

Do callous–unemotional traits moderate the effects of the juvenile justice system on later offending behavior?

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Background: Research suggests that callous–unemotional (CU) traits, a recent addition to psychiatric classification of serious conduct problems, may moderate the influence of a number of contextual factors (e.g., parenting, deviant peer influence) on an adolescent's adjustment. The current study sought to replicate past research showing that formal processing through the juvenile justice system increases recidivism and tested the novel hypothesis that CU traits would moderate the relationship between processing decision and future antisocial behavior. **Methods:** A diverse sample of first-time male offenders ($N = 1,216$; M age = 15.12, $SD = 1.29$) in three regions of the United States was assessed within 6 weeks of their first arrest and then at 6-month intervals for 36 months. **Results:** Compared to those who were informally processed (i.e., diverted), adolescents formally processed through the court were at a higher risk of self-reported offending and rearrests as measured by official records, after controlling for preexisting risk factors. However, baseline CU traits moderated this association such that those with high CU traits reported offending at high rates across the subsequent three years regardless of how the juvenile justice system processed their case. **Conclusions:** CU traits are important to psychiatric classification for designating a subgroup of antisocial youth who may respond differently to contextual influences, including being less susceptible to the negative effects of juvenile justice system involvement. The public health significance of this moderation is significant by suggesting that previous estimates of the harmful impact of formal processing by the juvenile justice system may underestimate its impact, given that the majority of arrested adolescents have normative levels of CU traits. **Keywords:** Callous–unemotional (CU) traits; treatment; juvenile justice system; formal processing; recidivism.

Introduction

In the most recent revision of the classification systems for psychiatric disorders, the Diagnostic Statistical Manual of Mental Disorders (DSM-5; APA, 2013) and the International Classification of Diseases (ICD-11; Reed et al., 2019), a new specifier was included within the diagnoses of Conduct Disorder in the DSM-5 and Conduct Dissocial-Disorder and Oppositional Defiant Disorder in the ICD-11 to designate those youth with elevated callous–unemotional (CU) traits, called 'with Limited Prosocial Emotions' (Reed et al., 2019). CU traits are defined by limited guilt and empathic concern, constricted displays of emotion, and reduced concern over performance in important activities (Frick et al., 2014). CU traits are found in 25%–30% of adolescents with serious conduct problems (Kahn et al., 2013), and these adolescents display more persistent and severe aggression and violent offending, use aggression for personal gain, engage in behavior that causes more harm toward others, and display conduct problems

that are more stable (see Frick, et al., 2014 for review).

Another important finding from this research is that people with CU traits appear to show a reduced level of emotional reactivity to certain types of stimuli, including a reduced sensitivity to others distress and to punishment cues under certain conditions (see Blair et al., 2014; Frick et al., 2014). These temperamental differences have been used to explain why children and adolescents with elevated CU traits, while responsive to some mental treatments, still often leave treatment with severe behavior problems (Hawes et al., 2014). In addition, these differences may also make youth with CU traits less affected by certain negative contextual factors, such as being less influenced by deviant peers (Kerr et al., 2012). The potential differences in the responsiveness to environmental risk by adolescents with and without CU traits could have important public health implications. That is, if youth with elevated CU traits are included in estimates of risk, the level of risk may be underestimated for the majority youth who do not show elevations on these traits.

Conflict of interest statement: No conflicts declared.

One area in which the importance of CU traits as a moderator of risk may be particularly important is in studying the effects of juvenile justice involvement on adolescent development. Despite the juvenile justice system originally being established as a place to rehabilitate children and adolescents who have committed crimes, a significant body of research suggests greater involvement with the justice system has harmful effects and actually increases the risk for later antisocial behavior (Dishion et al., 2001; Loughran et al., 2009; Pettitclerc et al., 2013). Several theories attempt to explain this finding. First, justice system involvement increases contact with other youth who may encourage continued antisocial behavior through modeling and reinforcement (Dishion et al., 2001; Thornberry et al., 1993). Second, society's reaction to criminal behavior influences identity development such that once society labels the individual as a criminal, they take on that persona and behave in criminal ways (Matsueda, 1992). Lastly, involvement in the juvenile justice system can expose the adolescent to violence, either by being targeted or witnessing violence (Beck & Rantala, 2016). Given exposure to trauma has been linked to increased antisocial behavior (Vidal et al., 2017), it is possible exposure to violence within the juvenile justice system may contribute to increased offending.

These potential explanations for the iatrogenic effects of juvenile justice involvement highlight why this may be an important area to study the moderating influence of CU traits. First, if one of the mechanisms through which juvenile justice system contact increases recidivism is by enhancing exposure to delinquent peers, those with elevated CU traits may be less influenced by this exposure because they seem to be less susceptible to deviant peer influence (Kerr et al., 2012). Second, CU traits are, in part, defined by limited concern about others' opinion and evaluation (Frick et al., 2014). As a result, effects of being labeled delinquent may be less likely to be internalized by an adolescent high on CU traits and, thus, may be less likely to influence their future antisocial behavior. Third, the reduced emotional reactivity associated with CU traits, relative to other youth with serious conduct problems, may lead to less extreme responses to many adverse experiences (Ebner & Singewald, 2017).

Current study

Based on this research, the purpose of the current study is twofold. First, we sought to replicate previous work by testing the prediction that youth processed formally (i.e., through the court) by the juvenile justice system would be more likely to show later antisocial behavior over a 36-month follow-up period, after controlling for preexisting characteristics that could lead to both greater involvement with the justice system and an increase in their risk for

later offending. Importantly, we tested this prediction in a sample of adolescents arrested for the first time for low to moderately severe offenses, to increase variability in decisions to formally or informally process the adolescent within a limited range of offense severity. Second, we tested whether CU traits moderated the effect of the juvenile system involvement on later antisocial behavior. That is, we predicted that adolescents with high CU traits would engage in high levels of antisocial behavior irrespective of their juvenile system involvement (i.e., formal vs. informal), but that those low on CU traits would show increased antisocial behavior when they were formally processed.

Method

Participants

Participants were 1,216 male first-time adolescent offenders from three distinct regions of the United States. Participants were eligible for the study if they were English speakers, were arrested for an eligible offense of low to moderate severity, and were between the ages of 13 and 17 years old at the time of their first arrest. The recruited sample was limited to first-time offenders with offenses of mild to moderate severity (e.g., theft of goods, simple battery, vandalism) to limit large differences in severity between those who were formally and informally processed (e.g., murder versus drug possession). That is, each participating site recruited participants with first offenses that were associated with between a 35%–65% chance of being formally (vs. informally) processed over the five years prior to the study onset, based on a review of official records. As a result, this design partially controlled for severity of offense, while still ensuring substantial variability in the types of processing decisions made (i.e., our key predictor). Additional sample characteristics are reported in Table 1.

Procedures

The Institutional Review Board at all institutions approved the study procedures. Parental informed consent and youth assent were obtained at the time of assessment, until the participant turned 18 at which point consent was received from the participant. Participants were informed that participation was voluntary, would not influence their relationship with the justice system, they were able to withdraw from the study at any time without penalty, and their data were protected from being subpoenaed for use in court by a Privacy Certificate. Youth completed the baseline assessment within six weeks of the disposition date for their first arrest. They were then reassessed every six months for 36 months. Across all three sites, 72.32% of individuals eligible to participate enrolled in the study. Retention rates ranged from 95.48% at the 6-month follow-up to 91.34% at the 36-month follow-up with an average retention rate of 93.38% across the 6 follow-up points. Additional study procedures and sample characteristics have been published previously (Ray et al., 2017).

Measures – baseline predictors

Juvenile justice system processing. Official court records were used to categorize the youth into two groups based on how they were processed by the justice system after their first arrest. Formally processed youth ($n = 473$; 38.9%) were youth whose cases were petitioned and appeared before a

judge, and they received court-ordered probation or were adjudicated through the court. In contrast, informally processed youth ($n = 743$; 61.1%) were diverted from court and were handled only by a probation department or other designated agency (e.g., Families in Need of Services; mental health agency). Processing decision was dichotomously coded such that informal processing was coded as 0 and formal processing was coded as 1.

Measures – outcome variables

Self-report offending. Offending was measured at each follow-up point using the 24-item revised version of the Self-Report of Offending Scale (SRO) that assesses drug and property offenses, as well as crimes against persons (SRO; Huizinga et al., 1991). Scores on this scale have been correlated with aggression and official records of arrests across diverse samples (Thornberry & Krohn, 2000). Participants were asked (yes = 1 or no = 0) if, in the last 6 months since the last assessment, they engaged in each crime, and if yes, how many times. The SRO variety score was calculated to evaluate the number of different crimes endorsed over each assessment period. Higher scores represent a greater variety of crimes committed and are correlated with measures of seriousness and frequency of antisocial behavior (Monahan & Piquero, 2009). The stability of the variety score from the 6-month to the 36-month follow-up was significant ($r = .33$; $p < .001$). The internal consistency of scores ranged from $\alpha = .81$ –.83.

Arrests. Data from participants' official records of juvenile and adult arrests were obtained during the 36-month follow-up periods within the jurisdictions in which the participant was initially arrested. Only new charges during the follow-up periods were included. Over the 36-month period, 40.8% ($n = 496$) were arrested for any offense, with 24.7% arrested for a violent crime. Among the entire sample, 19.4% were arrested once, 10.7% were arrested twice, 5.8% were arrested three times, and 4.9% were arrested four or more times. The most common offenses participants were arrested for included drug-related crimes (31.7%), theft (18.1%), and burglary (11.8%). The arrest outcome variable included the total number of arrests across the 36 months.

Measures – moderating variable

Callous-unemotional traits. CU traits were assessed at baseline using the self-report Inventory of Callous-Unemotional traits (ICU; Kimonis et al., 2008), a 24-item instrument that has been associated with antisocial behavior (positively) and empathy (negatively) across a range of adolescent samples (Cardinale & Marsh, 2017). The internal consistency was acceptable at baseline (Cronbach's $\alpha = .76$).

Measures – baseline control variables

Participants self-reported their age and race/ethnicity. Race/ethnicity was coded such that the African-American variable was coded as 1 if they self-reported this ethnicity and 0 if not. The Latino race variable was coded the same way. Socioeconomic status was measured by youth reporting the highest level of education either parent obtained at baseline, with those with no high school diploma coded as 1 ($n = 314$), a high school diploma was coded as 2 ($n = 405$), and greater than a high school diploma coded as 3 ($n = 447$). Intelligence was measured at baseline using the matrix reasoning and vocabulary sub-tests of the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999). Self-reported offending prior to first official arrest was assessed at baseline using the SRO and asked if they *ever* in their life engaged in each crime

(Cronbach's $\alpha = .76$). Impulse control was assessed at baseline using the 8-item self-report Impulse Control subscale of the Weinberger Adjustment Inventory (Weinberger & Schwartz, 1990; Cronbach's $\alpha = .73$). Peer delinquency was assessed via self-report using the 13-item Peer Delinquency Scale (PDS) which asks how many of their friends have engaged in delinquent acts, such as carrying a gun (Thornberry et al., 1994; Cronbach's $\alpha = .93$). Parental supervision was measured at baseline using the Parental Monitoring Inventory (PMI; Steinberg et al., 1992) which is a self-youth assessment of how much their caregiver tried to know and actually knows about domains of the adolescent's life and how often they required various forms of curfew (Cronbach's $\alpha = .78$). Youth reported on the neighborhood disorder around their home at baseline using 21-items to assess physical and social disorder of the neighborhood (Cronbach's $\alpha = .94$; Sampson & Raudenbush, 1999).

Analytic plan

Multiple imputation was conducted in SPSS 25 (IBM, Armonk, NY, USA), with regression-based imputation, using twenty imputations, allowing us to retain participants with missing data in all models. All variables, including covariates, were used for the imputation. Nine variables had no missing data, and ten variables had some missing data. The per cent of missing data across these variables ranged from 9.3% for self-reported offending at 36 months to .001% for IQ. Among all participants ($N = 1,216$), 25.08% ($n = 305$) had some missing data which led to 2.9% of all values being imputed.

First, an unconditional growth model was estimated to evaluate the average pattern of change in offending across the follow-up points in the entire sample. Next, a series of conditional growth curve models (offending) and negative binomial regressions (arrests) were estimated to evaluate our two study hypotheses. To test the first hypothesis that adolescents who were formally processed upon first arrest would engage in more offending, a growth curve model was estimated to evaluate the influence of processing decision as a time-invariant predictor of delinquency across time, accounting for all baseline time-invariant covariates. Next, a negative binomial regression was conducted with processing decision at baseline as a predictor of total arrests across the 36-month period, accounting for all baseline covariates. This method of analyzing arrests was chosen due to the low base rate of arrests at any single time point, which prevented use of growth curve models. To test the second hypothesis, these analyses were repeated and included baseline CU traits and the interaction between CU traits and processing decision in the prediction of both offending and arrests. The growth curve models and the negative binomial regressions were conducted within *Mplus* 8 using the imputed data set.

Results

Preliminary analyses

Correlations among the study variables are reported in Table 1. An unconditional growth model was estimated to assess the average pattern of change in offending in the sample. Overall, the level of offending decreased over time ($-.17$) supporting previous research showing, on average, adolescents desist from crime over time. The correlation between the slope and intercept was not significant, which suggests change in offending was not dependent on the starting level ($B = -.04$, $SE = .021$, $p = .055$). This model also demonstrated significant variability

Table 1 Zero-order correlations among demographic variables and main study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	-													
2. IQ	.06	-												
3. Black	-.09**	-.14**	-											
4. Hispanic	.03	-.07	-.70**	-										
5. Peer Delinquency	.16**	-.01	-.08*	.03	-									
6. Impulse Control	-.01	.02	.10**	-.05	-.33**	-								
7. Parental Monitoring	-.13**	.03	.06	-.07	-.33**	.22**	-							
8. Parental Education	.08*	.21**	.15**	-.34**	.03	-.04	.04	-						
9. Neighborhood Dysfunction	.01	-.11**	.18**	-.05	.39**	-.19**	-.09*	-.07	-					
10. Processing Decision	.02	-.051	-.13**	.17**	.06	-.02	.03	-.07	-.03	-				
11. CU Traits	-.02	-.07	-.08*	.11**	.35**	-.34**	-.24**	-.05	.17**	.06	-			
12. Offending - Baseline	.20**	.08*	-.10**	.05	.69**	-.33**	-.29**	.08*	.29**	.35**	.08*	-		
13. Offending - 6 Months	.04	.02	-.09*	.07	.47**	-.22**	-.20**	.02	.19**	.06	.34**	.56**	-	
14. Offending - 12 Months	.01	.01	-.07	.04	.39**	-.17**	-.12**	.01	.16**	.08*	.29**	.46**	.59**	-
15. Offending - 18 Months	-.03	.00	-.07	.08*	.26**	-.12**	-.13**	-.01	.10*	.06	.19**	.31**	.42**	.61**
16. Offending - 24 Months	-.01	.01	-.08*	.06	.27**	-.12**	-.10**	.02	.10*	.11*	.20**	.33**	.42**	.53**
17. Offending - 30 Months	-.01	.02	-.07	.06	.24**	-.15**	-.12**	.02	.07	.07	.21**	.28**	.36**	.47**
18. Offending - 36 Months	-.01	.03	-.07	.03	.22**	-.08**	-.08*	.03	.07	.07	.15**	.27**	.32**	.39**
19. Total Arrests	-.02	-.12**	.02	.05	.15**	-.10**	-.14**	-.10**	.06	.12**	.17**	.15**	.19**	.18**
Mean	15.29	88.43	-	-	1.74	3.25	3.16	-	2.07	-	26.28	3.43	1.43	1.25
Standard Deviation	1.29	11.56	-	-	.67	.86	.66	-	.68	-	8.08	3.10	2.25	2.18
Percentage	-	-	36.9%	45.8%	-	-	-	25.9% ^a	-	38.9%	-	-	-	-

	15	16	17	18	19
1. Age					
2. IQ					
3. Black					
4. Hispanic					
5. Peer Delinquency					
6. Impulse Control					
7. Parental Monitoring					
8. Parental Education					
9. Neighborhood Dysfunction					
10. Processing Decision					
11. CU Traits					
12. Offending-Baseline					
13. Offending-6 Months					
14. Offending-12 Months					
15. Offending-18 Months					
16. Offending-24 Months					
17. Offending-30 Months					
18. Offending-36 Months					
Mean					
Standard Deviation					
Percentage					
15. Age					
16. IQ					
17. Black					
18. Hispanic					
19. Peer Delinquency					
20. Impulse Control					
21. Parental Monitoring					
22. Parental Education					
23. Neighborhood Dysfunction					
24. Processing Decision					
25. CU Traits					
26. Offending-Baseline					
27. Offending-6 Months					
28. Offending-12 Months					
29. Offending-18 Months					
30. Offending-24 Months					
31. Offending-30 Months					
32. Offending-36 Months					
33. Total Arrests					
34. Mean					
35. Standard Deviation					
36. Percentage					

(continued)

Table 1 (continued)

	15	16	17	18	19
19. Total Arrests	.23**	.22**	.17**	.17**	-
Mean	1.05	.98	.95	.86	.84
Standard Deviation	1.93	1.90	1.92	1.76	1.39
Percentage	-	-	-	-	40.8% ^b

Black and Hispanic were coded 1 for endorsing the race/ethnicity and 0 for all other individuals. Processing Decision coded 1 for formal processing and 0 for informal processing.

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

^aPercentage of adolescents whose parents did not have a high school diploma.

^bPercentage of adolescents who had at least one rearrest during the 36-month assessment period.

in both the intercept ($B = 1.61, SE = .107, p < .001$) and slope ($B = .052, SE = .006, p = .001$), supporting the subsequent conditional models. Additional details regarding these preliminary analyses are reported in Appendix S1.

Tests of main study hypotheses

To test whether processing decision predicted offending over the follow-up period, a conditional growth model was estimated with processing decision as the predictor. Replicating previous work, there was a conditional effect of processing decision on the intercept, such that formally processed adolescents reported significantly more offending over the first 6-month assessment period than informally adolescents ($B = .265, SE = .092, p = .004$). However, processing decision did not predict change in offending after this point (i.e., slope), such that the rate of change over time was not different between the two processing groups ($B = .028, SE = .023, p = .224$). When these models were repeated, but including covariates, the main effect of processing decision on the intercept ($B = .129, SE = .076, p = .088$) and slope ($B = .04, SE = .23, p = .09$) was both nonsignificant. Next, a negative binomial regression was used to evaluate whether processing decision predicted the total number of arrests across the 36 months. Similarly, there was a conditional effect of processing decision on the number of rearrests across the 36 months, such that formally processed adolescents were rearrested more frequently than informally processed adolescents ($B = .385, SE = .094, p < .001$), and this main effect of processing decision remained even when accounting for covariates ($B = .377, SE = .093, p < .001$).

These analyses were then repeated, but also included CU traits and the interaction between CU traits and processing decision in the models (Table 2). Formal processing positively predicted the offending intercept (i.e., 6-month time point) but not the rate of change in offending over time (i.e., slope). CU traits also positively predicted the offending intercept, as well as the rate of change in offending over time, such that those with high CU traits desisted from crime more slowly over time. The conditional effects of both CU traits and processing decision were modified by a significant interaction in the prediction of the intercept of offending. In the negative binomial regression analyses (Table 3), processing decision also continued to positively predict the number of rearrests, such that formally processed adolescents were arrested more frequently over the follow-up period. Further, this main effect was modified by a significant interaction between CU traits and processing decision in the prediction of total frequency of rearrests.

We explored the significant interactions between CU traits and processing decision in the prediction of self-reported offending in several ways. First, a negative

Table 2 Growth curve model testing the prediction of offending by processing decision, callous–unemotional traits, and their interaction accounting for baseline covariates

	Coefficient	SE	95% CI	p Value	N
Intercept					1,216
Processing Decision	.161	.077	.010 to .311	.037	
CU Traits	.041	.006	.029 to .053	.001	
Processing Decision*CU Traits	-.02	.010	-.039 to -.001	.042	
Baseline SR Offending	.136	.015	.107 to .116	.001	
Age	-.108	.030	-.166 to -.050	.001	
IQ	.000	.003	-.006 to .007	.947	
Black	-.085	.115	-.310 to .141	.462	
Hispanic	-.014	.112	-.233 to .206	.903	
Impulse Control	-.008	.048	-.102 to .085	.859	
Peer Delinquency	.351	.075	.205 to .498	.000	
Parental Monitoring	-.049	.058	-.163 to .065	.404	
Parental Education	.060	.050	-.038 to .158	.230	
Neighborhood Disorder	.074	.059	-.042 to .189	.209	
Slope					
Processing Decision	.032	.023	-.012 to .077	.153	
CU Traits	-.004	.002	-.008 to -.001	.029	
Processing Decision*CU Traits	.003	.003	-.003 to .008	.404	
Baseline Offending	-.004	.005	-.014 to .006	.466	
Age	-.015	.010	-.034 to .004	.114	
IQ	.000	.001	-.002 to .002	.714	
Black	-.039	.036	-.109 to .031	.276	
Hispanic	-.029	.035	-.097 to .039	.404	
Impulse Control	.009	.015	-.020 to .038	.558	
Peer Delinquency	-.016	.024	-.064 to .031	.508	
Parental Monitoring	-.003	.017	-.037 to .032	.884	
Parental Education	.009	.016	-.022 to .040	.560	
Neighborhood Disorder	-.021	.019	-.057 to .016	.265	
Correlation: Slope with Intercept	.009	.015	-.019, .038	.514	

Unstandardized coefficients are reported. SE, standard error; CI, confidence interval. Bold was to highlight the variables that were significant effects on the outcome variable.

binomial regression was conducted with CU traits, processing decision, and their interaction predicting offending at the first follow-up period (i.e., 6-month assessment) while accounting for covariates, which corresponds to the intercept in the growth curve analyses. The marginal means were calculated and plotted within Stata 16 to illustrate the difference

between informal/formal processing across the range of CU traits (Figure 1A). The slopes for informal processing (.06, $SE = .01$, $z = 5.95$, $p < .001$, 95% CI = .04–.09) and formal processing (.03, $SE = .01$, $z = 2.64$, $p = .008$, 95% CI = .01–.06) were both significant. As can be seen in Figure 1A, the differences between informal and formal processing are significant

Table 3 Negative binomial regression analyses testing the prediction of rearrests by processing decision, callous–unemotional traits, and their interaction accounting for baseline covariates

	Coefficient	IRR	SE	95% CI	p Value	n
Intercept	4.194	66.29	1.591	.526 to 3.536	.008	1,216
Processing Decision	.377	1.46	.093	.195 to .559	.001	
CU Traits	.029	1.03	.009	.011 to .046	.001	
Processing Decision*CU Traits	-.023	0.98	.011	-.044 to -.001	.044	
Baseline Offending	.030	1.03	.019	-.007 to .066	.110	
Age	-.057	0.94	.038	-.131 to .017	.129	
IQ	-.011	0.99	.005	-.020 to -.002	.014	
Black	.432	1.54	.153	.132 to .731	.005	
Hispanic	.241	1.27	.151	-.055 to .536	.111	
Impulse Control	.041	1.04	.064	-.166 to .084	.518	
Peer Delinquency	.123	1.13	.091	-.055 to .302	.176	
Parental Monitoring	-.204	0.82	.068	-.337 to -.071	.003	
Parental Education	-.131	0.88	.064	-.256 to -.006	.039	
Neighborhood Disorder	-.050	0.95	.074	-.196 to .095	.497	

Unstandardized coefficients are reported. SE, standard error; CI, confidence interval; IRR, incident rate ratios. Bold was to highlight the variables that were significant effects on the outcome variable.

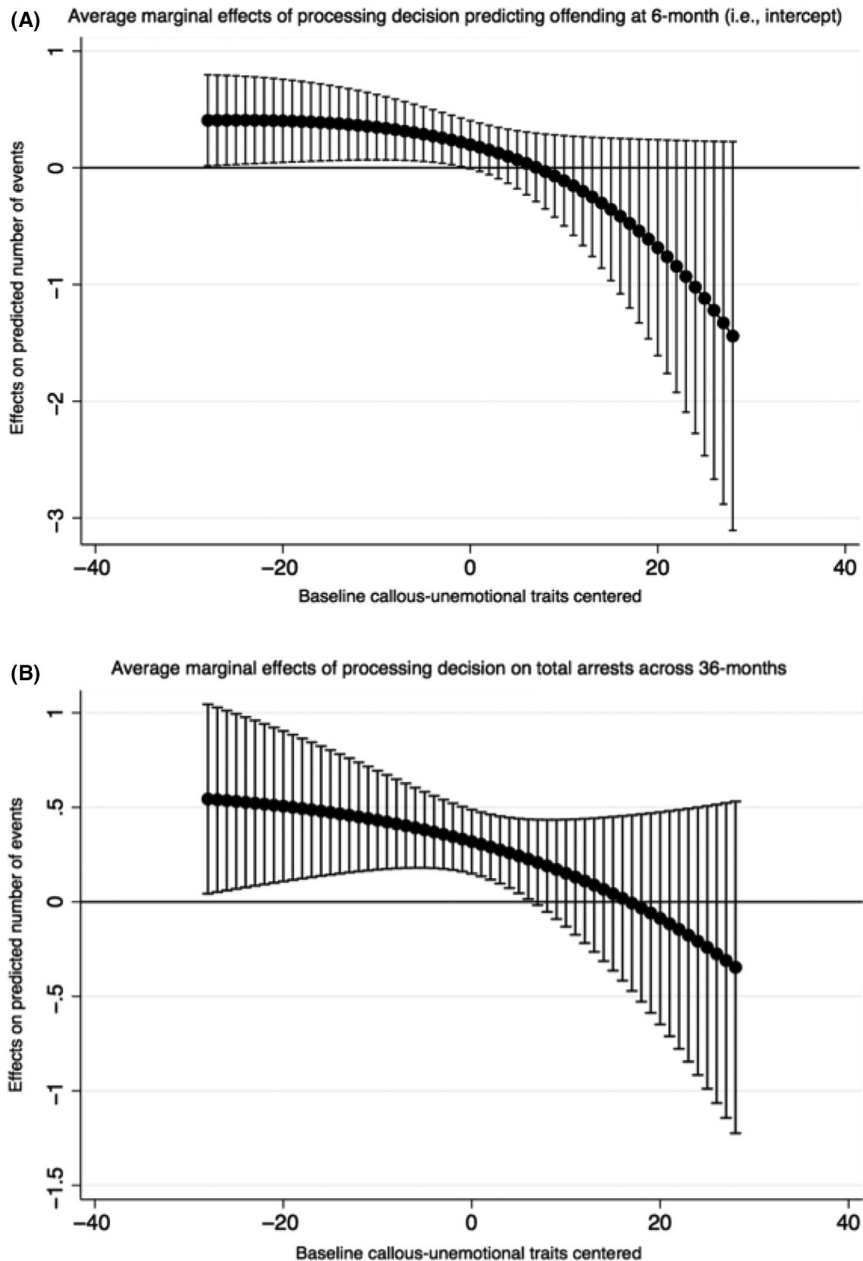


Figure 1 The marginal means plots illustrating the informal/formal processing differences decrease as CU traits increases in the prediction of both (A) self-reported offending at 6-month follow-up time point (i.e., intercept of the growth model) (B) total number of rearrests across the 36-month follow-up period. 95% confidence intervals shown

for CU traits below 29 but not above this level, such that at low levels of CU traits, there is a difference in the effect of informal and formal processing on self-reported offending, supporting our hypotheses. To explore this further using all time points, the mean level of offending across all follow-up periods was compared between formally and informally processed youth at two levels of CU traits: lower (range = 0–28) and upper range (range = 29–55). These results are reported in Figure 2A. Among adolescents within the lower range of CU traits, adolescents formally processed had higher levels of offending than those informally processed ($p < .001$). However, among adolescents within the upper range of CU traits, there were no differences in offending.

We repeated these steps to explore the significant interaction between processing decision and CU traits on the prediction of total rearrests rate across the 36-month follow-up. The slope for informal processing ($.02$, $SE = .01$, $z = 3.40$, $p < .001$, $95\% \text{ CI} = .01-.03$), but not formal processing ($.01$, $SE = .01$, $z = 0.62$, $p = .536$, $95\% \text{ CI} = -.01-.02$), was significant. As can be seen in Figure 1B, the differences between informal and formal processing are significant for CU traits below 36 but not above this level, such that at low levels of CU traits, there is a difference in the effect of informal and formal processing on total rearrest rate across the 36-month follow-up period, supporting our hypotheses. Again, the mean level of rearrests across all follow-up periods was compared between formally

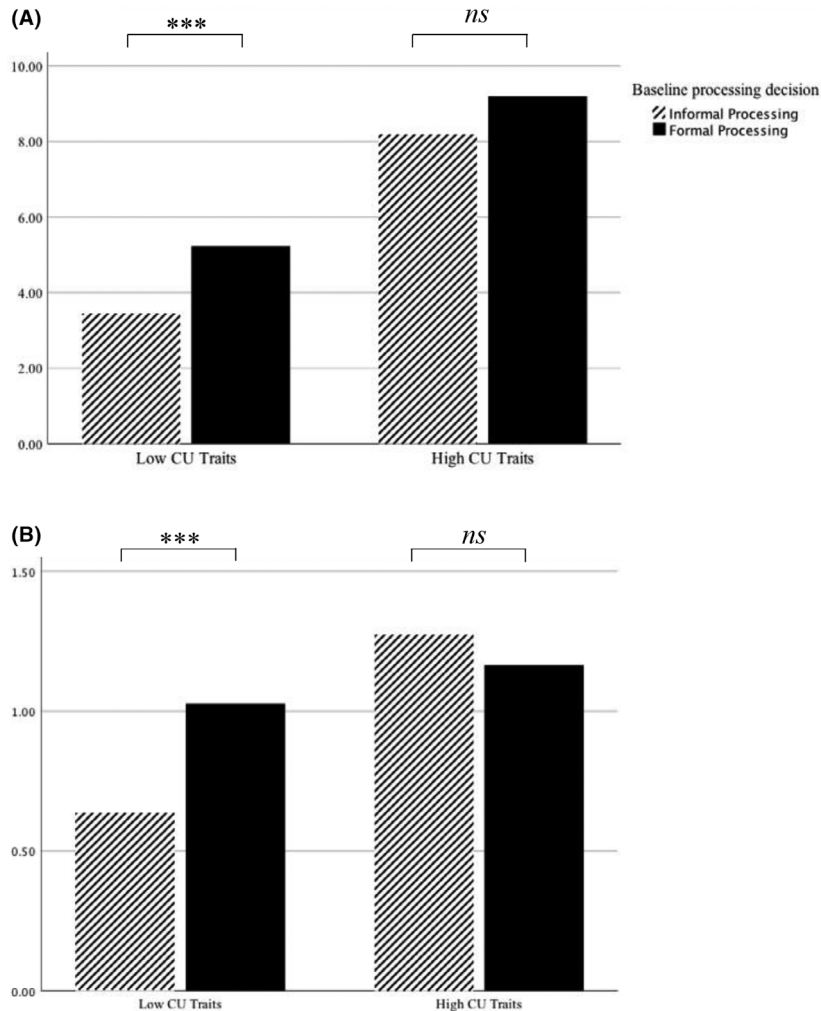


Figure 2 Mean sum of self-reported offending (A) and mean sum of arrests (B) across follow-up assessments between formal vs informally processed adolescents within the lower ($n = 737$) and upper half ($n = 479$) of CU traits. $***p < .001$. ns, nonsignificant

and informally processed youth at two levels of CU traits: lower (range = 0–35) and upper range (range = 36–55). Similar to the findings reported for self-report offending, adolescents within the lower range of CU traits and who were formally processed were rearrested at a higher rate than informally processed adolescents ($ps < .05$; see Figure 2B). However, among adolescents within the upper range of CU traits, there were no longer differences in rearrest rates between those formally and informally processed. See Appendix S2 for additional details regarding these post hoc tests.

Discussion

While the addition of the ‘with Limited Prosocial Emotions’ specifier to the DSM-5 and ICD-11 was largely based on findings that these traits designate a clinically and etiologically distinct group of children and adolescents with conduct problems (Frick et al., 2014), there is also evidence these traits may moderate the influence of certain contextual factors on the youths’ behavior. In the current study, we tested this moderating influence on the effects of

juvenile justice involvement on their antisocial behavior.

Consistent with past research, our results showed that greater justice involvement lead to more antisocial behavior over the 3 years following an adolescent’s first arrest (Gatti et al., 2009; Loughran et al., 2009; Petittclerc et al., 2013). This was true whether the outcomes were measured as self-reported offending or as re-arrests based on official records. Notably, 4.9% of our sample were rearrested four or more times, supporting previous research that approximately 5% of offenders are responsible for a disproportion of crime (Vaughn et al., 2013). Of most importance for the current study, however, is the finding of a moderating influence of CU traits on this association, which reached statistical significance for both the self-report measure of offending and for official rates of re-arrests. Those with elevated CU traits showed higher rates of antisocial behavior over time, irrespective of way the juvenile justice system processed their case. These results are consistent with past research showing children and adolescents high on CU traits, but not the other dimensions of psychopathy (Edens, Skopp, & Cahill, 2008) are less

responsive to many contextual influences, such as the influence of harsh and inconsistent parenting (Waller et al., 2013) and the influence of deviant peers on their antisocial behavior (Kerr et al., 2012). This latter finding from past research is particularly important for interpreting the current results, given that greater exposure to the influence of deviant peers is one of the most common explanations provided for the iatrogenic effects of juvenile justice system involvement (Dishion et al., 2001; Thornberry et al., 1993).

Strengths of the current study include the extended follow-up period with multiple assessment points to allow the use of growth curve models and the use of both self-report of offending and official records of arrest (each with its own strengths and weaknesses; Skogan, 1977). Also, the use of multiple sites led to an ethnically diverse and fairly large sample, and the extensive data collection allowed us to control for a number of pre-existing vulnerabilities that could have influenced the decision on how to process the adolescent. However, the strengths of the study need to be weighed with some important limitations. The current study was limited to boys, and thus, the generalizability of the findings to girls remains unknown. Further, the focus of the study was on assessing the impact of processing decision on first-time offenders who committed low to moderately severe crimes and who, as a result, are likely to have variability in the decision as to whether or not to divert them from the system. However, this design means it is not clear if the associations found would replicate in other adolescent samples with a history of more or less severe offenses leading to their first arrests (Loughran et al., 2009). Thus, these results need to be replicated in other offending samples to determine if the moderating role of CU traits generalizes to other justice involved youth.

With these limitations in mind, our results have important implications for public health policy and future research. The finding of a moderating influence of CU traits on the relationship between processing decision and recidivism risk suggests past estimates of the iatrogenic effects of formal processing on recidivism have likely been underestimated. That is, given the majority of adolescents with serious conduct problems display normative levels of CU traits (Kahn et al., 2013), the policy to formally process the average adolescent who is arrested may contribute to an even *higher* risk for reoffending for most adolescents than previously estimated. Thus, future work needs to consider the level of these traits when assessing the potential harmful effects of the juvenile justice system and clearly supports policies that divert first-time

offenders from justice system involvement. Further, the finding that the level of antisocial behavior was high in those with elevated CU traits, irrespective of the processing decision, supports the large body of work linking these traits with a more severe and chronic pattern of antisocial behavior (Frick et al., 2014). More importantly, it suggests that these youth may require intensive, innovative, and tailored approaches to treatment (Frick, 2012). As noted above, youth with CU traits are not unresponsive to treatment. For example, White and colleagues (White et al., 2013) reported on an open trial of 134 adolescents who had been arrested and referred to a community mental health center for treatment using Functional Family Therapy (FFT; Sexton & Alexander, 1999). They reported that adolescents with elevated CU traits showed a decrease in offending in the year following treatment and they actually showed the largest decrease in behavior problems over the course of treatment. However, they also started treatment with the most severe behavior problems and, despite showing a decline over treatment, still showed the most severe behavior problems at the end of treatment. Thus, comprehensive treatments for youth with elevated CU traits in the justice system are important for reducing their severe behavior problems, but it is also important to test innovative ways to enhance these treatments even further (Frick, 2012).

Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article:

Appendix S1. Preliminary analyses.

Appendix S2. Results.

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Key points

- Formal processing of juvenile offenders after their first arrest led to higher rates of self-reported offending and higher rates of re-arrests over the ensuing 36 months, even after controlling for preexisting vulnerabilities.
- The effects of formal processing on self-reported delinquency over the follow-up period was moderated by the level of CU traits, such that those with elevated CU traits reoffended at high rates irrespective of the way the justice system processed their case.
- These findings suggest that previous estimates of the harmful impact of formal processing by the juvenile justice system may *underestimate* its impact, given that the majority of arrested adolescents have normative levels of CU traits.
- These findings also support the need for enhancing mental health interventions in the juvenile justice system for youth with elevated levels of CU traits.

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