

Irritable oppositional defiance and callous unemotional traits: Is the association partially explained by peer victimization?

Edward D. Barker,¹ and Randall T. Salekin²

¹Developmental Psychopathology Laboratory, Department of Psychological Sciences, Birkbeck, University of London, London, UK; ²Disruptive Behavior Clinic, Department of Psychology, University of Alabama, Tuscaloosa, AL, USA

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): that irritability increases peer victimization, which, in turn, predicts both CU and internalizing symptoms. **Sample:** Using data from 5,923 mother-child pairs participating in The Avon Longitudinal Study of Parents and Children, the authors tested the outcomes of internalizing difficulties and callous-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). Contrary to 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. **Keywords:** Avon Longitudinal Study of Parents and Children, peer victimization, depression, anxiety, callous-unemotional traits.

Introduction

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 (CU) 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 subdimensions have been reliably identified, through existing clinical diagnostic assessments, in both the United Kingdom and North America. For example, Burke et al. (2010) differentiated ODD *negative affective* (i.e. 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 adults, rule violations, purposefully annoy others, blaming 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, does not share 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 Georgiou (2009) recently reported that CU traits (i.e. low empathy, callous use of others) and reactive aggression (e.g. similar to poorly modulated anger and irritability), each independently increased

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risk for victimization by peers. The Fanti (2009) study, however, was cross-sectional, and therefore could not determine the degree to which irritable children become more callous toward others on the experience of peer victimization. Such a finding may speak to the need to consider, in children, the distinction of primary versus secondary adult psychopaths (e.g. Karpman, 1941; Lee, Salekin & Iselin, 2010; Salekin & Lynam, 2010; Skeem, Poythress, Edens, Lilienfeld, & Cale, 2003). In contrast with 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 toward 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: (a) youth high in CU are reported to show more severe and chronic patterns of antisocial behavior than other delinquent youth (Forsman, Lichtenstein, Andershed, & Larsson, 2010; Salekin, 2008), and (b) 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 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, Karpman (1941) and Skeem et al.'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. However, 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, Loeber, Lahey, and Rathouz (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 et al. (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 be-

tween 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) if there were a corresponding increase in callous attitudes toward 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., 2012; e.g. Patterson & Capaldi, 1990).

In this study, we sought to extend research findings from Burke et al., 2005, 2010 and Stringaris and Goodman, 2009. Specifically, using the Avon Longitudinal Study of Parents and Children (ALSPAC), a prospective epidemiological birth cohort, we investigated: (a) the degree to which irritability prospectively associated with both internalizing difficulties and callous unemotional attitudes toward others, and (b) 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 gender (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 Children and Parents (ALSPAC) was established to understand how genetic and environmental characteristics influence health and development in parents and children. All pregnant women resident in a defined area in the South West of England, with an expected date of delivery between 1st April 1991 and 31st December 1992, were eligible and 13 761 women (contributing 13 867 pregnancies) were recruited. These women have been followed over the last 19–22 years (Fraser et al., 2012). When compared with 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 nine 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: (a) has temper outbursts, (b) has been touchy or easily annoyed, and (c) has been angry or resentful. Internal reliability was acceptable at age 8 ($\alpha = .81$) and age 10 ($\alpha = .82$).

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: (a) had been hit, (b) had belongings stolen, (c) had been called names, and (d) had lies told about them. These four items showed acceptable internal reliability in a confirmatory factor analysis at age 8 ($\chi^2(5923) = 10.01$, $p < .01$; CFI = 0.98; TLI = 0.97; RMSEA = 0.031, 90% CI: 0.013–0.045) and at age 10 ($\chi^2(5870) = 20.27$, $p < .001$; 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. Herein, internalizing difficulties were comprised of the separate indices of: (a) anxiety (any indication of), and (b) depression (Goodman et al., 2011).

Callous and Unemotional traits at age 13 were measured by mother report on a six-item questionnaire (Moran, Ford, Butler, & Goodman, 2008). The following items were rated as 'not true,' 'partly true' or 'certainly true': (a) makes a good impression at first, but people tend to see through him–her after they get to know him–her (reverse coded), (b) shallow or fast-changing emotions, (c) is usually genuinely sorry if s/he has hurt someone or acted badly (reverse coded), (d) Can seem cold-blooded or callous; 5) Keeps promises (reverse coded), and (e) 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 behavior aged 9–17 (Moran et al., 2009). This scale, within ALSPAC, 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 'well validated measure,' 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., 2011), we controlled for conduct problems (e.g. fight, steals, lies). To control for previous levels of callous attitudes, we reversed coded four items (i.e. help others, has one good friend, considerate to others, and kind to younger children) from the prosocial SDQ scale. These specific items

have previously been used as a part of a 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, and 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 5,923 youth (boys = 2,995; girls = 2,928). 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 this analysis.

Analyses

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 and 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

Table 1 Correlations, means and *SD* of the study variables

Variable	1	2	3	4	5	6	7	8	9
1. Irritable age 8	–	0.576	.064	.099	0.316	0.220	0.209	0.245	0.426
2. Irritable age 10	0.610	–	.124	.095	0.393	0.299	0.163	0.252	0.326
3. Peer victimization age 8	0.140	0.148	–	.531	0.159	0.148	0.091	0.046	0.172
4. Peer victimization age 10	0.193	0.174	.541	–	0.201	0.240	0.080	0.081	0.146
5. Callous-unemotional traits age 13	0.373	0.469	.133	.158	–	0.419	0.342	0.199	0.430
6. Internalizing difficulties age 13	0.232	0.306	.104	.155	0.346	–	0.199	0.335	0.222
7. Callous attitude age 7	0.287	0.232	.079	.097	0.392	0.027	–	0.276	0.371
8. Emotional difficulties age 7	0.258	0.216	.028	.014	0.199	0.381	0.275	–	0.276
9. Conduct problems age 7	0.456	0.443	.193	.177	0.493	0.211	0.397	0.275	–
Males: mean (<i>SD</i>)	1.17 (0.37)	1.17 (0.38)	.53 (.56)	.23 (.37)	1.80 (0.54)	1.17 (0.37)	1.34 (0.35)	1.60 (1.81)	1.70 (1.50)
Females: mean (<i>SD</i>)	1.14 (0.32)	1.15 (0.33)	.43 (.51)	.16 (.29)	1.81 (0.53)	1.14 (0.32)	1.23 (0.29)	1.73 (1.83)	1.52 (1.44)

Correlations for males below the diagonal, for females above the diagonal; correlations are for the latent variables; means are for manifest variables; *SD*, standard deviation; males and females significantly differed ($p < .05$) in mean levels on all manifest variables except callous-unemotional traits and callous attitudes; gray area, control variables.

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 with 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 ($r = .346$) and girls ($r = .419$), 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 with 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 nested model comparisons, for sex-differences in (a) the overall latent components of the path-analytic model, and (b) the auto regressions, cross-lags, 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 six respective latent constructs ($\Delta\chi^2(22) = 88.74$, $p < .001$), but did

not significantly differ in the auto regressions, cross-lags, predictions, and the covariance of outcomes ($\Delta\chi^2(9) = 7.09$, $p = .62$). A multiple group model was, therefore, estimated where loadings on the latent factors were allowed to vary between males and females, but the auto regression, cross-lags, and predictions of outcomes and covariance of outcomes were constrained to be equivalent. This model showed acceptable fit to the data ($\chi^2(502) = 2249.95$, $p < .001$; 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: (a) there was strong continuity in both irritability and peer victimization, (b) the cross-lagged predictions between irritability and peer victimization – at ages 8 and 10 – did not significantly differ, (c) irritability – at age 10 – predicted age 13 CU more strongly than internalizing difficulties ($\Delta\chi^2(2) = 8.74$, $p < .013$); and (d) peer victimization – at age 10 – predicted age 13 internalizing difficulties more strongly than age 13 CU ($\Delta\chi^2(2) = 6.60$, $p = .04$).

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

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 [+]	.008	-.001	.021
Peer victimization [+]	Irritable [+]	CU [+]	.025	.003	.049
Internalizing difficulties					
Irritable [+]	Peer victimization [+]	Intern [+]	.017	.004	.038
Peer victimization [+]	Irritable [+]	Intern [+]	.017	.003	.036

[+], increasing; CU, callous unemotional traits; CI, confidence interval; LL, lower limit; UL, upper limit.

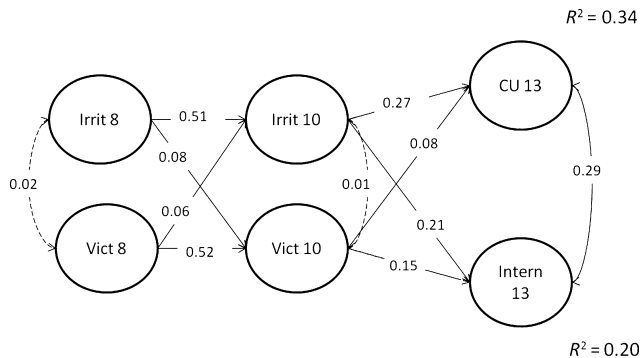


Figure 1 Latent path-analytic model: ages 7.5–13. *Note.* circles denote latent variables; dotted lines indicate nonsignificant relationships; solid lines indicate significant relationships at $p < .05$; Irrit, irritable; Vict, peer victimization; CU, callous unemotional traits; intern, internalizing difficulties; 8, 10, 13 = age in years.

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 in all indirect pathways, as well as the corresponding path coefficients displayed in Figure 1.

Discussion

This study sought to extend research findings from Burke et al. (2010) and Stringaris and Goodman (2009) by examining the failure model (Patterson & Stoolmiller, 1991), in which 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. Pellegrini 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, consistent with the idea of secondary adult psychopathy (e.g., Karpman, 1941; Skeem et al., 2003, 2007), 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 Figure 1).

These findings support and extend those of Burke et al. (2005) 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, 2007). 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 this study), each independently associated with peer victimization in a cross-sectional sample of adolescents. In this 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 these 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: (a) 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; (b) deviant peers also act quite aggressively toward their friends (Dishion, Andrews, & Crosby, 1995); and (c) 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. (2011) 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 et al. (2005, 2010) and Stringaris and Goodman (2009) 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 a 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 partly due 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) 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 also 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 these 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 has not only linked normal development and abnormal development, but also stressed the need to consider dynamic fac-

tors (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), and 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 limitations and the study findings must be interpreted within the context of these limitations. First, the study relies on self and mother interview data. Future studies that utilize multimethod assessment (on all collected measures) 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 the overall latent path model (Figure 1). These differences were at the omnibus level of the 22 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 environmental 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 – particularly in a longitudinal design.

Conclusions

In summary, this 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, Wright, DeLisi, Walsh et al., 2007; Beaver, Mancini, DeLisi, & Vaughn, 2011; Beaver, Wright, DeLisi, Daigle et al., 2007), would increase knowledge of particular children who might benefit from more intensive treatments.

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Correspondence to

Edward D. Barker, Department of Psychological Science, Birkbeck, University of London, Malet Street, London, WC1E 7AX, UK; Tel: +44 207 631 6225; Email: t.barker@bbk.ac.uk

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 mechanism. 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 versus secondary adult psychopaths (e.g., Karpman, 1941; Skeem et al., 2003).
- In contrast with primary psychopaths, whose callousness is thought to be 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 toward others via harsh social experiences.

References

- Angold, A., Costello, E.J., & Erlanki, A. (1999). Comorbidity. *Journal of Child Psychology and Psychiatry*, 40, 57–87.
- Barker, E.D., Oliver, B.R., Viding, E., Salekin, R.T., & Maughan, B. (2011). The impact of prenatal maternal risk, fearless temperament and early parenting on adolescent callous-unemotional traits: A 14-year longitudinal investigation. *Journal of Child Psychology and Psychiatry*, 52, 878–888.
- Barker, E.D., Arseneault, L., Brendgen, M., Fontaine, N., & Maughan, B. (2008). Joint development of bullying and victimization in adolescence: Relations to delinquency and self-harm. *Journal of the American Academy of Child and Adolescent Psychiatry*, 47, 1030–1038.
- Beaver, K.M., Mancini, C., DeLisi, M., & Vaughn, M.G. (2011). Resiliency to victimization: The role of genetic factors. *Journal of Interpersonal Violence*, 26, 874–898.
- Beaver, K.M., Wright, J.P., DeLisi, M., Daigle, L.E., Swatt, M.L., & Gibson, C.L. (2007a). Evidence of a gene × environment interaction in the creation of victimization. *International Journal of Offender Therapy and Comparative Criminology*, 51, 620–645.
- Beaver, K., Wright, J., DeLisi, M., Walsh, A., Vaughn, M., Boisvert, D., & Vaske, J. (2007b). A gene × gene interaction between DRD2 and DRD4 is associated with conduct disorder and antisocial behavior in males. *Behavioral and Brain Functions*, 3, 30.
- Bentler, P.M., & Bonett, D.G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, 88, 588–606.
- Browne, M.W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K.A. Bollen & J.S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Newbury Park, CA: Sage.
- Bukowski, W.M., Velasquez, A.M., & Brendgen, M. (2008). Variation in patterns of peer influence: Considerations of self and other. In M.J. Prinstein & K.A. Dodge (Eds.), *Understanding peer influence in children and adolescents* (pp. 125–140). New York: Guilford Press.
- Burke, J.D., Hipwell, A.E., & Loeber, R. (2010). Dimensions of oppositional defiant disorder as predictors of depression and conduct disorder in preadolescent girls. *Journal of the American Academy of Child and Adolescent Psychiatry*, 49, 484–492.
- Burke, J.D., Loeber, R., Lahey, B.B., & Rathouz, P.J. (2005). Developmental transitions among affective and behavioral disorders in adolescent boys. *Journal of Child Psychology and Psychiatry*, 46, 1200–1210.
- Cicchetti, D., & Schneider-Rosen, K. (1984). *Towards transactional model of childhood depression new directions for child development*. San Francisco: Jossey-Bass.
- Clark, D.A., & Rhyno, S. (2005). Unwanted intrusive thoughts in nonclinical individuals: Implications for clinical disorders. In D.A. Clark (Ed.), *Intrusive thoughts in clinical disorders: Theory, research, and treatment* (pp. 1–29). New York: Guilford.
- Crick, N.R., & Nelson, D.A. (2002). Relational and physical victimization within friendships: Nobody told me there'd be friends like these. *Journal of Abnormal Child Psychology*, 30, 599–607.

- Dishion, T.J., Andrews, D.W., & Crosby, L. (1995). Antisocial boys and their friends in early adolescence: Relationship characteristics, quality, and interactional process. *Child Development, 66*, 139–151.
- Dodge, K.A., Greenberg, M.T., & Malone, P.S. (2008). Testing an idealized dynamic cascade model of the development of serious violence in adolescence. *Child Development, 79*, 1907–1927.
- Fanti, K.A., Frick, P.J., & Georgiou, S. (2009). Linking callous-unemotional traits to instrumental and non-instrumental forms of aggression. *Journal of Psychopathology and Behavioral Assessment, 31*, 285–298.
- Forsman, M., Lichtenstein, P., Andershed, H., & Larsson, H. (2010). A longitudinal twin study of the direction of effects between psychopathic personality and antisocial behaviour. *Journal of Child Psychology and Psychiatry, 51*, 39–47.
- Fraser, A., Macdonald-Wallis, C., Tilling, K., Boyd, A., Golding, J., Davey Smith, G., ... & Lawlor, D.A. (2012). Cohort Profile: The Avon Longitudinal Study of Parents and Children: ALSPAC mothers cohort. *International Journal of Epidemiology* DOI: 10.1093/ije/dys066.
- Frick, P.J., Bodin, S.D., & Barry, C.T. (2000). Psychopathic traits and conduct problems in community and clinic-referred samples of children: Further development of the psychopathy screening device. *Psychological Assessment, 12*, 382–393.
- Frick, P.J., O'Brien, B.S., Wootton, J.M., & McBurnett, K. (1994). Psychopathy and conduct problems in children. *Journal of Abnormal Psychology, 103*, 700–707.
- Golding, J., Pembrey, M., & Jones, R. (2001). ALSPAC – The Avon Longitudinal Study of parents and children I. Study methodology. *Paediatric and Perinatal Epidemiology, 15*, 74–87.
- Goodman, R. (2001). Psychometric properties of the Strengths and Difficulties Questionnaire (SDQ). *Journal of the American Academy of Child and Adolescent Psychiatry, 40*, 1337–1345.
- Goodman, A., Heiervang, E., Collishaw, S., & Goodman, R. (2011). The 'DAWBA bands' as an ordered-categorical measure of child mental health: Description and validation in British and Norwegian samples. *Social Psychiatry and Psychiatric Epidemiology, 46*, 521–532.
- Karpman, B. (1941). On the need for separating psychopathy into two distinct clinical types: Symptomatic and idiopathic. *Journal of Criminology and Psychopathology, 3*, 112–137.
- Kim-Cohen, J., Caspi, A., Moffitt, T.E., Harrington, H., Milne, B.J., & Poulton, R. (2003). Prior juvenile diagnoses in adults with mental disorder: Developmental follow-back of a prospective-longitudinal cohort. *Archives of General Psychiatry, 60*, 709–717.
- Lee, Z., Salekin, R.T., & Iselin, A-M. R. (2010). Psychopathic traits in youth: Is there evidence for primary and secondary subtypes? *Journal of Abnormal Child Psychology, 38*, 381–393.
- van Lier, P.A.C., Vitaro, F., Barker, E.D., Brendgen, M., Tremblay, R.E., & Boivin, M. (2012). Peer victimization, poor academic achievement and the link between childhood externalizing and internalizing problems. *Child Development* DOI: 10.1111/j.1467-8624.2012.01802.x.
- Loeber, R., Green, S.M., Keenan, K., & Lahey, B.B. (1995). Which boys will fare worse? Early predictors of the onset of conduct disorder in a six-year longitudinal study *Journal of the American Academy of Child and Adolescent Psychiatry, 34*, 499–509.
- Maughan, B., Rowe, R., Messer, J., Goodman, R., & Meltzer, H. (2004). Conduct disorder and oppositional defiant disorder in a national sample: developmental epidemiology. *Journal of Child Psychology and Psychiatry, 45*, 609–621.
- Meltzer, H., Gatward, R., Goodman, R., & Ford, F. (2000). *Mental health of children and adolescents in Great Britain*. London: The Stationery Office.
- Moran, P., Ford, T., Butler, G., & Goodman, R. (2008). Callous and unemotional traits in children and adolescents living in Great Britain. *British Journal of Psychiatry, 192*, 65–66.
- Moran, P., Rowe, R., Flach, C., Briskman, J., Ford, T., Maughan, B., ... & Goodman, R. (2009). Predictive value of callous-unemotional traits in a large community sample. *Journal of the American Academy of Child and Adolescent Psychiatry, 48*, 1079–1084.
- Muthén, L.K., & Muthén, B.O. (1998–2010). *Mplus. Statistical analyses with latent variables. User's guide (6.0 ed)*. Los Angeles: Muthén & Muthén.
- Nock, M.K., Kazdin, A.E., Hiripi, E., & Kessler, R.C. (2007). Lifetime prevalence of oppositional defiant disorder: Results from the National Comorbidity Survey Replication. *Journal of Child Psychology and Psychiatry, 40*, 871–878.
- Olweus, D. (1991). Bully/victim problems among schoolchildren: Basic facts and effects of a school based intervention program. In D.J. Pepler & K.H. Rubin (Eds.), *The development and treatment of childhood aggression* (pp. 411–448). Hillsdale, New Jersey: Lawrence Erlbaum Associates.
- Pardini, D., Lochman, J.E., & Powell, N. (2007). The development of callous-unemotional traits and antisocial behavior in children: Are there shared and/or unique predictors? *Journal of Clinical Child and Adolescent Psychology, 36*, 319–333.
- Patterson, G.R., & Capaldi, D.M. (1990). A mediational model for boys' depressed mood. In J. Rolf, A.S. Masten, D. Cicchetti, K.H. Nuechterlein & S. Weintraub (Eds.), *Risk and protective factors in the development of psychopathology* (pp. 141–163). New York: Cambridge University Press.
- Patterson, G.R., & Stoolmiller, M. (1991). Replications of a dual failure model for boys' depressed mood. *Journal of Consulting and Clinical Psychology, 59*, 491–498.
- Patterson, G.R., Reid, J.B., & Dishion, T.J. (1992). *Antisocial boys*. Eugene, OR: Castalia.
- Pellegrini, A.D., Bartini, M., & Brooks, F. (1999). School bullies, victims, and aggressive victims: Factors relating to group affiliation and victimization in early adolescence. *Journal of Educational Psychology, 91*, 216–224.
- Pine, D.S. (2002). *A research agenda for DSM-V*. Washington, DC: American Psychiatric Association.
- Salekin, R.T., & Lynam, D.R. (2010). *Handbook of child and adolescent psychopathy*. New York: Guilford Press.
- Salekin, R.T. (2008). Psychopathy and recidivism from mid-adolescence to young adulthood: Cumulating legal problems and limiting life opportunities. *Journal of Abnormal Psychology, 117*, 386–395.
- Satorra, A. (2000). Scaled and adjusted restricted tests in multi-sample analysis of moment structures. In R.D.H. Heijmans, D.S.G. Pollock & A. Satorra (Eds.), *Innovations in multivariate statistical analysis* (pp. 233–247). London: Kluwer Academic Publishers.
- Schreier, A., Wolke, D., Thomas, K., Horwood, J., Hollis, C., Gunnell, D., ... & Harrison, G. (2009). Prospective study of peer victimization in childhood and psychotic symptoms in a nonclinical population at age 12 years. *Archives of General Psychiatry, 66*, 527–536.
- Skeem, J., Johansson, P., Andershed, H., Kerr, M., & Louden, J.E. (2007). Two subtypes of psychopathic violent offenders that parallel primary and secondary variants. *Journal of Abnormal Psychology, 116*, 395–409.
- Skeem, J.L., Poythress, N., Edens, J.F., Lilienfeld, S.O., & Cale, E.M. (2003). Psychopathic personality or personalities? Exploring potential variants of psychopathy and their implications for risk assessment. *Aggression and Violent Behavior, 8*, 513–546.

- Snyder, J., Schrepferman, L., Stoolmiller, M., & Brooker, M. (2007). The roles of anger, conflict with parents and peers, and social reinforcement in the early development of physical aggression. In T.A. Cavell & K.T. Malcolm (Eds.), *Anger, aggression, and interventions for interpersonal violence* (pp. 87–214). Mahwah, NJ: Erlbaum.
- Stringaris, A., & Goodman, R. (2009). Three dimensions of oppositionality in youth. *Journal of Child Psychology and Psychiatry*, 50, 216–223.
- Sweeting, H., Young, R., West, P., & Der, G. (2006). Peer victimization and depression in early-mid adolescence: A longitudinal study. *British Journal of Educational Psychology*, 76, 577–594.
- Toblin, R.L., Schwartz, D., Hopmeyer Gorman, A., & Abou-ezzeddine, T. (2005). Social-cognitive and behavioral attributes of aggressive victims of bullying. *Journal of Applied Developmental Psychology*, 26, 329–346.
- Viding, E., Blair, R.J.R., Moffitt, T.E., & Plomin, R. (2005). Evidence for substantial genetic risk for psychopathy in 7-year-olds. *Journal of Child Psychology and Psychiatry*, 46, 592–597.
- Viding, E., Fontaine, N.M.G., Oliver, B.R., & Plomin, R. (2009). Negative parental discipline, conduct problems and callous-unemotional traits: A monozygotic twin differences study. *The British Journal of Psychiatry*, 195, 414–419.
- Vitaro, F., Brendgen, M., Boivin, M., Cantin, S., Dionne, G., Tremblay, R.E., ... & Pérusse, D. (2011). A monozygotic twin difference study of friends' aggression and children's adjustment problems. *Child Development*, 82, 617–632.
- Waschbusch, D.A., Carrey, N.J., Willoughby, M.T., King, S., & Andrade, B.F. (2007). Effects of methylphenidate and behavior modification on the social and academic behavior of children with disruptive behavior disorders: The moderating role of callous/unemotional traits. *Journal of Clinical Child and Adolescent Psychology*, 36, 629–644.
- Watson, D., & Clark, L.A. (1994). Introduction to the special issue on personality and psychopathology. *Journal of Abnormal Psychology*, 103, 3–5.

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