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## Irritable Oppositional Defiance and Callous Unemotional Traits: Is the Association Partially Explained by Peer Victimization?

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### Abstract

**Background**—Irritability is a subdimension of ODD, which predicts mainly to internalizing disorders, and to a lesser extent, conduct problems and callous-unemotional traits. Given that youth with similar dispositions as the irritable types -- as well as youth high in callous unemotional (CU) traits -- have both been reported to experience high levels of victimization by peers, the authors examined an extension of the “failure model” (Patterson & Capaldi, 1990): irritability increases peer victimization, which, in turn, predicts both CU and internalizing symptoms.

**Sample**—Using data from 5923 mother-child pairs participating in The Avon Longitudinal Study of Parents and Children, the authors tested the outcomes of internalizing difficulties and callousness-unemotional traits (based on mother report at age 13) via the predictors (at ages 8 and 10) of irritability (mother report) and the experience of peer victimization (youth report).

**Results**—Irritability and peer victimization (age 10) directly predicted both CU and internalizing difficulties (age 13). Against a strict interpretation of the failure model, the significant indirect pathway described peer victimization (age 8) as increasing irritability (age 10), which, in turn, increased both CU and internalizing difficulties (age 13).

**Conclusion**—Results suggest that - for youth with irritable dispositions - co-occurring CU and internalizing difficulties can be acquired via adverse experiences in the social environment.

Oppositional defiance in youth is a highly prevalent psychiatric condition with strong associations with a wide range of adult psychiatric illness, including both emotional (i.e., anxiety, depression) and externalizing disorders (i.e., antisocial personality disorder, conduct disorder, substance use and callous-unemotional traits) (Angold, Costello, & Erlanki, 1999; Loeber, Green, Keenan, & Lahey, 1995; Maughan, Rowe, Messer, Goodman, & Meltzer, 2004). Given the wide range of associated illnesses, it has been suggested that ODD represents a more complex and multidimensional psychiatric category, which captures a wider range of psychopathology in youth, than originally thought (Burke, Hipwell, & Loeber, 2010; Stringaris & Goodman, 2009). Researchers have therefore sought to better understand ODD, its potential variants and their respective outcomes.

Toward this end, at least two ODD sub-dimensions have been reliably identified, via existing clinical diagnostic assessments, in both the United Kingdom and North America. For example, Burke and colleagues (2010) differentiated ODD *negative affective* (i.e.,

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touchy, angry and spiteful) from ODD *opposition* (i.e., loses temper, defies and argues) via a factor analytic study on a large clinic-referred sample of boys. Of interest, these two ODD types predicted somewhat different psychopathology. Specifically, the negative affect ODD prospectively associated with depression -- and to a lesser extent, conduct problems --, whereas opposition ODD associated primarily with conduct problems. Similarly, Stringaris and Goodman (2009), in an epidemiological study of boys and girls, identified *a priori* the dimensions of ODD *irritable* (i.e., temper outbursts, easily annoyed, angry/resentful) and ODD *headstrong* (i.e., argued with grownups, rule violations, purposefully annoy others, blamed others). The *irritable* (or affective) dimension prospectively associated with emotional problems, peer problems, and to a lesser extent, conduct problems and a callous disposition toward others -- whereas the *headstrong* (or opposition) dimension related more heavily with conduct problems and hyperactivity. The finding by Stringaris and Goodman (2009) that irritability positively associated with peer difficulties (i.e., picked on by others, solitary, shares with children) is of interest given that a separate research tradition (i.e., bullying-victimization) reports similar findings. Specifically, youth with poorly modulated anger and irritability (e.g., Toblin, Schwartz, Hopmeyer Gorman, & Abou-ezzeddine, 2005) are at increased risk for victimization by peers (Olweus, 1991; Pellegrini, Bartini, & Brooks, 1999). Moreover, Fanti, Frick and Gerogiou (2009) recently reported that callous unemotional traits (i.e., low empathy, callous use of others) and reactive aggression (e.g., similar to poorly modulated anger and irritability) each independently increased risk for victimization by peers. The Fanti study, however, was cross-sectional, and therefore could not determine the degree to which irritable children 'become' more callous towards others on the experience of peer victimization; nor did the study examine if this would especially be the case for youth with irritable dispositions. Such a finding may speak to the need to consider, in children, the distinction of "primary" vs. "secondary" adult psychopaths (e.g., Skeem, Poythress, Edens, Lilienfeld, & Cale, 2003). In contrast to primary psychopaths, whose callousness is thought underpinned by a heritable affective deficit (i.e., low co-occurrence of callousness with anxiety/depression), the callousness of the secondary type is thought to be an environmentally acquired affective disturbance, such that these individuals grow both anxious/depressed and callous towards others via harsh social experiences, e.g., parental maltreatment and/or rejection (Barker, Oliver, Viding, Salekin, & Maughan, 2011; Pardini, Lochman, & Powell, 2007; Skeem, Johansson, Andershed, Kerr, & Loudon, 2007).

In brief, identifying environmental influences on callous traits (and co-occurring internalizing difficulties) is desirable for two reasons: (1) youth high in CU are reported to show more severe and chronic pattern of antisocial behavior than other delinquent youth (Forsman, Lichtenstein, Andershed, & Larsson, 2010; Salekin, 2008); but 2) environmental effects would suggest that the levels of callousness in youth could decrease if an intervention targeted the adverse social condition (e.g., peer victimization). We note that, if identified, such a finding might appear to contrast with previous research that suggests callous youth are not affected by social the environment (e.g., harsh parenting; Viding, Fontaine, Oliver, & Plomin, 2009) and are less responsive to treatment (Waschbusch, Carrey, Willoughby, King, & Andrade, 2007). However, as reviewed above, Skeem's (2003) typology (i.e., primary vs. secondary psychopathy) allows for two types of callous persons: those who are not affected by the environment and those who are. Yet to the best of our knowledge, no published research to date has examined the extent to which irritable youth may increase in callousness (Fanti, et al., 2009) and internalizing difficulties (Sweeting, Young, West, & Der, 2006) via victimization by peers.

Burke, et al. (2005) tested a less specific version of this core research question, through the use of the "failure model" (Patterson & Capaldi, 1990; Patterson, Reid, & Dishion, 1992), which posits that youth with aggressive dispositions are at increased risk for developing internalizing difficulties via the experiences of peer rejection, lack of support, and poor

social skill development. Burke and colleagues (2005) reported preliminary evidence for this idea in that “psychosocial impairment” -- a composite indicator that included any separation from parent, any grade retention or dropping out of school, and/or being disliked by peers -- reduced the association between conduct problems and depression. However, the authors did not assess (a) if the reduction was significant (i.e., establishing a statistically significant indirect effect); or (b) a corresponding increase in callous attitudes towards others; and (c) as stated, the psychosocial impairment variable was quite general in definition, making it difficult to judge the specific importance of peer victimization, an integral component of the failure model (e.g., van Lier et al., in press).

In the present study, we sought to extend research findings from Burke and colleagues and Stringaris and Goodman. Specifically, using the Avon Longitudinal Study of Parents and Children, a prospective epidemiological birth cohort, we investigated: (i) the degree to which irritability prospectively associated with both internalizing difficulties and callous unemotional attitudes toward others, and (ii) whether this association worked indirectly via the experience of peer victimization. As levels of internalizing symptoms related to peer victimization have been shown to vary by sex (e.g., Barker et al., 2008), we also tested the degree to which predictions and indirect effects might differ for males and females.

## Method

### Sample

The Avon Longitudinal Study of Parents and Children (ALSPAC) is an ongoing population-based study designed to investigate the effects of a wide range of influences on the health and development of children. Pregnant women resident in the former Avon Health Authority in south-west England, having an estimated date of delivery between 1 April 1991 and 31 December 1992, were invited to take part in the study, resulting in a cohort of 14 541 pregnancies and 13 988 singletons/twins alive at 12 months of age. When compared to 1991 National Census Data, the ALSPAC sample was found to be similar to the UK population as a whole (Golding, Pembrey, & Jones, 2001). Ethical approval for the study was obtained from the ALSPAC Law and Ethics Committee and the Local Research Ethics Committees. More detailed information on ALSPAC is available from the website: <http://www.bris.ac.uk/alspac/>.

### Measures

**Irritability at ages 8 and 10**—Irritability was derived from the Development and Well-Being Assessment (DAWBA), a well-validated measure, developed for the British Child Mental Health surveys (Meltzer, Gatward, Goodman, & Ford, 2000). In addition to generating binary (yes/no) diagnostic indicators, DAWBA algorithms have recently been developed to generate six-level ordered-categorical measures of the probability of disorder for each of the individual items underlying the diagnoses, ranging from <0.1% to >70% (Goodman, Heiervang, Collishaw, & Goodman, 2011). Evaluated in two large-scale national samples, these DAWBA ‘bands’ functioned well as ordered-categorical measures, showed dose–response associations with mental health service contacts, and showed very similar associations with potential risk factors as clinician-rated diagnoses (Goodman, et al., 2011).

The DAWBA asks 9 separate symptoms of ODD. Each question was introduced with the stem: ‘over the last 6 months, and as compared with other children the same age, has s/he often . . .’ followed by the specific clause. Following the lead of Stringaris and Goodman (2009), irritability was defined by the following three symptoms: 1) has temper outbursts, 2) has been touchy or easily annoyed, and 3) has been angry or resentful. Internal reliability was acceptable at age 8 ( $\alpha = 0.81$ ) and age 10 ( $\alpha = 0.82$ ).

**Peer Victimization at ages 8 and 10**—Child reports of victimization by peers were collected at the ALSPAC Child in Focus Clinics at ages 8 and 10 (see Schreier et al., 2009). The children responded how often (1 = never to 4 often) they had experienced the following: 1) had been hit; 2) had belongings stolen, 3) had been called names, and 4) had lies told about them. These 4 items showed acceptable internal reliability in a confirmatory factor analysis at age 8 ( $\chi^2(5923) = 10.01, p < 0.01$ ; CFI: 0.98; TLI: 0.97; RMSEA = 0.031, 90% CI: 0.013 – 0.045) and at age 10 ( $\chi^2(5870) = 20.27, p < 0.001$ ; CFI: 0.99; TLI: 0.90; RMSEA = 0.041, 90% CI: 0.023 – 0.057).

*Internalizing Difficulties* at age 13 were derived from the previously described six-level ordered-categorical measures of the DAWBA. Here, internalizing difficulties were comprised of the separate indices of: 1) anxiety (any indication of), and 2) depression (Goodman, et al., 2011).

*Callous and Unemotional traits* at age 13 were measured by mother report on a 6-item questionnaire (Moran, Ford, Butler, & Goodman, 2008). The following items were rated as “not true”, “partly true” or “certainly true”: 1) Makes a good impression at first but people tend to see through him/her after they get to know him/her (reverse coded); 2) Shallow or fast-changing emotions; 3) Is usually genuinely sorry if s/he has hurt someone or acted badly (reverse coded); 4) Can seem cold-blooded or callous; 5) Keeps promises (reverse coded); and 6) Genuine in his/her expression of emotions (reverse coded). These items were chosen on the basis of factor analyses of scales measuring CU traits (Frick, Bodin, & Barry, 2000; Frick, O'Brien, Wootton, & McBurnett, 1994). This questionnaire correlated highly ( $r=.81$ ) with the CU scale of the Antisocial Process Screening Device in 182 children displaying antisocial behaviour aged 9-17 (Moran et al., 2009). This scale, within ASLPAC, shows acceptable internal reliability via a confirmatory factor analysis (Barker, et al., 2011).

*Control variables* at age 7 were derived from mother reports on the Strengths and Difficulties Questionnaire (SDQ; Goodman, 2001). To control for the possibility that any identified relationship between irritability and peer victimization might be due to aggressiveness eliciting victimization by peers rather than irritability (e.g., Barker et al., 2008), we controlled for conduct problems (e.g., fight, steals, lies). To control for previous levels of callous attitudes, we reversed coded 4 items (i.e., help others, has one good friend, considerate to others, kind to younger children) from the prosocial SDQ scale. These specific items have previously been used as part of an CU assessment in children (Viding, Blair, Moffitt, & Plomin, 2005). To control for previous levels of internalizing problems, we used the emotional difficulties SDQ subscale (e.g., unhappy, worries, fearful). These three control variables were regressed on all the study variables.

### Attrition and missing data

Participants with data for either the CU or internalizing difficulty scales were selected for the analysis. This resulted in a sample of 5923 youth (boys = 2995; girls = 2928). In a multivariate model, we tested the extent to which the study variables predicted exclusion from the current analysis. Mothers with low educational attainment (OR=1.64; 95% CI 1.30-2.10) and from low SES circumstances (OR=1.39; 95% CI 1.30 - 1.73) were likely to be excluded in the present analysis.

### Analysis

Analyses proceeded in two steps. In Step 1, an overall analytic strategy was to estimate a latent path-analytic model where we could, simultaneously, assess the relative contributions of irritability and peer victimization on internalizing and CU at age 13, and potential indirect effects, where, for example, irritability might relate to CU, via the experience of

victimization by peers (and vice-versa). Latent analysis affords the opportunity for more precise auto regressions and cross-lags, as a degree of measurement error is partialled out of the path coefficient estimates. In this step, we also tested for sex-differences in the overall model. In Step 2, we examined the following indirect pathways: the effect of age 8 irritability on age 13 CU and internalizing difficulties via age 10 peer victimization; and the effect of age 8 peer victimization on age 13 CU and internalizing difficulties via age 10 irritability. Indirect pathways were bootstrapped 10,000 times with bias corrected confidence intervals. Sex-differences in the indirect pathways were tested by bootstrapping the difference in the respective pathways within a multiple group model (i.e., sex as the group). All indirect pathways were programmed in model constraint statements in Mplus (Muthén & Muthén, 1998-2010).

All analyses were conducted in *Mplus* Version 6.21 (Muthén & Muthén, 1998-2010). To provide robust estimates and to account for missing values, full information maximum likelihood estimation with robust standard errors (MLR) was used. Individual model fit was determined through the Comparative Fit Index and Tucker-Lewis Index (CFI & TLI; acceptable fit => 0.90) (Bentler & Bonett, 1980) and root mean square error of approximation (RMSEA; acceptable fit =< 0.08) (Browne & Cudeck, 1993). Satorra-Bentler Scaled Chi-Square difference tests (Satorra, 2000) were used to test nested model comparisons.

## Results

### Descriptive Statistics

As presented in Table 1 (boys below the diagonal, girls above), study variables were significantly correlated. We note here that, because the measures were rated by the mothers (irritability, internalizing and CU; as well as the control variables) and the youth (peer victimization), we refrained from interpreting effect size differences for within rater correlations (e.g., irritable with internalizing and CU) in comparison to cross-rater correlations (e.g., peer victimization with internalizing and CU). Overall, for males and females, increased irritability positively correlated with increased victimization by peers, CU and internalizing difficulties. Likewise, increased peer victimization positively correlated with higher levels of CU and internalizing difficulties. For males and females, internalizing difficulties (at age 13), were moderately correlated for boys ( $r = 0.346$ ) and girls ( $r = 0.419$ ), respectively. With regard to the control variables (i.e., the grayed portion of Table 2; age 7 callous attitudes, emotional difficulties and conduct problems), for males and females, each generally associated with increased levels of irritability, peer victimization and conduct problems - at ages 8 and 10 -, and increased age 13 CU and internalizing difficulties. That said, for males compared to females, age 7 callous attitudes was less associated with age 13 internalizing difficulties (i.e., 0.027 vs. 0.199).

### Step1: Latent Autoregressive Cross-lags

We first tested, via a nested model comparisons, for sex-differences in (1) the overall latent components of the path-analytic model, and (2) the autoregressions, crosslags, predictions and covariance of the outcomes (i.e., age 13 CU and internalizing difficulties). Males and females differed significantly in the loadings of the individual items on the 6 respective latent constructs ( $\Delta\chi^2(22) = 88.74, p < 0.001$ ), but did not significantly differ in the autoregressions, crosslags, predictions and the covariance of outcomes ( $\Delta\chi^2(9) = 7.09, p = 0.62$ ). A multiple group model was therefore estimated where loadings on the latent factors were allowed to vary between males and females, but the autoregression, crosslags and predictions of outcomes and covariance of outcomes were constrained to be equivalent. This



model showed acceptable fit to the data ( $\chi^2(502) = 2249.95, p < 0.001$ ; CFI: 0.92; TLI: 0.91; RMSEA: 0.034, 90% CI: 0.033-0.036).

Four results of the model (see Figure 1) are highlighted here: 1) there was strong continuity in both irritability and peer victimization; 2) the cross-lagged predictions between irritability and peer victimization – at ages 8 and 10 – did not significantly differ; 3) irritability – at age 10 – predicted age 13 CU more strongly than internalizing difficulties ( $\Delta\chi^2(2) = 8.74, p < 0.013$ ); and 4) peer victimization – at age 10 – predicted age 13 internalizing difficulties more strongly than age 13 CU ( $\Delta\chi^2(2) = 6.60, p = 0.04$ ).

### Step 2: Indirect Effects

Table 2 contains the indirect effects. Against our expectation, the indirect pathway of irritable to CU via peer victimization did not significantly differ from zero (i.e., the 95% CIs spanned zero); however, the indirect pathway of peer victimization to CU via irritable was significantly different from zero, indicating increased levels of CU worked from victimization to increased irritable to increased CU. Moreover, the indirect pathways to age 13 internalizing difficulties included both age 8 victimization and CU via age 10 CU and victimization (respectively). These findings, collectively, suggest that age 13 CU is indirectly affected by the social environment at age 8, but in a more constrained manner than age 13 internalizing difficulties. These findings are impressive, given that domain relevant (and highly associated; see Table 1) controls -- at age 7 -- were accounted for in all indirect pathways, as well as the corresponding path coefficients displayed in Figure 1.

### Discussion

The present study sought to extend research findings from Burke and colleagues (2010, 2011) and Stringaris and Goodman (2009) by examining the failure model (Capaldi & Patterson, 1999; Patterson & Stoolmiller, 1991) where children with aggressive dispositions are at increased risk for internalizing difficulties via the ‘wear and tear’ of poor development of social skills, peer rejection and lack of social support. We extended this model and hypothesized that youth with high in irritability would be at increased risk to experience peer victimization (e.g., Pelligrini et al., 1999), and that this pathway, would, in turn, relate not only to internalizing difficulties, but also to co-occurring callous attitudes toward others. More specifically, we tested the extent to which CU traits and internalizing difficulties can be acquired via the social environment, in line with the idea of secondary adult psychopathy (e.g., Skeem et al., 2003, 2006), hereafter referred to as “secondary CU”. Of note, we controlled for relevant variables (at age 7), such as conduct problems, emotional difficulties, and callous attitudes, in all path coefficients and indirect pathways (see Figures 1 and 2).

The current findings support and extend those of Burke and colleagues (2005, 2010) and Stringaris and Goodman (2009), but also bear on the idea of secondary CU in children and adolescents, where CU and internalizing difficulties can be acquired both directly and indirectly by peer victimization (e.g., Skeem et al., 2003, 2006). With regard to direct effects, irritability and peer victimization (age 10) predicted both CU and internalizing difficulties (age 13). Such findings support Fanti et al. (2009), who reported that CU and reactive aggression (like irritability in the current study), each independently associated with peer victimization in a cross sectional sample of adolescents. In the current longitudinal study, we were able to test the extent to which irritability might increase peer victimization, which would then increase both CU and internalizing difficulties (i.e., the ‘Failure Model’). Against the indirect pathway that would be predicted by the “failure model,” however, higher levels of both CU and internalizing difficulties were not initiated via irritability increasing victimization, but through peer victimization increasing irritability, which then increased CU and internalizing difficulties. Nevertheless, these findings do highlight that the

social environment can indirectly affect CU via altering irritability. We do not interpret the present findings as suggesting that the *failure model*, per se, does not apply to irritability; rather, it may be that a special type of peer victimization is more relevant to the relationship between irritability and the secondary CU. Specifically, Vitaro et al. (2011) suggested that: (1) a robust risk for conduct problems in late childhood and adolescence is affiliating with deviant peers and friends -- the peer group can serve as a training agent by the positive reinforcement of deviant behaviors and extinction of conventional behaviors; (2) deviant peers also act quite aggressively towards their friends (Dishion, Andrews, & Crosby, 1995); and (3) victimization of certain youth within the deviant peer group can become more frequent if reinforced (Snyder, Schrepferman, Stoolmiller, & Brooker, 2007) and set the norm for interpersonal relationships (Bukowski, Velasquez, & Brendgen, 2008). Vitaro et al. (2010) also noted that victimization by the friend, which can be considered a special type of peer victimization, is related to concurrent externalizing behavior problems and internalizing difficulties in middle childhood (Crick & Nelson, 2002). As both Burke (2005, 2010) and Stringaris (2010) have reported, irritability associates to internalizing difficulties, delinquency and peer problems. Hence the “failure model” pathway from irritability to secondary CU may be best characterized via irritable youth who both affiliate with, and are victimized by, a deviant peer group.

The current results have both clinical and diagnostic implications. Clinically, these findings suggest that a single diagnostic label should not be taken to imply a single outcome and thus single treatment. Indeed, as frequently experienced by clinicians in clinical practice, effective treatments may vary among children with the same diagnostic category and this may be due partly to the differences in the risk pathways (victimization) that give rise to changes in the initial diagnoses (ODD, or irritability). In the case of this study, youth who are irritable and experience peer victimization would also have CU traits along with internalizing symptoms, which could complicate the response to a treatment that is primarily aimed at internalizing symptoms. Thus, clinicians treating oppositionality and those involved in the planning of service provision may need to examine environmental factors (peer victimization) in order to develop or plan for the most appropriate treatment for any given child. In addition, clinically the findings have implications for prevention programs that focus on halting peer victimization.

These findings may have implications for the formal diagnostic systems given the very strong associations of early oppositionality with adult psychopathology (Kim-Cohen et al., 2003; Nock, Kazdin, Hiripi, & Kessler, 2007), and for a better developmental understanding of adult psychiatric illness, a clear aim of DSM-5 (Pine, 2002). Thus, the DSM and ICD may want to explicitly acknowledge the dimensions of ODD such as the irritability dimension and headstrong dimension - not examined here - to better forecast outcomes. Another key consideration, however, based on the current findings, should be the consideration of developmental pathway models that incorporated key environmental factors (e.g., peer rejection) into classification and prediction schemes. Such systems would, therefore, be dynamic in the process of diagnosing youth as well as predicting outcome.

Finally, the DSM-5 workgroups are considering taxonomic versus dimensional models, as well as the possibility of personality dimensions due in part to the emergence of fields such as developmental psychopathology (Cicchetti & Schneider-Rosen, 1984). This growing body of research that has not only linked normal development and abnormal development but also stressed the need to consider dynamic factors (Dodge, Greenberg, & Malone, 2008). If these models are incorporated into the diagnostic system it will be important to determine the extent to which ODD-dimensions relate, overlap, or are the same as general models of personality factors (e.g., irritable equates to high neuroticism) thereby interconnecting DSM, ICD, temperament and personality terminology (e.g., Clark & Rhyno, 2005; Watson &

Clark, 1994). We speculate that this research will also help to unite different mental health languages or discipline-specific constructs (ICD and DSM general models of personality) but may also be highly valuable in determining how diagnoses may change in their manifestation over time as well as to how they may predict different offense patterns (Stringaris & Goodman, 2009).

### Limitations

The current study had several limitation and the study findings must be interpreted within the context of these limitations. First, the study relies on self and mother interview data and future studies that utilize multi-method assessment (on all collected measure) procedures may shed further light on these relations. Second, in any longitudinal study there is some attrition as there was in this study. Attrition could have led to a loss of power to detect effects and may also specify the findings to those individuals who continued in the study. However, the attrition rate was well within what is considered reasonable for a long follow-up and we **used a maximum likelihood approach** to minimize the likelihood of inaccurate estimates. Third, we identified sex differences in overall latent path model (Figure 1). These differences were at the omnibus level of the twenty-two items underlying the six latent constructs in the overall model. Future studies may want to examine exactly where these specific differences lie (e.g., pairwise comparisons of the items underlying irritability, victimization, CU and internalizing difficulties) as well as the magnitude of the differences. Finally, future studies would be further strengthened with measurement of environment and biological markers such as the results of imaging and genotyping. Irritability appears to be associated with peer victimization and a specific callous unemotional style that may be differentiated from other forms of aggression by quantitative-genetic and neurobiological findings. In closing, irritability and peer victimization may occupy a chief position in the later development of callous unemotional traits, an avenue of development that has, to our knowledge, not been investigated previously and particularly in a longitudinal design.

### Conclusions

In summary, the present study showed that for males and females alike, irritable symptoms and peer victimization led to later development of CU traits and internalizing symptoms. We suggest the need to consider a secondary CU type where CU and internalizing symptoms can be acquired by negative social experiences. We further suggest that examination of children who may be especially genetically vulnerable for “secondary CU” on the experience of social adversity, such as peer victimization (e.g., Beaver et al., 2007a; Beaver, Mancini, DeLisi, & Vaughn, 2011; Beaver et al., 2007b), would increase knowledge on particular children who might benefit from more intensive treatments.

### Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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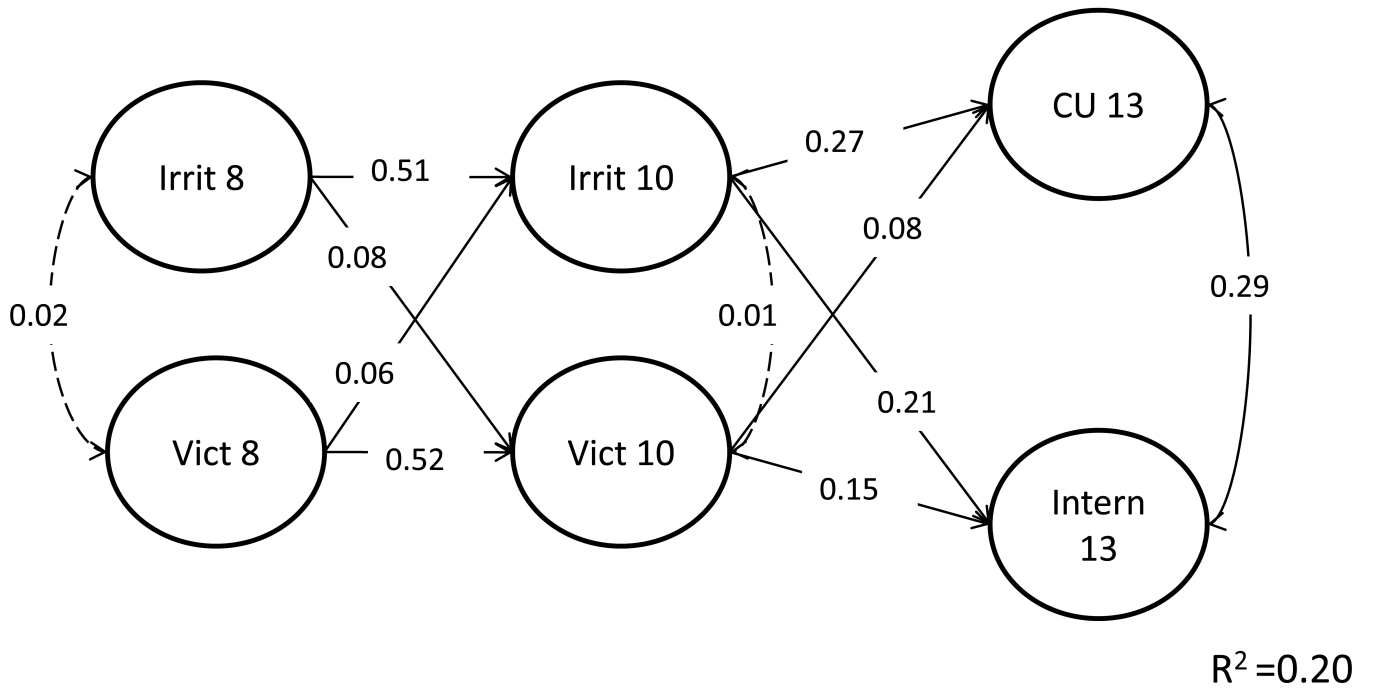
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**KEY POINTS**

- The social mechanisms that might explain how irritability associates with callousness and internalizing difficulties are not currently known.
- Peer victimization appears an important social mechanisms: peer victimization increased irritability, which, in turn, increased both callousness and internalizing difficulties.
- Peer victimization also directly predicted both callousness and internalizing difficulties
- The authors suggest that this finding may speak to the need to consider, in children, the distinction of “primary” vs. “secondary” adult psychopaths (e.g., Skeem, et al., 2003).
- In contrast to primary psychopaths, whose callousness is thought underpinned by a heritable affective deficit (i.e., low co-occurrence of callousness with internalizing difficulties), the callousness of the secondary type is thought to be an environmentally acquired affective disturbance, such that these individuals grow both anxious/depressed and callous towards others via harsh social experiences.

$R^2 = 0.34$



**Figure 1.** Latent Path Analytic Model: ages 7.5 to 13. Note. Circles denote latent variables; dotted lines indicate non-significant relationships; solid lines indicate significant relationships at  $p < 0.05$ ; Irrit = Irritable; Vict = peer victimization; CU = callous unemotional traits; Intern = Internalizing difficulties; 8, 10, 13 = age in years.



**Table 1**

Correlations, Means and Standard Deviations of the Study Variables

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Irritable Age 8	--	0.576	0.064	0.099	0.316	0.220	0.209	0.245	0.426
2. Irritable Age 10	0.610	--	0.124	0.095	0.393	0.299	0.163	0.252	0.326
3. Peer Victimization Age 8	0.140	0.148	--	0.531	0.159	0.148	0.091	0.046	0.172
4. Peer Victimization Age 10	0.193	0.174	0.541	--	0.201	0.240	0.080	0.081	0.146
5. Callous-Unemotional Traits age 13	0.373	0.469	0.133	0.158	--	0.419	0.342	0.199	0.430
6. Internalizing Difficulties age 13	0.232	0.306	0.104	0.155	0.346	--	0.199	0.335	0.222
7. Callous Attitude age 7	0.287	0.232	0.079	0.097	0.392	0.027	--	0.276	0.371
8. Emotional Difficulties age 7	0.258	0.216	0.028	0.014	0.199	0.381	0.275	--	0.276
9. Conduct Problems age 7	0.456	0.443	0.193	0.177	0.493	0.211	0.397	0.275	--
Males: Mean (StdDev)	1.17 (0.37)	1.17 (0.38)	0.53 (0.56)	0.23 (0.37)	1.80 (0.54)	1.17 (0.37)	1.34 (0.35)	1.60 (1.81)	1.70 (1.50)
Females: Mean (StdDev)	1.14 (0.32)	1.15 (0.33)	0.43 (0.51)	0.16 (0.29)	1.81 (0.53)	1.14 (0.32)	1.23 (0.29)	1.73 (1.83)	1.52 (1.44)

Note. Correlations for males below the diagonal, for females above the diagonal; correlations are for the latent variables; means are for manifest variables; Stdv = Standard Deviation; Males and females significantly differed ( $p < 0.05$ ) in mean levels on all manifest variables except Callous-Unemotional traits and Callous Attitudes; Grey area = control variables

**Table 2**  
Significant indirect effects of Irritable and Peer Victimization on CU and Internalizing Difficulties

Age 8	Age 10	Age 13	Estimate	95% Bias Corrected CI	LL	UL
Callous Unemotional Traits						
Irritable [+]	Peer Victimization [+]	CU [+]	0.008	-0.001	0.021	
Peer Victimization [+]	Irritable [+]	CU [+]	0.025	0.003	0.049	
Internalizing Difficulties						
Irritable [+]	Peer Victimization [+]	Intern [+]	0.017	0.004	0.038	
Peer Victimization [+]	Irritable [+]	Intern [+]	0.017	0.003	0.036	

Note. [+] = increasing; CU = callous unemotional traits; Bootstrapped 10,000 times; CI = confidence interval; LL = lower limit; UL = upper limit