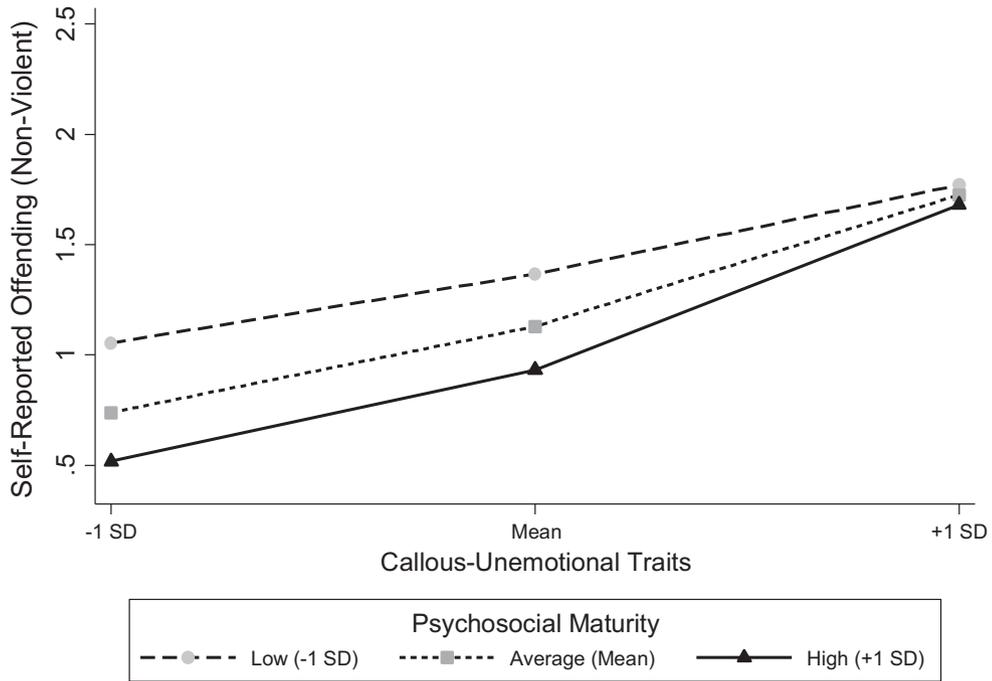


Figure 2. Interaction of callous-unemotional traits and psychosocial maturity predicting nonviolent offending in the year following a first arrest.

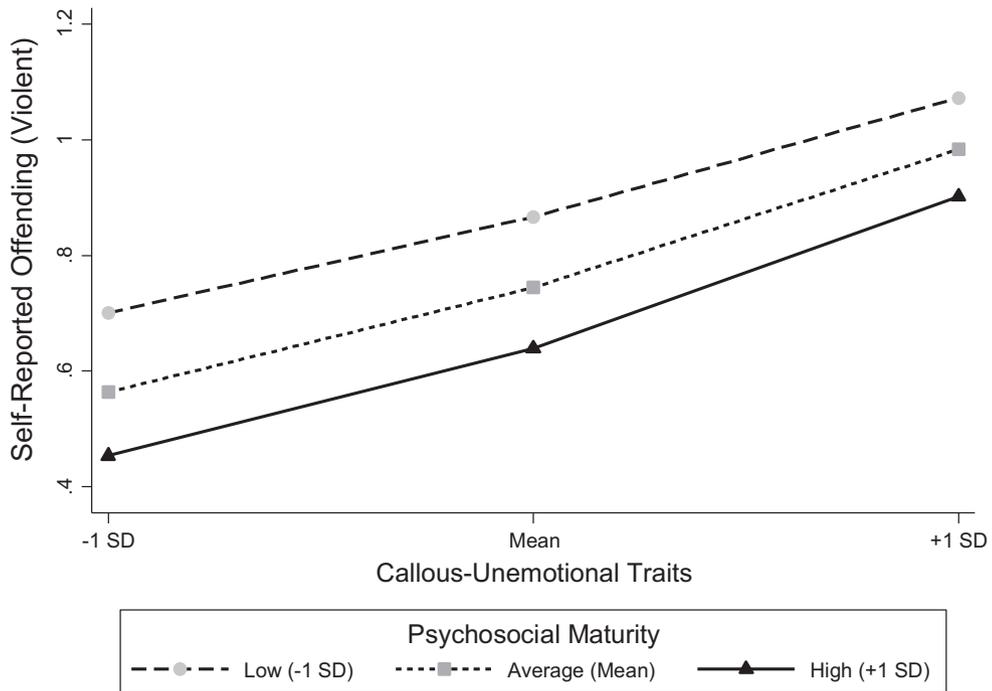


Figure 3. Interaction of callous-unemotional traits and psychosocial maturity predicting violent offending in the year following a first arrest.

As a check for robustness, we fit supplementary models using a dichotomous CU group variable and the same set of covariates. Based on prior

literature (Frick et al., 2003; Kimonis, Centifanti, Allen, & Frick, 2014), the sample was separated using a quartile split to identify low CU youth

($N = 898$; $M_{\text{additive}} < 32$) and high CU youth ($N = 318$; $M_{\text{additive}} \geq 32$). Consistent with the previous analyses, results indicated that CU group (IRR = 1.46, $SE = .12$, 95% CI [1.23, 1.72], $p < .001$) and PSM (IRR = 0.64, $SE = .05$, 95% CI [0.55, 0.74], $p < .001$) were independently associated with overall offending. That is, youth with high CU traits or low PSM engaged in more crime over the following year. Results indicated that the interaction was significant (IRR = 1.72, $SE = .28$, 95% CI [1.25, 2.35], $p = .001$). Among youth with low CU traits, the slope was significantly different from zero ($dy/dx = -1.16$, $SE = .22$, 95% CI [-1.58, -0.73], $p < .001$). That is, among low CU youth, a one-unit increase in psychosocial maturity was associated with a 1.16 unit decrease in reoffending. Among high CU youth, the slope was not significantly different from zero ($p = .75$).

Supplementary models were also fit to test whether the interaction of between the dichotomous CU group variable and PSM varied across nonviolent and violent offending. Results indicated that the interaction was significant for both nonviolent (IRR = 2.04, $SE = .43$, CI [1.35, 3.08], $p = .001$) and violent offending (IRR = 1.40, $SE = .21$, CI [1.05, 1.87], $p = .02$). Among youth with low CU traits, the slope was significantly different from zero for nonviolent ($dy/dx = -.86$, $SE = .20$, CI [-1.25, -0.46], $p < .001$) and violent offending ($dy/dx = -.37$, $SE = .07$, 95% CI [-0.51, -0.22], $p < .001$). That is, among low CU youth, a one-unit increase in psychosocial maturity was associated with a 0.86 unit decrease in nonviolent offending and a 0.36 unit decrease in violent offending. Among high CU youth, the slope was not significantly different from zero for nonviolent ($p = .84$) or violent offending ($p = .19$). Youth high in CU traits engaged in the same amount of crime regardless of their level of PSM.

Discussion

Using longitudinal data from a large sample of justice-system-involved youth, this study examined CU traits and PSM together to determine whether these factors were uniquely or interactively associated with self-reported offending, even after accounting for prior offending. Our results indicate that youth high in CU traits engage in more offending 1 year following their first arrest than their low CU counterparts. We also found that PSM is associated with less offending. These findings are consistent with previous research that shows youth with

elevated CU traits show more delinquent behavior than their low CU counterparts (Frick et al., 2014), that CU traits predict future offending after controlling for additional risk factors (Kahn et al., 2013), and that those high in PSM are less likely to be delinquent (Cauffman & Steinberg, 2000).

Given the potential protective effect of psychosocial factors (Gao & Raine, 2010; Salekin, Lee, et al., 2010) and evidence that youth with higher levels of PSM engage in less delinquent behavior (Monahan, Steinberg, Cauffman, & Mulvey, 2009; Monahan et al., 2013), we posited that PSM would be negatively associated with delinquency for all youth regardless of their CU traits. However, this was not supported by our results. Among youth with low or average CU traits, youth who are more psychosocially mature offended less during the subsequent year than those with lower levels of PSM. However, PSM was not associated with offending among high CU youth. That is, youth high in CU traits engaged in the same amount of offending during the subsequent year regardless of their level of PSM.

This study's results align with empirical research detailing the distinct psychological, behavioral, and psychophysiological profiles of antisocial youth with and without CU traits (see Frick et al., 2014 for a review). The notion that normative psychosocial maturation over the course of adolescence (Monahan et al., 2013) leads to a decline in offending may not apply to youth who are high in CU traits. Offending among youth with high CU traits may be less affected by psychosocial maturation deficits (e.g., low self-control) and more affected by deficits in empathy (Pardini & Byrd, 2012) or impaired emotion reactivity and recognition (Loney, Frick, Clements, Ellis, & Kerlin, 2003). The fact that PSM operates differently among youth with high CU traits carries implications for the effectiveness of interventions targeting aspects of psychosocial maturation to reduce crime (Piquero, Jennings, Farrington, Diamond, & Gonzalez, 2016). To reduce delinquency among youth high in CU traits, targeting PSM may be less effective than reducing their CU traits or finding ways to motivate them to act in ways that they do not hurt others (Frick, 2012; Hawes, Price, & Dadds, 2014). However, targeting PSM may be an effective strategy among youth with low-to-moderate levels of CU traits.

This study has several strengths. CU traits and justice system contact are two major risk factors for continued criminal offending. Therefore, justice-involved youth represents a uniquely vulnerable group of adolescents, and this study examines

whether PSM may reduce offending among this high-risk sample. The longitudinal design of our study is an additional strength, because it allowed us to make stronger inferences about the predictive utility of CU traits and PSM above and beyond the effects of prior delinquent behavior. Last, our study benefited from the ability to test our hypotheses in a large, racially and ethnically diverse sample of juvenile offenders.

Despite these strengths, there are several limitations that must be acknowledged. First, our sample included only male youth. Female adolescents tend to exhibit fewer delinquent behaviors than male ones (Cauffman, Fine, Thomas, & Monahan, 2017; Sickmund & Puzanchera, 2014), lower levels of CU traits (Essau et al., 2006; Kimonis et al., 2008), and higher levels of PSM (Cauffman & Steinberg, 2000; Williams & Steinberg, 2011). There is evidence that PSM operates in the same manner for both boys and girls across domains, including deviant behaviors (Ozkan & Worrall, 2017). For example, the development of impulse control, a component of PSM, over adolescence is associated with a decline in violent offending among boys and girls (Cauffman et al., 2017). However, the behavioral problems associated with CU traits are sometimes inconsistent between boys and girls (Essau et al., 2006; Hillege, Das, & de Ruiter, 2010; Kimonis et al., 2008; Sevecke, Kosson, & Krischer, 2009). As such, we do not know whether the pattern of findings observed in this study would be observed among girls. Additional research employing samples of male and female youth would help us better understand the implications of CU traits and PSM for juvenile delinquency. Second, our sample consisted of first-time offenders who were arrested and charged for relatively minor crimes. Although the average ICU scores in the current sample were consistent with previous studies of serious delinquent offenders and justice-system-involved youth (Docherty, Boxer, Huesmann, O'Brien, & Bushman, 2016; Feilhauer, Cima, & Arntz, 2012), future research should test the generalizability of our findings to groups of juvenile offenders accused of committing more severe offenses. Third, our participants self-reported on all main variables, increasing the risk of inflated associations and potentially biased measurements. In addition, self-reports of offending are subject to memory biases and influenced by a participant's openness about his behavior (Barry, Golmaryami, Rivera-Hudson, & Frick, 2013). Additionally, there are concerns regarding dishonest responses among individuals with elevated CU traits (Kahn et al., 2013; Lilienfeld, Fowler, & Patrick, 2006). Yet, self-

reported offending is still considered a more sensitive assessment of youths' true behavior because adolescents are aware of their illegal behavior that may go undetected by justice system officials (Maxfield, Weiler, & Widom, 2000). We believe it is important for researchers to conduct multimethod or multi-informant studies to determine whether the current findings are replicable.

Despite these limitations, this study makes a critical contribution to the literature by highlighting the differential impact of psychosocial maturation on crime involvement among youth with different degrees of CU traits. These findings have important implications for the juvenile justice system. Unlike the adult criminal system, the foremost goal of the juvenile justice system is to rehabilitate juvenile offenders and deter them from reentering the system (Mears, Hay, Gertz, & Mancini, 2007; Scott & Steinberg, 2010). Unfortunately, prevention programs and rehabilitation efforts have found only minor success in doing so (Lipsey & Cullen, 2007). Because rehabilitative treatments may have larger effects if they address an individual's specific criminogenic needs (Andrews et al., 1990; Lipsey & Cullen, 2007), justice officials should consider screening juveniles for CU traits to identify who would respond to the treatments typically administered in juvenile justice settings. Youth with low levels of CU traits may benefit from interventions that target aspects of PSM. In contrast, the same practices may be ineffective for high CU youth (Frick et al., 2014; Salekin, Worley, & Grimes, 2010). Instead, interventions that target the emotional, cognitive, and motivational characteristics underlying the behavior of high CU youth (e.g., reward dominance and lack of empathy) may be more successful at preventing reoffending (Caldwell, Skeem, Salekin, & Van Rybroek, 2006; Frick, 2012; Hawes et al., 2014). Through conducting comprehensive risk evaluations and enrolling juvenile offenders in interventions that are tailored to their needs, justice system officials may be more effective in reducing recidivism rates and continued justice system involvement.

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