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Indirect Effects of Early Parenting on Adult Antisocial Outcomes via Adolescent Conduct Disorder Symptoms and Callous-Unemotional Traits

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Parental harsh punishment and warmth have been associated with child and adolescent conduct disorder (CD) symptoms and callous-unemotional (CU) traits (i.e., lack of guilt, empathy, and deficient affect); however, it is unclear whether the effect of these parenting behaviors on antisocial outcomes persists into adulthood. Thus, the present study aimed to test whether adolescent CD symptoms and CU traits mediate the effect of parental harsh punishment and warmth on adult antisocial outcomes (i.e., antisocial personality disorder (ASPD), externalizing psychopathology, partner violence, and violent and substance crime). Participants included the high-risk control and normative samples from the Fast Track project ($N = 753$, male = 58%, African American = 46%). Harsh punishment during kindergarten through grades 1–2 predicted higher adolescent CD symptoms, and directly observed warmth during kindergarten through grades 1–2 predicted lower adolescent CU traits. Adolescent CD symptoms predicted greater adult substance crime, and adolescent CU traits predicted greater adult ASPD symptoms and externalizing psychopathology. Further, adolescent CD symptoms indirectly accounted for the effect of parental harsh punishment on adult substance crime, and adolescent CU traits indirectly accounted for the effect of parental warmth on ASPD symptoms and externalizing psychopathology. Findings support the importance of early interventions targeting parenting behaviors to reduce risk for the development of antisocial behavior, and inform developmental models of antisocial behavior in adolescence through adulthood.

Developmental psychopathology perspectives emphasize multiple factors leading to the development of multiple pathways of antisocial behavior (Cicchetti & Rogosch, 1996). Conduct disorder (CD) is defined as behaviors that violate the rights of others (e.g., physical aggression) or societal norms (e.g., lying) (American Psychiatric Association,

2013). Children and adolescents with CD show emotion regulation deficits combined with maladaptive socializing experiences, resulting in poor executive control of behavior (e.g., an inability to delay gratification and anticipate negative consequences; Frick & Viding, 2009). However, research supports heterogeneity within the group of youth displaying conduct problems, and callous-unemotional (CU) traits should be considered in developmental models of antisocial children and adolescents (Frick, Ray, Thornton, & Kahn, 2014). CU traits capture the deficient affective component of psychopathy (i.e., a lack of guilt, empathy) and identify those

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antisocial youth who are at heightened risk for severe and persistent aggressive and antisocial behavior, compared with antisocial youth without CU traits (Frick et al., 2014). These youth show emotional hyporeactivity to empathy-evoking stimuli (Blair, Colledge, Murray, & Mitchell, 2001; Kimonis, Frick, Fazekas, & Loney, 2006). It is the failure of negative emotional cues to elicit arousal in youth with CU traits that is thought to prevent the inhibition of antisocial and aggressive behaviors (Blair, 1999).

Given their association with antisocial behavior, understanding protective and risk factors for the development of CD and CU traits is necessary; furthermore, the family context is a promising setting for early intervention. Certain parenting behaviors have been found to shape antisocial behavior underlying CD and CU traits. From a social learning perspective, Patterson's coercion theory explains how antisocial behavior is escalated and maintained through the use of parental harsh punishment as a tool to control behavior (Patterson, Reid, & Dishion, 1992). Children with a defiant and/or difficult temperament are punished punitively, which, in turn, socializes the children to become aggressive themselves—a bidirectional relationship that promotes further negative parent-child interactions. Once these aggressive tendencies are established, the child often carries these negative behaviors with them into future interactions perpetuating further antisocial behavior (Patterson et al., 1992). To illustrate, research has found that parental harsh punishment (e.g., physical punishment) predicted conduct problems in childhood and adolescence (Dodge, Pettit, & Bates, 1994; Hipwell et al., 2008; Wang & Kenny, 2014), and positive family activities (e.g., eating dinner together) negatively predicted conduct problems (Pajer et al., 2008). Additionally, dysfunctional parenting has been found to mediate the association between other negative contextual factors (e.g., poverty) and conduct problems (Shaw, Hyde, & Brennan, 2012). Whereas harsh and coercive parenting has been consistently associated with the development of conduct problems among youth scoring low on CU traits, research suggests that low parental warmth may be more highly associated with CU traits (Pasalich, Witkiewitz, McMahon, Pinderhughes, & Conduct Problems Prevention Research Group [CPPRG], 2016).

Children and adolescents with high levels of CU traits are characterized by high punishment insensitivity and reward-seeking behaviors (Byrd, Loeber, & Pardini, 2014)—a fearless temperament that may explain why youth with CU traits are less responsive to parental harsh punishment. Children with this type of temperament may be more likely to internalize parents' values and morals and develop empathy when they experience a positive relationship with their parent that involves shared positive affect and warmth (Kochanska, 1997; MacDonald, 1992). To illustrate, Kimonis and colleagues found that low levels of maternal warmth were linked with higher CU traits among adolescent offenders (Bisby, Kimonis, & Goulter, 2017; Kimonis, Cross, Howard, & Donoghue, 2013), and similar

findings have also been established among high-risk (Waller, Hyde, Grabbell, Alves, & Olson, 2014) and normative (Hawes, Dadds, Frost, & Hasking, 2011) samples. High levels of parental warmth are also considered to protect against antisocial behavior among children with elevated CU traits (Kroneman, Hipwell, Loeber, Koot, & Pardini, 2011; Pasalich, Dadds, Hawes, & Brennan, 2011; Ray et al., 2017). However, a limitation of the current literature on parenting behaviors is the failure to examine both high harsh punishment and low warmth in the same model—two parenting behaviors that commonly co-occur.

Emerging research suggests that these distinct parenting behaviors may independently predict child and adolescent antisocial behavior. For example, longitudinal research within a community sample found that parental harsh punishment at age 4 predicted conduct problems and CU traits at age 13 among boys, and parental warmth was associated with CU traits among girls at age 13 (Barker, Oliver, Viding, Salekin, & Maughan, 2011). Another study with monozygotic twins found that the twin who had experienced more parental harsh discipline at age 7 displayed greater conduct problems, but not CU traits, at age 12 compared with the other twin (Viding, Fontaine, Oliver, & Plomin, 2009). Further, Pasalich et al. (2016) examined the impact of the Fast Track intervention—a multimodal preventive intervention targeting social-cognitive skills supplemented with academic tutoring and positive parenting training groups—and found differential intervention-induced changes in parenting behaviors on CD symptoms and CU traits. Specifically, results showed that the intervention reduced parental harsh punishment and increased parental warmth, which in turn predicted lower levels of CD symptoms and CU traits, respectively. This literature, however, is limited by examining the associations of parenting behaviors through childhood and adolescence and not into adulthood.

The maltreatment literature robustly links experiences of abuse in childhood to antisocial outcomes in adulthood (see Widom, 2017); however, the literature on the long-term impact of less extreme forms of parenting behaviors is equivocal, and even less is known about the long reach of positive parenting. One meta-analytic review found significant, but small ($r < .10$), effects linking corporal punishment to externalizing problems; however, the follow-up lengths varied greatly (i.e., 0.5–25 years) and the author concluded that the impact of physical punishment was negligible (Ferguson, 2013). More recently, Rebellon and Straus (2017) found that across three continents (i.e., Asia, Europe, North America), individuals who had been disciplined using physical punishment as a child (age 10) showed higher ratings of physical (e.g., hit someone) and non-physical (e.g., stealing) antisocial behavior in adulthood (M age = 21, SD = 3.9). Additionally, a review and meta-analysis found that physical punishment is associated

with the same maladaptive outcomes (e.g., aggression, behavior problems) as physical abuse—an often debated area in policy circles (Gershoff et al., 2018). The effects of these parenting behaviors have also been increasingly associated with neurobiological activity, such that less amygdala reactivity to fearful facial expressions mediated the effect between experiences of harsh verbal and physical parenting and low socioeconomic status at age 2 and antisocial behavior at age 20 (Gard et al., 2017). In terms of the long-term effects of parental warmth, research has linked maternal warmth in childhood with physical health in adulthood (Carroll et al., 2013), but it is unclear whether parental warmth has long-lasting protective effects on later-life externalizing psychopathology and antisocial outcomes.

CU traits in childhood and adolescence commonly co-occur with a range of aggressive and antisocial behaviors (e.g., Frick, Cornell, Barry, Bodin, & Dane, 2003) but it is currently unclear what antisocial outcomes these traits predict into adulthood, and whether CD symptoms and CU traits are associated with distinct antisocial outcomes. For example, serious conduct problems in childhood have been found to predict adult externalizing psychopathology, substance abuse, and dependence, and a greater number of convictions in adulthood compared with individuals without conduct problems (Odgers et al., 2007; Wertz et al., 2018). However, very little research has examined whether adolescent CU traits are associated with adult antisocial behavior over and above the effects of conduct problems, and currently available research is limited by brief follow-up periods. Frick and colleagues found that children with co-occurring conduct problems and CU traits accounted for over half of all police contacts for the full sample across four yearly assessments (Frick, Stickle, Dandreaux, Farrell, & Kimonis, 2005). Additionally, CU traits predicted general and violent recidivism among boys with an average follow-up period of 32 months (Kimonis, Kennealy, & Goulter, 2016). A study that employed the same sample as the present study found that the presence of CU traits in adolescence predicted antisocial and criminal behavior in early adulthood (i.e., 2 years post high school), over and above prior and concurrent conduct problems (McMahon, Witkiewitz, Kotler, & CPPRG, 2010). Further, CU traits in adolescence has been found to be a stronger predictor of antisocial personality disorder (ASPD) symptoms in adulthood (age 18 and 19) than CD (Loeber, Burke, & Lahey, 2002). To the best of our knowledge, intimate partner violence is yet to be examined in relation to adolescent CU traits. Youth conduct problems have been associated with violent victimization of partners in adulthood (Odgers et al., 2007) and the broader psychopathy construct among adults has been associated with partner violence (Mager, Bresin, & Verona, 2014), but it is unknown whether CU traits in adolescence predicts partner violence in adulthood. This is a significant gap in the literature given that individuals scoring high on CU traits are considered to have weak emotional bonds to others and display a callous disregard in relationships.

The Present Study

Parental harsh punishment and warmth have been linked to antisocial outcomes in childhood and adolescence; however, the developmental sequelae of these parenting behaviors into adulthood are unclear. This study aimed to examine the associations between parenting behaviors and adolescent and adult antisocial outcomes through three specific aims. First, we aimed to replicate and extend findings by Pasalich et al. (2016) by examining the associations between early parental harsh punishment and parental warmth and adolescent CD symptoms and CU traits with the non-intervention sample (i.e., community and high-risk control groups) from the Fast Track project. We hypothesized that, similarly, parental harsh punishment in kindergarten through grade 2 would predict CD symptoms but not CU traits in adolescence and parental warmth in kindergarten through grade 2 would predict CU traits but not CD symptoms. Second, we examined whether CD symptoms and CU traits in adolescence differentially predicted antisocial behavior in adulthood. Past research has linked CD symptoms and CU traits to a range of antisocial behaviors including ASPD symptoms, externalizing psychopathology, intimate partner violence, and violent and substance crime; however, as indicated, follow-up periods have been brief and it was unclear whether CD symptoms and CU traits would be associated with distinct adult outcomes. Thus, we hypothesized that CD symptoms and CU traits in adolescence would predict antisocial behavior in adulthood, but we do not provide specific hypotheses with regard to the adult constructs. Finally, we examined whether CD symptoms and CU traits in adolescence account for the relationship between parenting dimensions in childhood and antisocial behavior in adulthood. We hypothesized that CD symptoms would account for the indirect effect of parental harsh punishment on adult antisocial behaviors, and CU traits would account for the indirect effect of parental warmth on adult antisocial behaviors.

METHOD

Participants and Procedure

Participants were from the Fast Track project, a longitudinal multisite (Durham, North Carolina; Nashville, Tennessee; Seattle, Washington; and rural Pennsylvania) investigation of the development and prevention of child conduct problems (CPPRG, 1992, 2000). In 1991–1993, 9,594 kindergarteners across three cohorts were screened for classroom conduct problems by teachers using the Teacher Observation of Child Adjustment-Revised Authority Acceptance Score (Werthamer-Larsson, Kellam, & Wheeler, 1991), and a subset were screened for home behavior problems by parents using a 22-item instrument based on the Child Behavior

Checklist (CBCL; Achenbach, 1991). A multistage screening procedure identified children for the high-risk sample (control = 446; intervention = 445) and normative sample ($n = 387$). The present study used data from the high-risk control (65% male; 49% African American, 48% European American, 3% other race) and normative (51% male; 43% African American, 52% European American, 3% other race) samples; the intervention sample was not included in the present analyses. Seventy-nine of the participants recruited for the high-risk control group were included as part of the normative sample, and the total final sample included 753 participants (one participant was excluded from analyses because of a missing weighting value). Legal guardians provided consent and participants assented to procedures. Parents were compensated with \$75 for completing each of the summer interviews, while teachers were compensated \$10/child each year for completing classroom measures.

Measures

The present study included data collected from the following periods: covariates in kindergarten; parental harsh punishment and warmth in kindergarten, grade 1, and grade 2 (respondents included: biological mother; kindergarten = 88.6%, grade 1 = 84.0%, grade 2 = 80.6%; biological father; kindergarten = 3.8%, grade 1 = 2.7%, grade 2 = 2.7%; other female (e.g., foster mother, adoptive mother, stepmother, other female relative); kindergarten = 6.8%, grade 1 = 7.3%, grade 2 = 7.4%; other male (e.g., stepfather, other male relative); kindergarten = 0.5%, grade 1 = 0.5%, grade 2 = 0.4%); CD symptoms in grade 6; CU traits in grade 7; and all adult antisocial outcomes at age 25 years. The inclusion of data at these particular time points was due to restrictions with which these measures were administered.

Covariates

Covariates included initial risk screen scores summed from standardized teacher and parent screening scores ($M = 1.10$, $SD = 1.64$, range = -3 to 5), sex (male = 58%), socioeconomic status (SES; $M = 25.65$; $SD = 12.90$; Hollingshead, 1975) measured in kindergarten, urban/rural status (urban = 74%), and race (non-African American = 53.9%; African American = 46.1%).

Parenting Measures

Parental Harsh Punishment. Harsh punishment was assessed with the Life Changes Interview (Dodge, Bates, & Pettit, 1990) post-kindergarten, grade 1, and grade 2. Parents responded to how they would handle six different situations of child misbehavior (e.g., hitting another child, noncompliance) delivered in the form of short written vignettes. Responses were coded into one of several mutually exclusively

categories (e.g., inductive reasoning, withdrawal of privileges, proactive guidance, physical punishment), and coded as 0 (not mentioned), 1 (mentioned), or 2 (typical). Physical punishment was calculated as a mean score across the six vignettes. Internal consistency was poor across the three time points ($\alpha = .41-.55$), possibly due to its small potential range (0–2) and low levels ($M = .12-.21$); however, the high interrater correlation coefficient (.93) available for a subset of the high-risk control and intervention samples provides support for the reliability of this measure (CPPRG, 1992).

Parental Warmth. Parental warmth was assessed with the Interaction Rating Scale (IRS; Crnic & Greenberg, 1990) during the Parent-Child Interaction Task (PCIT). Participants and their mothers completed the PCIT at home (post-kindergarten, grade 1, and grade 2). The PCIT included four tasks: Child's Game (5 min), Parent's Game (5 min), Lego Task (5 min), and Clean-Up (3 min). An observer completed the IRS rating of parent-child interaction based on 16 global items of gratification, sensitivity, and involvement on a 5-point rating scale (1 "no enjoyment", "intrusive", "little interest"; 5 "long periods of enjoyment", "no intrusions", "predominantly engaged", respectively). Parental warmth was calculated as the mean of six items from gratification (e.g., enjoyment in the interaction with the child), sensitivity (e.g., sensitive responding to the child's cues), and involvement (e.g., time spent interacting with the child) that were coded across the four different tasks (interrater intraclass correlation coefficient = .73). Internal consistency was good across the three-time points ($\alpha = .87-.92$).

Adolescent Outcomes

Conduct Disorder Symptoms. Criterion counts for DSM-IV symptoms of CD were assessed at the end of grade 6 and based on the previous 12 months using Version IV of the Parent Interview of the NIMH Diagnostic Interview Schedule for Children (DISC; Shaffer et al., 1996). Lay interviewers, uninformed about intervention status, were trained until they reached reliability. Assessments of CD were based on 15 criteria derived from a 23-symptom item set (range = 0–9) completed by the primary parent. Internal consistency was marginal ($\alpha = .61$).

Callous-Unemotional Traits. CU traits were measured with parent report of the Antisocial Process Screening Device (APSD; Frick & Hare, 2001) in grade 7. The APSD is a 20-item measure that assesses CU traits, narcissism, and impulse control/conduct problems on a 3-point scale (0 "not at all true", 1 "sometimes true", 2 "definitely true"). The 6-item CU traits subscale (e.g., "is concerned about the feelings of others," reverse scored) was used in the present study, and demonstrated acceptable internal consistency in the present study ($\alpha = .66$).

Adult Outcomes

Antisocial Personality Disorder Symptoms. The 132-item Adult Self-Report (ASR; Achenbach, 1997) measures psychiatric symptoms for ASPD, attention-deficit/hyperactivity disorder, avoidant personality, somatic problems, anxiety, and depression disorders. Indicators are scored (1 “yes”, 0 “no”) using DSM-IV criteria. The present study included ASPD symptoms assessed at age 25 years. Internal consistency was good in the present study ($\alpha = .82$).

Externalizing Psychopathology. Self-report of externalizing symptoms was also assessed with the ASR at age 25 (Achenbach, 1997). The externalizing scale is comprised of items from the delinquent (e.g., “I lie or cheat”) and aggressive (e.g., “I argue a lot”) behavior problem subscales. Items are scored on a three-point scale (0 “not true” to 2 “often true”). Internal consistency was excellent in the present study ($\alpha = .91$).

Partner Violence. Partner violence was measured with the self-report 47-item General Violence Questionnaire (Holtzworth-Munroe, Rehman, & Herron, 2000) at age 25. Violent acts (i.e., threatened with a knife or gun; pushed, shoved, grabbed, slapped, or threw something; punched, hit, kicked, bit, or slammed against a wall; beat up or choked, strangled, burned, or scalded on purpose; or used a knife or gun) over the past 12 months perpetrated by participants towards romantic partners were summed. In this sample, 502 participants reported having a romantic partner in the past 12 months. Internal consistency was acceptable in the present study ($\alpha = .74$).

Violent and Substance Crime. Court records were collected locally and supplemented using a national database (based on full name, birthdate, and social security number) including arrests, adjudications, diversions, and magistrate appearances. We limited offenses to violent and substance convictions and diversions but summed data from grade 8 to age 25 given the low base rates.

Data Analyses

Descriptive statistics were conducted using SPSS version 24; all other analyses were conducted using Mplus 7.1 (Muthén & Muthén, 2013). All models were estimated using full-information likelihood (FIML) to handle missing data (harsh punishment, kindergarten = 0.4%, grade 1 = 6.4%, grade 2 = 12.6%; warmth, kindergarten = 0.1%, grade 1 = 5.7%, grade 2 = 9.2%; CD symptoms = 18.1%; CU traits = 18.5%; ASPD symptoms = 17.7%; externalizing symptoms = 17.7%; partner violence = 33.3%, violent crime = 20.3%; substance crime = 20.1%) (Rubin & Little, 2002). Model fit criteria included chi-square (χ^2) value, Root Mean Square Error of Approximation

(RMSEA), and Comparative Fit Index (CFI). Models with non-significant χ^2 value, RMSEA less than .06, and CFI greater than .90 indicate adequate fit; however, with larger sample sizes as per the present study, a non-significant χ^2 value is not necessary (Hu & Bentler, 1999). First, kindergarten to grade 2 punishment and warmth were modeled, separately and then conjointly, with unconditional confirmatory factor analyses (Muthén & Curran, 1997). Next, we added covariates (i.e., initial risk screen score, sex, SES, urban/rural status, and race); adolescent CD symptoms and CU traits; and adult ASPD symptoms, externalizing psychopathology, partner violence, and violent and substance crime (see Figure 1). Each variable was covaried with all other variables of their respective timepoint. For all analyses, a probability weight was used to account for the oversampling of high-risk participants and to approximate a community normative sample (Jones, Dodge, Foster, Nix, & CPPRG, 2002). Direct and indirect associations of adolescent CD symptoms and CU traits were examined between early parental harsh punishment and warmth and adult antisocial outcomes using the product of coefficients method with 10,000 bootstrapped samples to obtain 95% confidence intervals (CI) of the mediated effect (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Indirect effects were considered significant if the confidence intervals did not include a 0 value. The product of coefficients approach with bootstrapped confidence intervals is recommended for testing indirect effects (Fairchild & MacKinnon, 2014; MacKinnon et al., 2002). In contrast to traditional mediation analysis (Baron & Kenny, 1986), a significant association between the independent and outcome variable is not required for establishing an indirect effect. Significant structural parameters of main study variables were compared between CD symptoms and CU traits (e.g., harsh punishment to CD symptoms vs. harsh punishment to CU traits) using Wald’s test with standardized scores.

RESULTS

Descriptive Statistics

Means and standard deviations of main study variables, and correlations are presented in Table 1. CD symptoms in grade 6 were not significantly correlated with either parenting behavior. CU traits in grade 7 were positively correlated with harsh punishment and negatively correlated with parental warmth. Parental harsh punishment was positively associated with ASPD symptoms and partner violence, and parental warmth was negatively associated with all adult outcomes with the exception of violent crime. Adolescent CD symptoms were positively associated with all adult outcomes, and CU traits were positively associated with all adult outcomes with the exception of partner violence. Finally, all adult outcomes were positively correlated with each other, with the exception of partner violence and violent and substance crime.

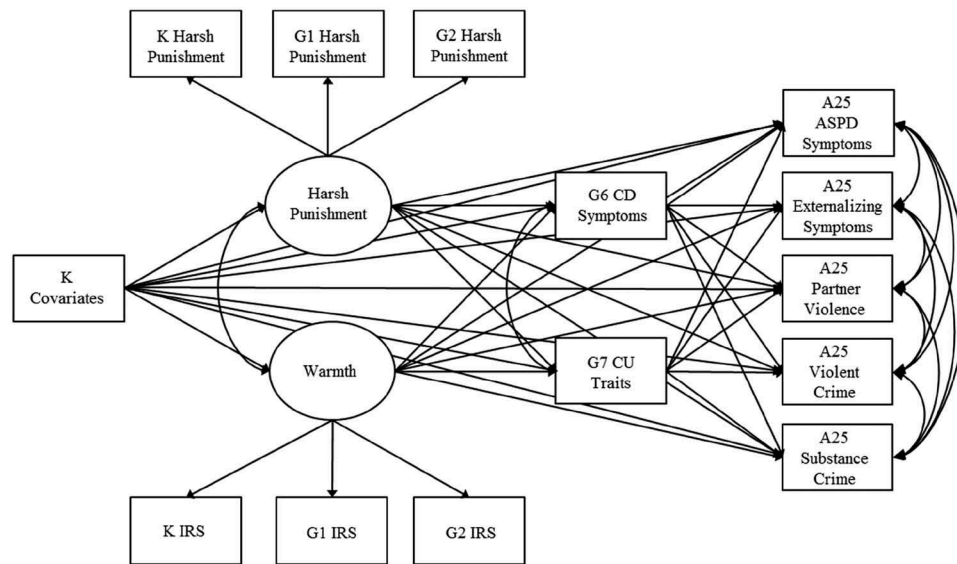


FIGURE 1 Structural model of CD symptoms and CU traits mediating the associations between parental harsh punishment and parental warmth and adult antisocial outcomes. All paths included in the model are shown. *Note.* K = kindergarten, G = grade, A = age, IRS = Interaction Rating Scale, CD = conduct disorder, CU = callous-unemotional, ASPD = antisocial personality disorder.

Structural Model

Parental Harsh Punishment and Warmth Factor Analyses

The models of punishment and warmth as separate models were both “just identified”; suggesting that the number of observed parameters was equal to the number of estimated parameters; however, when punishment and warmth were estimated conjointly the model provided adequate fit to the data ($\chi^2(8) = 26.037, p = .001, CFI = .976, RMSEA = .055, 90\% CI [.032, .079]$). Parental harsh punishment and warmth were also significantly negatively associated with each other ($\beta = -.021, B(SE) = -4.780(.004), p < .001$).

Parenting Behaviors on Adolescent and Adult Outcomes

Next, the model of parental harsh punishment and warmth was expanded to include covariates, adolescent CD symptoms and CU traits, and adult outcomes. This model provided adequate fit to the data ($\chi^2(56) = 162.324, p < .001, CFI = .950, RMSEA = .050, 90\% CI [.041, .059]$). Table 2 reports findings among main study variables. Parental harsh punishment positively predicted adolescent CD symptoms ($\beta = .172, B(SE) = 1.231 (.450), p = .006$) but not CU traits ($\beta = -.041, B(SE) = -.708 (.873), p = .417$), and the difference between these paths approached significance (Wald’s $X^2 = 3.54, p = .060$). Additionally, parental harsh punishment did not predict any adult outcome variable; and was positively associated with the risk screen score ($\beta = .164, B(SE) = .014 (.004), p = .002$), negatively associated with SES ($\beta = -.267, B(SE) =$

$-.003 (.000), p < .001$), and living in rural areas ($\beta = -.129, B(SE) = -.037 (.013), p = .005$). Parental warmth negatively predicted adolescent CU traits ($\beta = -.204, B(SE) = -1.014 (.281), p < .001$) but not CD symptoms ($\beta = .085, B(SE) = .174 (.119), p = .141$), and the difference between these paths was significant (Wald’s $X^2 = 7.40, p = .007$). Additionally, parental warmth was negatively associated with the risk screen score ($\beta = -.122, B(SE) = -.037 (.013), p = .004$), positively associated with SES ($\beta = .432, B(SE) = .014 (.002), p < .001$), and living in urban areas ($\beta = .140, B(SE) = .139 (.048), p = .003$). Parental warmth was also positively associated with ASPD symptoms ($\beta = .135, B(SE) = .681 (.327), p = .037$), but no other adult outcome variables.

Adolescent CD symptoms only predicted substance crime ($\beta = .165, B(SE) = .179 (.076), p = .019$), and was also positively associated with the risk screen score ($\beta = .111, B(SE) = .068 (.025), p = .006$), being male ($\beta = .221, B(SE) = .399 (.075), p < .001$), and living in urban areas ($\beta = .121, B(SE) = .247 (.096), p = .010$). Adolescent CU traits positively predicted adult ASPD symptoms ($\beta = .179, B(SE) = .182 (.048), p < .001$) and externalizing psychopathology ($\beta = .133, B(SE) = .542 (.229), p = .018$). CU traits were also positively associated with the risk screen score ($\beta = .163, B(SE) = .242 (.061), p < .001$), being male ($\beta = .152, B(SE) = .663 (.165), p < .001$), living in urban areas ($\beta = .098, B(SE) = .482 (.207), p = .019$), and were negatively associated with SES ($\beta = -.150, B(SE) = -.025 (.007), p = .001$). None of the significant adolescent to adult paths were significantly different from their corresponding path (CD vs. CU to substance crime, Wald’s $X^2 = 1.79, p = .181$; CD vs. CU to ASPD, Wald’s $X^2 = .51, p = .475$; CD vs. CU to externalizing, Wald’s $X^2 = 2.83, p = .092$).

TABLE 1
Descriptive Statistics and Correlations between Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
<i>Variables</i>	1												
1. K Harsh punishment	.42***	1											
2. G1 Harsh punishment	.30***	.35***	1										
3. G2 Harsh punishment	-.15***	-.21***	-.16***	1									
4. K Warmth	-.21***	-.15***	-.15***	.42***	1								
5. G1 Warmth	-.18***	-.12**	-.13**	.35***	.49***	1							
6. G2 Warmth	.01	.03	.07	.01	-.01	-.05	1						
7. G6 CD symptoms	.10*	.11**	.07	-.16***	-.25***	-.21***	.15***	1					
8. G7 CU traits	.08	.09*	.11**	-.11**	-.05	-.08	.27***	.27***	1				
9. A25 ASPD symptoms	.07	.04	.10*	-.14**	-.11**	-.13**	.14**	.20***	.61***	1			
10. A25 Externalizing	.10*	.07	.14**	-.16***	-.11*	-.15**	.15**	.05	.32***	.33***	1		
11. A25 Partner violence	.02	.02	.01	-.07	-.07	-.08	.23***	.21***	.39***	.26***	.09	1	
12. A25 Violent crime	.07	.03	.05	-.16***	-.12**	-.16***	.18***	.13**	.29***	.22***	.04	.27***	1
13. A25 Substance crime													
<i>Descriptives</i>													
<i>M</i>	.21	.19	.12	3.52	3.66	3.65	.41	.62	3.02	15.27	.80	.79	.47
<i>SD</i>	.23	.22	.16	.79	.82	.84	.95	.37	2.32	10.30	1.96	1.91	1.36
<i>Range</i>	0-2	0-1	0-1	1-5	1-5	1-5	0-7	0-2	0-7	0-58	0-15	0-25	0-16

Note. K = kindergarten, G = grade, A = age, CD = conduct disorder, CU = callous-unemotional, ASPD = antisocial personality disorder. * $p < .05$; ** $p < .01$; *** $p < .001$.

TABLE 2
Estimates of between Parental Behaviors, Adolescent, and Adult Outcome Variables

Variable	<i>B</i> (<i>SE</i>)	β	<i>p</i>
<i>Harsh Punishment</i>			
CD symptoms	1.231(.450)	.172	.006
CU traits	-.708(.873)	-.041	.417
ASPD symptoms	1.433(1.052)	.081	.173
Externalizing symptoms	-1.846(4.642)	-.026	.691
Partner violence	1.714(1.219)	.119	.160
Violent crime	-.951 (.596)	-.093	.111
Substance crime	.615(.583)	.079	.291
<i>Warmth</i>			
CD symptoms	.174(.119)	.085	.141
CU traits	-1.014(.281)	-.204	<.000
ASPD symptoms	.681(.327)	.135	.037
Externalizing symptoms	-1.577(1.569)	-.078	.315
Partner violence	-.208(.255)	-.051	.415
Violent crime	-.167(.172)	-.057	.333
Substance crime	-.174(.153)	-.079	.254
<i>CD Symptoms</i>			
ASPD symptoms	.227(.163)	.092	.164
Externalizing symptoms	-.344(.563)	-.035	.541
Partner violence	.253(.134)	.126	.059
Violent crime	.195(.120)	.137	.104
Substance crime	.179(.076)	.165	.019
<i>CU Traits</i>			
ASPD symptoms	.182(.048)	.179	<.001
Externalizing symptoms	.542(.229)	.133	.018
Partner violence	.028(.049)	.034	.558
Violent crime	.052(.029)	.088	.078
Substance crime	.005(.022)	.011	.825

Note. CD = conduct disorder, CU = callous-unemotional, ASPD = antisocial personality disorder.

All adult outcome variables, with the exception of substance crime, were associated with the risk screen score (ASPD, $\beta = .098$, $B(SE) = .148$ (.062), $p = .017$; externalizing, $\beta = .136$, $B(SE) = .826$ (.296), $p = .005$; partner violence, $\beta = .112$, $B(SE) = .138$ (.069), $p = .045$; violent crime, $\beta = .105$, $B(SE) = .092$ (.038), $p = .015$). Adult ASPD symptoms ($\beta = -.208$, $B(SE) = -.035$ (.007), $p < .001$), externalizing psychopathology ($\beta = -.113$, $B(SE) = -.076$ (.032), $p = .017$), and violent crime ($\beta = -.105$, $B(SE) = -.011$ (.004), $p = .002$) were negatively associated with SES. All adult outcomes were associated with being male (ASPD, $\beta = .127$, $B(SE) = .563$ (.168), $p = .001$; externalizing, $\beta = .136$, $B(SE) = 2.200$ (.744), $p = .003$; violent crime, $\beta = .105$, $B(SE) = .450$ (.086), $p < .001$; and substance crime, $\beta = .012$, $B(SE) = .402$ (.079), $p < .001$) with the exception of partner violence, which was associated with being female ($\beta = -.186$, $B(SE) = -.675$ (.149), $p < .001$). Additionally, ASPD symptoms were associated with living in urban areas ($\beta = .084$, $B(SE) = .422$ (.155), $p = .023$).

Indirect Effects of Adolescent CD Symptoms and CU Traits

Finally, we examined whether parental harsh punishment and parental warmth were associated with adult antisocial outcomes indirectly through adolescent CD symptoms and CU traits. CD symptoms accounted for the effect of parental harsh punishment on adult substance crime ($B(SE) = .220$ (.147), 95% CI [.051, .515]), such that parental harsh punishment was associated with higher CD symptoms, which in turn, was associated with greater substance crime in adulthood; however, this was not significantly different from the corresponding CU path (harsh punishment to CD vs. CU to substance crime, Wald's $X^2 = 1.17$, $p = .280$). CU traits accounted for the association of parental warmth with adult ASPD symptoms ($B(SE) = -.184$ (.077), 95% CI [-.329, -.078]), which was also significantly different from the corresponding CD path; warmth to CD vs. CU to ASPD, Wald's $X^2 = 4.19$, $p = .041$) and externalizing psychopathology ($B(SE) = -.549$ (.299), 95% CI [-.1.101, -.139]), which was not significantly different from the corresponding CD path; warmth to CD vs. CU to externalizing, Wald's $X^2 = 1.67$, $p = .196$), such that parental warmth was associated with lower CU traits, which in turn, was associated with reduced ASPD symptoms and externalizing psychopathology in adulthood. There were no other significant indirect effects.

DISCUSSION

Extensive research has found that antisocial behavior is associated with children's experiences of harsh parenting, but less is known about outcomes of parental warmth and the long-term developmental sequelae of these parenting behaviors in childhood on adult antisocial behavior. The purpose of the present study was to examine whether parental harsh punishment and warmth in childhood predicted antisocial behavior in adolescence and adulthood. Moreover, we aimed to determine whether CD symptoms and CU traits in adolescence are differentially associated with antisocial outcomes in adulthood, and whether CD symptoms and CU traits account for the relationship between parenting behaviors and antisocial behavior. Consistent with earlier findings (Pasalich et al., 2016), we found that parental harsh punishment predicted CD symptoms but not CU traits, and parental warmth predicted CU traits but not CD symptoms. Further, CD symptoms and CU traits in adolescence were linked with distinct antisocial outcomes at age 25. Extending past research, we also found an indirect effect between parental harsh punishment and adult substance crime via adolescent CD symptoms, and an indirect effect between parental warmth and adult ASPD symptoms and externalizing psychopathology via CU traits.

The present findings support past research suggesting specific associations between parenting dimensions and distinct

forms of adolescent behavior. Whereas the bivariate correlations showed that parental harsh punishment and CD symptoms were not associated with each other but harsh punishment and CU traits were significantly positively associated with each other; the structural model showed that harsh punishment was significantly positively associated with CD symptoms and not CU traits. These seemingly contradictory finding may be due to suppressor effects (i.e., a variable or variables that increases the predictive validity of another variable or variables by its inclusion in the regression equation; Maassen & Bakker, 2001). However, we are hesitant to make strong inferences with correlational data given they do not take into account parenting behaviors as a latent variable, estimated missing data, the weighting variable, and covariates. Parental harsh punishment has been robustly linked to the development of conduct problems (e.g., Hipwell et al., 2008; Wang & Kenny, 2014). Conversely, CU traits in children and adolescents appear to be less responsive to experiences of punitive punishment providing support for developmental models of CU traits emphasizing aberrant punishment processing (Frick et al., 2014). These traits are thought to be highly heritable (Viding, Blair, Moffitt, & Plomin, 2005) and less influenced by coercive parent-child interactions associated with the development of conduct problems (Patterson et al., 1992). For example, in a large sample ($N = 7,374$) of 7-year-old twins, the genetic influence on childhood-onset conduct problems was greater among those scoring high on CU traits (81%) compared with those with normative levels of CU traits (30%; Viding et al., 2005). Further, individuals with CU traits consistently show deficits in emotional arousal to negatively valenced cues (e.g., Blair et al., 2001; Kimonis et al., 2006), and the fearless and reward dominant temperament that typifies individuals with these traits render them relatively insensitive to learning from punishment from any source (Kochanska, 1997). However, that is not to say that parental harshness is unrelated to CU traits, as indicated by our nonsignificant Wald's test. For example, Waller and colleagues found that among a monozygotic twin sample, the twin who received greater parental harsh punishment exhibited greater aggression and higher levels of CU traits; but parental warmth was uniquely associated with CU traits, such that the twin who received greater parental warmth showed lower levels of CU traits (Waller, Hyde, Klump, & Burt, 2018). Further research should continue to examine the impact of parenting behaviors and home environments on the development of CD features and CU traits (e.g., maltreatment, interparental conflict).

Our finding that CD symptoms in adolescence were associated with substance crime in adulthood extends the literature examining the predictive utility of adolescent antisocial behavior. Past research is limited by brief follow-up periods and the failure to distinguish substance crime, instead clustering them with other nonviolent criminal offending. For example, some research has reported that impulsive conduct problems

and CU traits are associated with general offending among adolescents at 1-year follow up (Falkenbach, Poythress, & Heide, 2003), whereas others have found CU scores to be unassociated with offending in young adulthood (Salekin, 2008). Other research has found that after controlling for delinquency, CU traits robustly predicted criminal offending including serious offending (i.e., homicide, robbery, sexual assault, aggravated assault, kidnapping, and burglary; Kahn, Byrd, & Pardini, 2013); nonetheless, the authors included both violent and nonviolent offenses in the "serious offending" category. In the present study, CU traits did not predict substance or violent crime; however, the CU traits to substance crime path was not significantly different from the CD to substance crime path, and the regression coefficient approached significance for violent crime ($p = .078$) with significant bivariate correlations for both substance ($r = .13$, $p = .002$) and violent ($r = .21$, $p < .001$) crime. Given the inconsistencies in the literature, further research is needed to examine the utility of adolescent CD symptoms and CU traits for predicting adult criminal offending.

CU traits predicted ASPD symptoms and externalizing psychopathology, but these paths were not significantly different from the corresponding CD path. With the same sample, McMahon et al. (2010) found that CU traits in grade 7 predicted ASPD symptoms 2 years post-high school controlling for CD symptoms; we extend these findings by showing that CU traits in adolescence are predictive of ASPD symptoms at age 25. Whereas some researchers argue that it is impulsive and criminal behavior rather than attenuated affect that is most predictive of future antisocial behavior (Corrado, Vincent, Hart, & Cohen, 2004; Gretton, McBride, Hare, O'Shaughnessy, & Kumka, 2001), our findings suggest that CU traits may differentially distinguish future problematic behavior over-and-above CD symptoms.¹ The present study provides evidence for the chronicity of antisocial behavior associated with CU traits and supports research suggesting that CU traits in childhood and adolescence may designate an important sample of antisocial individuals at risk for persistent

¹ Analyses were repeated with a latent adult antisocial factor, with and without partner violence. These models provided adequate fit to the data (with partner violence: $\chi^2(97) = 367.974$, $p < .001$, CFI = .873, RMSEA = .061, 90% CI [.054, .068]; without partner violence: $\chi^2(81) = 304.413$, $p < .001$, CFI = .889, RMSEA = .061, 90% CI [.053, .068]); however, fit was poorer than in the model with separate adult constructs. Similar to the previous model, parental harsh punishment (with partner violence: $\beta = .047$, $B(SE) = .741 (1.045)$, $p = .478$; without partner violence: $\beta = .041$, $B(SE) = .646 (1.048)$, $p = .538$) and warmth (with partner violence: $\beta = .053$, $B(SE) = .238 (.341)$, $p = .484$; without partner violence: $\beta = .063$, $B(SE) = .248 (.353)$, $p = .421$) were not associated with adult antisocial behavior. Adolescent CD symptoms were not associated with adult antisocial behavior (with partner violence: $\beta = .132$, $B(SE) = .289 (.167)$, $p = .084$; without partner violence: $\beta = .126$, $B(SE) = .277 (.170)$, $p = .103$), but CU traits were significantly positively associated with adult antisocial behavior (with partner violence: $\beta = .187$, $B(SE) = .170 (.048)$, $p < .001$; without partner violence: $\beta = .190$, $B(SE) = .173 (.048)$, $p < .001$).

and serious aggressive and violent behavior (Frick et al., 2014).

Neither CD symptoms nor CU traits predicted intimate partner violence. Adult inmates serving a domestic battery sentence scored higher on the attenuated affect dimension of psychopathy than the impulsive-lifestyle facet (Swogger, Walsh, & Kosson, 2007). To our knowledge, the present study was the first to examine whether CD symptoms and CU traits in adolescence predicted intimate partner violence in adulthood. A novel finding was that intimate partner violence was associated with being female rather than male. One reason for this finding may be that women are more inclined to answer honestly in instances of heterosexual violence, given that they often suffer fewer punitive circumstances, and research finds that men commonly make external attributions for abusive domestic behavior (Cantos, Neidig, & O'Leary, 1993). This unexpected finding warrants further investigation. Future research should also continue to examine the predictive utility of adolescent antisocial behavior for future intimate relationship violence.

Our finding that parental warmth positively predicted ASPD symptoms may also be due to suppressor effects and the complexity of the model (i.e., there are several pathways from parental warmth to ASPD symptoms though other predictors and covariates and the unanticipated positive association is the residual variance); however, results from the bivariate correlations indicated a negative association. Thus, we suggest that neither parental harsh punishment nor warmth predicted adult antisocial behavior, which adds to the limited research examining the long-term consequences of less severe and positive parenting behaviors, and contrasts with findings on parental maltreatment (Widom, 2017). To our knowledge, this was the first study to examine the long reach (i.e., ages 5–7 to 25) of more common parenting behaviors; thus, it was unclear whether we would find significant effects. Parental harsh punishment and parental warmth may not have direct effects on the development of adult antisocial behavior, and rather only through later (i.e., adolescent) behavior does parenting in childhood impact adult outcomes. We found that CD symptoms accounted for the indirect effect of parental harsh punishment on adult substance crime, and CU traits accounted for the indirect effect of warm and responsive parenting on both adult ASPD symptoms and externalizing psychopathology. These findings suggest that whereas harsh punishment in childhood is associated with increases in CD symptoms in adolescence, which in turn, may be associated with increased rates of substance crime in adulthood, parental warmth is associated with decreases in CU traits, which is associated with reductions in ASPD and externalizing psychopathology in adulthood. Past research has demonstrated that it is the interplay of parenting behavior and the child's temperament that predicts development, such that children with elevated levels of CU traits are more responsive to the buffering effects of warm and affectionate parent interactions (Kochanska,

Kim, Boldt, & Yoon, 2013; Pasalich et al., 2011). Future research should examine whether parenting behaviors in adolescence moderate the effect of early assessment of CU traits.

The present prospective longitudinal study examined the impact of parenting behaviors measured across 3 years of early childhood on antisocial behavior in adolescence and adulthood, representing an advantage over retrospective and cross-sectional studies that comprise much of this literature. However, our findings must be considered within the context of several study limitations. First, as mentioned earlier, our measure of warmth was assessed with direct observation of the mother and child, whereas our measures of harsh punishment and adolescent and adult antisocial outcomes (with the exception of crime data) were based on parent- and self-report, respectively. Second, CU traits were not assessed at any other time point; thus, we could not control for childhood levels of CU traits or determine whether childhood CU traits were, in turn, associated with greater maladaptive parenting behaviors. Nor could we determine the stability of CU traits and whether they, specifically, persisted into adulthood. Relatedly, the time points included in the present study were limited to when these measures were administered; that is, our measures of warmth and punishment were only administered in kindergarten, grade 1 and grade 2; our measure of CD in grade 6 was used to closely align with our measure of CU traits in grade 7; and age 25 is currently the only available adult datapoint. Thus, other variables not assessed in the present study may explain these findings. Future research should examine associations between main study variables at additional developmental periods. Third, the focus of this study was externalizing and antisocial behavior; however, conduct problems and CU traits have been linked with internalizing symptoms (Fanti & Kimonis, 2017), and future research should examine whether parenting dimensions predict internalizing psychopathology among youth with and without CD symptoms and CU traits. It will also be important for future research to replicate our findings and begin to examine potential mechanisms that may help explain specific associations between CD and CU traits in adolescence and distinct antisocial outcomes in adulthood.

The present study demonstrated that parental harsh punishment in childhood is associated with the development of conduct problems in adolescence, whereas parental warmth is associated with decreased CU traits, which had long-term consequences for the development of antisocial behavior. Our findings also have practical implications for the prevention and treatment of problematic behavior among children and adolescents. Meta-analytic research has demonstrated that family-based prevention programs, focusing on skills to help parents more effectively socialize their child, reduce antisocial behavior development (e.g., Piquero, Farrington, Welsh, Tremblay, & Jennings, 2009; Piquero et al., 2016). The present study supports the accumulating evidence that CU traits are amenable to treatment that focuses on emotional responsiveness and empathic concern through parental

warmth and positive reinforcement (Kimonis et al., 2018; Pasalich et al., 2016). While parenting dimensions independently predicted adolescent antisocial behavior, other research has found that a combination of increases in parental warmth and involvement and decreases in physical punishment is associated with increases in emotional arousal (Pardini, Lochman, & Powell, 2007). Our findings inform developmental models of antisocial behavior suggesting that distinct parenting dimensions predict differential outcomes in adolescence through adulthood.

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The authors declare that they have no conflict of interest.

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