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# Trajectories of Callous-Unemotional Traits in Childhood Predict Different Forms of Peer Victimization in Adolescence

Nathalie M. G. Fontaine

*School of Criminology, University of Montreal*

Ken B. Hanscombe

*Department of Medical and Molecular Genetics, King's College London*

Mark T. Berg

*Department of Sociology, University of Iowa*

Eamon J. McCrory

*Division of Psychology and Language Sciences, University College London*

Essi Viding

*Division of Psychology and Language Sciences, University College London and Institute of Psychiatry, Psychology & Neuroscience, King's College London*

Callous-unemotional (CU) traits (e.g., lack of empathy and guilt) differentiate a group of children at particularly high risk for engaging in aggressive behavior, notably bullying. However, little is known about whether youths with CU traits are at risk for being victimized by their peers. We examined the associations between trajectories of CU traits in childhood (between 7 and 12 years old) and peer victimization in adolescence (14 years old). The participants were drawn from the Twins Early Development Study, a longitudinal population-based study of twins born in England and in Wales. The trajectories of CU traits (i.e., stable high, increasing, decreasing and stable low) were identified through general growth mixture modeling. Four forms of peer victimization were considered: physical victimization, verbal victimization, social manipulation, and attacks on property. We found that youths with stable high levels, increasing levels, and decreasing levels of CU traits in childhood had higher levels of physical victimization in adolescence, not explained by other predictors at age 7 (e.g., conduct problems). Youths with increasing levels of CU traits, compared with the ones with stable low levels, also had higher levels of verbal victimization, social manipulation, and attacks on property. Our findings highlight the importance of distinct trajectories of CU traits in accounting for the experience of different forms of peer victimization. Youths with CU traits may benefit from bullying prevention programs, as they are likely to be the targets of peer victimization.

Peer victimization is an important social problem. It affects a significant proportion of youths (about 11% of youths are victims and 6% are bully-victims based on cross-national

statistics) and is associated with negative mental health consequences, such as anxiety, depression, suicidal ideation, and harmful behavior toward the self and others (Arseneault, Bowes, & Shakoor, 2010; Nansel et al., 2004; Olweus, 2013). A better understanding of the factors associated with peer victimization in youth has potential implications for clinical practice, as it could lead to

more successful interventions aimed at preventing peer victimization and its negative consequences.

Researchers have identified several risk factors for peer victimization, including internalizing problems (e.g., depression symptoms), externalizing problems (e.g., aggressive behavior), hostile parenting, and low socioeconomic background (Due et al., 2009; Hodges, Malone, & Perry, 1997; Schwartz, Dodge, Pettit, & Bates, 1997). Aggressive behavior appears to be a particularly robust predictor of peer victimization (Ladd & Troop-Gordon, 2003; Snyder et al., 2003). Research also suggests that there are different subtypes of youth at high risk for being aggressive (Frick & Viding, 2009). Callous-unemotional (CU) traits, inferred from a pattern of behaviors reflecting lack of empathy and guilt, fearlessness and shallow/deficient affect, characterize one subtype of youths with aggression (Fontaine, McCrory, Boivin, Moffitt, & Viding, 2011). These youths are at an increased risk for engaging in various forms of aggressive behavior, including bullying (e.g., Ciucci & Baroncelli, 2014; Crapanzano, Frick, Childs, & Terranova, 2011; Muñoz, Qualter, & Padgett, 2011; Viding, Simmonds, Petrides, & Frederickson, 2009).

Little is known about the association between CU traits and peer victimization (i.e., being a victim of bullying). Extant research suggests that CU traits are weakly to moderately associated with peer victimization both cross-sectionally and longitudinally (Barker & Salekin, 2012; Fanti, Frick, & Georgiou, 2009; Fanti & Kimonis, 2012). However, the pattern of associations appears equivocal. For instance, examining the developmental course of bullying and victimization between 12 and 14 years old, Fanti and Kimonis (2012) found that CU traits were related to initial levels of bullying, but not victimization, and that CU traits did not predict change over time in bullying or in victimization. In another study, Fanti and colleagues (2009) found that CU traits were positively associated with bullying behavior but negatively associated with peer victimization. Still, bully-victims (i.e., youths who bullied and were bullied by others) had higher levels of callous behaviors (i.e., behaviors reflecting lack of empathy and guilt) compared with their peers who were bullies only, victims only, or who were neither bullied nor victimized by their peers. Therefore, it could be that youths with high levels of CU traits are more likely to engage in bullying behavior, and in turn to experience retaliation victimization (i.e., others taking revenge against them; Nansel et al., 2001; Pellegrini, Bartini, & Brooks, 1999). As an alternative hypothesis, youths with CU traits could be less likely to be victimized than their peers. It may be the case that youths with CU traits signal to others that they are not to be trifled with given that they feel less guilt and empathy when harming others. Therefore, rather than promoting victimization, CU traits may discourage it by deterring would-be aggressors (Pellegrini et al., 1999).

Important questions remained to be addressed with regard to CU traits and victimization. For instance, it is unclear how CU traits relate to different forms of peer victimization considered separately, as the previous studies

we reviewed (i.e., Barker & Salekin, 2012; Fanti et al., 2009; Fanti & Kimonis, 2012) were based on global measures of peer victimization (i.e., the scales combined items assessing different forms of peer victimization, such as physical victimization and social manipulation). In addition, we know little about whether sex interacts with CU traits to predict peer victimization. There is evidence suggesting that sex may not moderate the association between CU traits and peer victimization (Fanti & Kimonis, 2012). However, it is unclear if this would apply to different forms of peer victimization, which could be important to consider given data suggesting that boys are more likely to be physically victimized and girls more likely to be victims of social manipulation (Mynard & Joseph, 2000).

In the present study, we sought to extend previous work using a large population sample of youths assessed longitudinally to investigate the associations between trajectories of CU traits in childhood (between 7 and 12 years old; stable high, increasing, decreasing, and stable low trajectories; Fontaine, Rijdsdijk, McCrory, & Viding, 2010) and different forms of peer victimization (i.e., physical and verbal victimization, social manipulation, and attacks on property) in adolescence (14 years old). We also aimed to examine these associations over and above child-level and family-level factors found to be linked to peer victimization. We focused particularly on conduct problems, emotional problems, family socioeconomic status (SES) and negative parental discipline, as these factors have been identified as important predictors of peer victimization (Due et al., 2009; Hodges et al., 1997; Schwartz et al., 1997). Consistent with a retaliation hypothesis, we expected that youths with stable high levels or increasing levels of CU traits would be at risk for being victimized by their peers. As an exploratory hypothesis, we expected this association to be particularly salient for physical victimization compared with other forms of peer victimization, given that youths with CU traits are at particularly high risk for being involved in severe and violent forms of aggression (Frick & Viding, 2009). In examining these issues, we also investigated potential sex differences. Previous work suggests that sex may not moderate the association between CU traits and peer victimization (Fanti & Kimonis, 2012). Still, we wanted to explore whether this was the case for all forms of peer victimization.

## METHOD

### Participants and Procedures

The participants were drawn from a sample of 9,462 enrolled into the Twins Early Development Study (TEDS), a longitudinal study of twin pairs identified from population records of twin births in England and in Wales between 1994 and 1996. TEDS families are reasonably representative of the

United Kingdom census data for families with children (Oliver & Plomin, 2007; Trouton, Spinath, & Plomin, 2002). The sample frame of the present study included 4,156 youths (56.0% female) with available data on parents' reports and on youths' reports of peer victimization at age 14 and on the trajectories of CU traits between 7 and 12 years old (estimated in a previous study; Fontaine et al., 2010). The participants had no known medical or neurological problems at the age 14 assessment. The sample was predominantly White (95.2%). In a multivariable model, we tested the extent to which the study variables predicted exclusion from the current analyses (because the data on peer victimization at age 14 were not available). Boys ( $OR = 1.21$ ), 95% CI (confidence interval) [1.12, 1.32], and youths with higher levels of conduct problems ( $OR = 1.07$ ), 95% CI [1.03, 1.11], from lower family SES ( $OR = 0.84$ ) 95% CI [0.79, 0.88], and who experienced higher levels of negative parental discipline ( $OR = 1.07$ ), 95% CI [1.03, 1.12], at age 7 were likely to be excluded in these analyses. It should be noted that funding was available to collect peer victimization data only on a subset of TEDS participants. Furthermore, recognized challenges associated with continuing participation as the twins entered adolescence (especially the ones with behavioral problems; Asendorpf, van de Schoot, Denissen, & Hutteman, 2014) likely explains why the sample with peer victimization data was not representative of the larger TEDS sample on a few key variables. At each assessment, informed written consent was obtained from every family. The consent procedure was approved by the Institute of Psychiatry and Maudsley Ethics Committee.

## Measures

**Peer victimization.** The Multidimensional Peer-Victimization Scale (Mynard & Joseph, 2000) was used to assess four different forms of peer victimization when the participants were 14 years old: physical victimization (four items; e.g., "hurt me physically in some way"), verbal victimization (four items; e.g., "called me names"), social manipulation (four items; e.g., "made other people not talk to me"), and attacks on property (four items; e.g., "stole something from me"). Each item was rated as *not at all*, *once*, or *more than once*. We used parents' and youths' reports because assessment from multiple informants is desirable to capture different instances of peer victimization (Shakoor et al., 2011). The parents' and youths' reports were summed to create a composite measure of each form of peer victimization. Correlations between parents' and youths' reports ranged between .42 (attacks on property) to .55 (verbal victimization) and were significant at  $p < .001$ . The Cronbach's alphas for parents were .82, .89, .89, and .85 for physical victimization, verbal victimization, social manipulation, and attacks on property, respectively. The Cronbach's alphas for youths were .80, .84, .82, and .83 for physical victimization, verbal victimization, social manipulation, and attacks on property,

respectively. The Cronbach's alphas for the composite scores were .86, .90, .90, and .87 for physical victimization, verbal victimization, social manipulation, and attacks on property, respectively.

**Trajectories of CU traits.** Teachers assessed CU traits at 7, 9, and 12 years old using a composite measure created from seven items available in TEDS (see Viding, Blair, Moffitt, & Plomin, 2005). Items were drawn from the Antisocial Process Screening Device (Frick & Hare, 2001; e.g., "does not show feelings or emotions," "feels bad or guilty when he/she does something wrong" [reverse scored]) and from the Strengths and Difficulties Questionnaire (Goodman, 1997; e.g., "helpful if someone is hurt, upset or feeling ill" [reverse scored], "kind to younger children" [reverse scored]). The Cronbach's alphas for assessments at 7, 9, and 12 years of age were .74, .73, and .74, respectively (Fontaine et al., 2010). The trajectories of CU traits were identified using general growth mixture models in Mplus (Muthén & Muthén, 1998–2011). Four trajectories were identified: stable high (levels of CU traits remained high between 7 and 12 years old), increasing (levels of CU traits increased from 7 to 12 years old), decreasing (levels of CU traits decreased from 7 to 12 years old), and stable low (levels of CU traits remained low between 7 and 12 years old). The distribution of the youths included in the current study was as follows: stable high, 2.6% of the sample (27.4% female); increasing, 9.4% of the sample (37.5% female); decreasing, 15.4% of the sample (41.4% female); and stable low, 72.7% of the sample (62.5% female). The trajectories (i.e., stable high, increasing, decreasing, and stable low) were also identified in a recent research based on a different sample (Klingzell et al., 2015). However, the percentages of participants across the trajectories differed; notably a higher number of children in the study by Klingzell and colleagues (2015) were classified as being on the stable high trajectory (i.e., 5.9% compared with 2.6% in the current study). The variations should be considered in the light of methodological differences between the studies, including the age range under investigation (i.e., 3–7 years old in the study by Klingzell et al., 2015 vs. 7–12 years old in the current study).

**Onset indicators.** Child-level and family-level factors found in previous studies to be associated with peer victimization were considered: conduct problems, emotional problems, family SES and negative parental discipline (Due et al., 2009; Hodges et al., 1997; Schwartz et al., 1997). All predictors were assessed when the participants were 7 years old, which corresponds to the age at the onset of the trajectories of CU traits.

**Conduct problems and emotional problems.** Conduct problems (five items; e.g., "often fights with other children or bullies them") and emotional problems

(five items; e.g., “many worries, often seems worried”) were assessed using teachers’ ratings of the Strengths and Difficulties Questionnaires (Goodman, 1997). Each item was rated as *certainly true*, *somewhat true*, or *not true*. The Cronbach’s alphas were .67 and .76, for conduct problems and emotional problems, respectively.

**Family SES.** An index of family SES was created based on the fathers’ highest educational level and occupational status and the mothers’ highest educational level and occupational status, and the mothers’ age at birth of eldest child (Petrill, Pike, Price, & Plomin, 2004). These five variables were standardized and then summed.

**Negative parental discipline.** Negative parental discipline was assessed using four questionnaire items adapted from a semistructured interview (e.g., “give a smack or slap” and “telling off or shouting”; Deater-Deckard, Dodge, Bates, & Pettit, 1998). The four items were rated on a 4-point scale (from *never* to *often*) for the firstborn twin, followed by ratings on a 3-point scale (*less*, *same* or *more*) for the second-born twin. This rating method was chosen in order to focus parents on potential differences in their treatment of the two children. For firstborn twins, the sum of the respective items was standardized for the whole population to zero mean and unit variance. For second-born twins, this standardized sum was added to the standardized sum of the differential items; this composite score was then standardized (Knafo & Plomin, 2006). The Cronbach’s alpha was computed separately for the firstborn and second-born twins because the rating method was not identical for both. The Cronbach’s alpha was .55 for the firstborn twins and .70 for the second-born twins.

## Data Analyses

We conducted simultaneous hierarchical regression analyses (with planned contrasts) predicting the four

different forms of peer victimization. To reduce skewness, each scale of peer victimization was square root transformed before conducting the simultaneous regression analyses. In Step 1, we entered the trajectories of CU traits and sex. In Step 2, we added the onset indicators (i.e., conduct problems, emotional problems, family SES and negative parental discipline). In Step 3, we added interaction terms between sex and the trajectories of CU traits to examine if the associations between varying levels of CU traits and different forms of peer victimization differed between boys and girls. We used the COMPLEX analysis option in Mplus, Version 7.11 (Muthén & Muthén, 1998–2011), to account for the nonindependence of observations (i.e., twins). Missing data were managed through Full Information Maximum Likelihood (Muthén & Muthén, 1998–2011).

## RESULTS

### Descriptive Statistics

Table 1 presents the descriptive statistics of the study variables by each trajectory of CU traits and by sex. It notably reveals that youths on the stable high, increasing, and decreasing trajectories of CU traits had higher levels of all forms of peer victimization compared with the youths on the stable low trajectory. In addition, youths on the stable high trajectory had the highest levels of all forms of peer victimization. Compared with girls, boys had higher mean levels of physical victimization, verbal victimization, and attacks on property, whereas girls had higher mean levels of social manipulation.

Table 2 presents the correlations among the different forms of peer victimization and the onset indicators (i.e., conduct problems, emotional problems, family SES and negative parental discipline assessed at 7 years old). Higher scores of

TABLE 1  
Descriptive Statistics of the Study Variables by Each Trajectory of CU Traits and by Sex

	Physical Victimization		Verbal Victimization		Social Manipulation		Attacks on Property		Conduct Problems		Emotional Problems		Family SES		Negative Parental Discipline	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
CU Traits																
Stable High	1.46 <sub>a</sub>	1.39	2.70 <sub>a</sub>	1.12	1.86 <sub>a</sub>	1.44	1.37 <sub>a</sub>	1.29	2.74 <sub>a</sub>	2.53	1.74 <sub>a</sub>	2.23	-0.12 <sub>a</sub>	1.35	0.37 <sub>a</sub>	1.13
Increasing	1.06 <sub>b</sub>	1.32	2.39 <sub>b</sub>	1.52	1.57 <sub>a,b</sub>	1.52	1.24 <sub>a</sub>	1.36	0.76 <sub>b</sub>	1.26	1.21 <sub>b,c</sub>	1.78	0.12 <sub>a,b</sub>	1.20	0.16 <sub>a</sub>	1.10
Decreasing	1.06 <sub>b</sub>	1.31	2.36 <sub>b</sub>	1.54	1.54 <sub>b</sub>	1.49	1.15 <sub>a</sub>	1.34	1.48 <sub>c</sub>	1.82	1.42 <sub>a,b</sub>	2.07	0.05 <sub>a</sub>	1.19	0.15 <sub>a</sub>	1.14
Stable Low	0.63 <sub>c</sub>	1.10	2.02 <sub>c</sub>	1.70	1.40 <sub>c</sub>	1.54	0.92 <sub>b</sub>	1.26	0.30 <sub>d</sub>	0.82	1.18 <sub>b,c</sub>	2.03	0.21 <sub>b</sub>	1.32	-0.17 <sub>b</sub>	1.21
Sex																
Girls	0.43 <sub>a</sub>	0.92	2.00 <sub>a</sub>	1.74	1.69 <sub>a</sub>	1.64	0.88 <sub>a</sub>	1.25	0.42 <sub>a</sub>	1.11	1.29 <sub>a</sub>	2.17	0.16 <sub>a</sub>	1.40	-0.20 <sub>a</sub>	1.21
Boys	1.17 <sub>b</sub>	1.41	2.29 <sub>b</sub>	1.63	1.13 <sub>b</sub>	1.45	1.14 <sub>b</sub>	1.41	0.81 <sub>b</sub>	1.63	1.16 <sub>b</sub>	1.84	0.18 <sub>a</sub>	1.28	0.07 <sub>b</sub>	1.20
Total Sample	0.76	1.29	2.13	1.74	1.45	1.61	0.99	1.35	0.59	1.42	1.23	2.06	0.17	1.42	-0.08	1.29

Note: Each scale of peer victimization was square root transformed. Means with different subscripts differ significantly at  $p \leq .05$ . CU = callous-unemotional; SES = socioeconomic status.

TABLE 2  
Correlations Among Peer Victimization and Onset Indicators

	1	2	3	4	5	6	7	8
1. Physical Victimization	—							
2. Verbal Victimization	.53***	—						
3. Social Manipulation	.40***	.62***	—					
4. Attacks on Property	.55***	.53***	.45***	—				
5. Conduct Problems	.20***	.16***	.13***	.13***	—			
6. Emotional Problems	.04*	.06**	.08***	.07***	.16***	—		
7. Family SES	-.08***	-.05*	-.12***	.01	-.06**	-.07***	—	
8. Negative Parental Discipline	.18***	.19***	.13***	.11***	.20***	.03	-.03	—

Note: SES = socioeconomic status.

\* $p \leq .05$ . \*\* $p \leq .01$ . \*\*\* $p \leq .001$ .

conduct problems, emotional problems, and negative parental discipline were correlated with higher levels of all forms of peer victimization. Family SES was negatively related to peer victimization, except for attacks on property. Table 2 also reveals that the different forms of peer victimization were strongly (but not perfectly) correlated among each other.

### Regression Analyses

Table 3 presents the results from Step 1 and Step 2 of the simultaneous regression analyses. Five contrasts between the trajectories of CU traits were tested: stable high versus stable low, stable high versus increasing, stable high versus decreasing, increasing versus stable low, and decreasing versus stable low. These contrasts allowed us to compare the trajectories of stable high, increasing, and decreasing levels of CU traits with the normative group of youths with stable low levels of CU traits and to compare the unstable trajectories (increasing and decreasing) with the group of youths with stable high levels of CU traits.

In Step 1, the analysis revealed that youths on the stable high, increasing and decreasing trajectories of CU traits had higher levels of all forms of peer victimization compared with the youths on the low trajectory, even after controlling for sex. Youths on the stable high trajectory also had higher levels of physical victimization and social manipulation compared with the youths on the increasing trajectory. In addition, youths on the stable high trajectory had higher levels of all forms of peer victimization, except attacks on property, compared to the ones on the decreasing trajectory.

In Step 2, the onset indicators were added. Three main findings are noticeable from Table 3. First, youths on the stable high, increasing and decreasing trajectories of CU traits had higher levels of physical victimization compared with the youths on the low trajectory, even after controlling for sex and the onset indicators. Second, only youths on the increasing trajectory had higher levels of verbal victimization, social manipulation, and attacks on property compared with the ones on the low trajectory. Third, sex, conduct problems and negative parental discipline were significant

predictors of all forms of peer victimization, whereas family SES predicted physical victimization and social manipulation, and emotional problems predicted social manipulation and attacks on property.

For Step 1 and Step 2, the proportion of variance explained by the predictors ( $R^2$ ) was larger for physical victimization compared with the other forms of peer victimization. Overall, the effect sizes (regression coefficients) were small to medium.

To help explore potential explanations for the findings, notably the fact that the regression coefficients for most of the contrasts between the trajectories of CU traits reduced substantially after controlling for the onset indicators, we performed additional analyses. More specifically, to determine if this reduction was due largely to conduct problems (which could suggest that aggressive children are likely to become the targets of similar behavior as retaliation victimization) or due to emotional problems (which could suggest that problems regulating emotions increase the likelihood for peer victimization), we performed separate analyses (a) without emotional problems and (b) without conduct problems. The results from these additional analyses suggest that the regression coefficient reduction appeared to be largely driven by conduct problems. Nevertheless, emotional problems also contributed to the regression coefficient reduction, but to a lesser degree (detailed results available from the first author).

In Step 3, we added the interaction terms to test whether sex moderated the associations between the trajectories of CU traits and peer victimization. Only one interaction was significant at  $p \leq .05$ . We found that being on the stable high trajectory compared to the stable low trajectory was associated with higher levels of verbal victimization in girls ( $b = .41, p < .01$ ), but not in boys ( $b = .01, ns$ ).

## DISCUSSION

In this study, we examined the associations between varying levels of CU traits over time (i.e., stable high, increasing, decreasing, and stable low trajectories) in childhood (between 7 and 12 years old) and different forms of peer victimization

TABLE 3  
Simultaneous Regression Analyses of the Associations Between the Trajectories of CU Traits and Peer Victimization

	<i>Physical Victimization</i>		<i>Verbal Victimization</i>		<i>Social Manipulation</i>		<i>Attacks on Property</i>	
	<i>b</i>	<i>R</i> <sup>2</sup>	<i>b</i>	<i>R</i> <sup>2</sup>	<i>b</i>	<i>R</i> <sup>2</sup>	<i>b</i>	<i>R</i> <sup>2</sup>
Step 1		.14		.02		.06		.03
Sex <sup>a</sup>	.64***		.16***		-.46***		.22***	
CU Traits (Contrasts)								
a. Stable High vs. Stable Low	.55***		.43***		.53***		.31**	
b. Stable High vs. Increasing	.29*		.18		.27*		.05	
c. Stable High vs. Decreasing	.26*		.22*		.30**		.13	
d. Increasing vs. Stable Low	.25***		.25***		.26***		.26***	
e. Decreasing vs. Stable Low	.28***		.22***		.23***		.18***	
Step 2		.16		.06		.10		.04
Sex <sup>a</sup>	.61***		.12**		-.50***		.20***	
Onset Indicators								
Conduct Problems	.09***		.10***		.11***		.08***	
Emotional Problems	.02		.04		.04*		.06***	
Family SES	-.07***		-.04		-.10***		.02	
Negative Parental Discipline	.11***		.16***		.14***		.07***	
CU Traits (Contrasts)								
a. Stable High vs. Stable Low	.28*		.14		.20		.11	
b. Stable High vs. Increasing	.10		-.03		.03		-.11	
c. Stable High vs. Decreasing	.13		.07		.14		.02	
d. Increasing vs. Stable Low	.19**		.16**		.18**		.22***	
e. Decreasing vs. Stable Low	.15**		.06		.07		.09	

Note: The Z scores of all continuous variables were used in the analyses. The unstandardized regression coefficients are reported. Results from Step 3 analyses (interactions between trajectories and sex) are presented in the text only. CU = callous-unemotional; *R*<sup>2</sup> = proportion of variance explained; SES = socioeconomic status.

<sup>a</sup>Boys = 1, girls = 0.

\**p* ≤ .05. \*\**p* ≤ .01. \*\*\**p* ≤ .001.

(i.e., physical victimization, verbal victimization, social manipulation, and attacks on property) in adolescence (14 years old). The findings extend our understanding of the associations between CU traits and peer victimization in four key ways.

First, we documented that CU traits in childhood predicted physical victimization in adolescence, over and above conduct problems, emotional problems, family SES, and negative parental discipline. We found that youths with stable high levels, increasing levels, and decreasing levels of CU traits in childhood had higher levels of physical victimization in adolescence. Youths on the stable high trajectory had the highest levels, which is consistent with prior work showing that these youths are at particularly high risk for being involved in severe and violent forms of aggression (Frick & Viding, 2009). These youths may perpetrate physically aggressive behavior toward their peers, and in turn may become the targets of similar behavior as retaliation victimization. This appears supported by previous research, which showed that bully-victims had higher levels of callous behavior (Fanti et al., 2009). However, this hypothesis would need further investigation, given that we did not have data on the bullying behavior perpetrated by the youths at 14 years old. The additional analyses undertaken to explore potential explanations of the findings (i.e., conducting the analyses excluding emotional problems and then excluding conduct problems) support the

hypothesis that youths who are bullies may then become targets of retaliation victimization (i.e., the regression coefficient reduction of the contrasts between the trajectories of CU traits appeared to be largely driven by conduct problems). However, emotional problems also contributed to the regression coefficient reduction, albeit to a lesser extent, suggesting that emotional dysregulation is a relevant factor to consider (potentially more so for youths with secondary CU traits; see further discussion next).

It is not clear whether youths are first bullied and then retaliate against their aggressors, or whether they are bullies who then become targets of retaliation victimization. Extant research tends to support the first process (i.e., that youths who are victimized by their peers are at an increased risk, in turn, of victimizing others; Barker, Arseneault, Brendgen, Fontaine, & Maughan, 2008; Nansel et al., 2001). Nevertheless, future research on longitudinal assessments of both bullying and peer victimization, as well as other relevant factors such as CU traits, is needed to further our understanding of potential bidirectional mechanisms. It could be that a small group of youths with higher levels of CU traits compared with the normative group are more likely to be bullies who then receive retaliation. Such a longitudinal investigation could also help us to understand why youths with decreasing levels of CU traits, compared with the normative group, have higher levels of physical

victimization in adolescence. Perhaps these youths, who are also likely to have high levels of conduct problems in early childhood (Fontaine et al., 2010), are also likely to be physically victimized in early elementary school and beyond in to adolescence (Burk et al., 2011; Scholte, Engels, Overbeek, de Kemp, & Haselager, 2007).

Second, our findings suggest that not considering the distinctive trajectories of CU traits and aggregating the different forms of peer victimization could blur the associations between CU traits and peer victimization risk. We found that CU traits in childhood predicted peer victimization but that this association depended on the trajectories of CU traits and the forms of peer victimization under examination. Of importance, only youths on the increasing trajectory of CU traits had significantly higher levels of all forms of peer victimization, not accounted for by conduct problems, emotional problems, family SES, and negative parental discipline. One potential explanation for this finding could be that youths with irritable dispositions may develop CU traits via adverse experiences in the social environment, such as peer victimization (Barker & Salekin, 2012). In our prior work, we found that youths on the increasing trajectory of CU traits were more likely than the ones on the stable low trajectory to have higher rates of conduct problems in early and late childhood (Fontaine et al., 2010). Because conduct problems are associated with irritability (Stringaris & Goodman, 2009) and peer victimization (Ladd & Troop-Gordon, 2003; Snyder et al., 2003), these youths could have been ensnared into a social mechanism in which high levels of conduct problems increased their likelihood for being irritable and being victimized by peers, which in turn could have led to the development of CU traits and other adjustment problems (e.g., internalizing problems; Barker & Salekin, 2012) and thus further peer victimization. Additional research would be needed to test such a mechanism. This bears on the idea of secondary CU traits in youths, for whom it has been hypothesized that CU traits develop as a coping style to adapt to adverse social experiences (in contrast to primary CU traits, which have been theorized as an inherent deficit that is manifested by an absence of conscience, lack of guilt, and no feeling or regard for others; see, e.g., Fanti, Demetriou, & Kimonis, 2013; Kahn et al., 2013). Youths identified with secondary CU traits have been characterized by high levels of anxiety and other important adjustment problems, such as aggressive behavior (Fanti et al., 2013; Kahn et al., 2013), which could place them at a particularly high risk for being the targets of different forms of peer victimization.

Third, as previously reported in past studies (Due et al., 2009; Hodges et al., 1997; Schwartz et al., 1997), we found that conduct problems, emotional problems, low family SES, and negative parental discipline were significant predictors of peer victimization. Notably, these findings suggest that higher levels of negative parental discipline confer a heightened likelihood for all forms of peer victimization. Future analyses, using a monozygotic twin

differences design, would be useful to investigate whether negative parental discipline is a nonshared environmental risk factor for peer victimization (i.e., a unique environmental experience that makes family members different from each other, independently of genetics; see, e.g., Viding, Fontaine, Oliver, & Plomin, 2009).

Fourth, consistent with previous research (Fanti & Kimonis, 2012), we did not find strong support for a moderation effect of sex on the associations between CU traits and peer victimization, with the exception that being on the stable high trajectory compared to the stable low trajectory was associated with higher levels of verbal victimization in girls but not in boys. Overall, this suggests that the trajectories of CU traits did not significantly differ for boys and girls in the prediction of peer victimization.

This study has a number of important strengths, including the use of a large population-based sample of youths followed longitudinally; the inclusion of data collected from different sources of information, specifically the teachers, the parents (usually the mothers), and the youths; and the examination of developmental varying levels of CU traits (i.e., trajectories identified through a group-based approach), as well as different forms of peer victimization. However, a number of limitations should also be noted. First, data on bullying behavior perpetrated by the participants were not collected at 14 years old, impeding our ability to test whether youths with CU traits were bully-victims in adolescence (whether they were bullied and were bullied by others). Second, given the small number of participants in some of the trajectories (the stable high trajectory more particularly), our capacity to detect significant interactions between sex and the trajectories of CU traits may have been limited. Third, most longitudinal studies are afflicted by attrition, as there was in this study. Notably, adolescents with behavioral problems may be unwilling to continue participation in a study into which their parents initially enrolled them, and initially cooperative parents may drop out at later ages of their children even if their children remain in the study (Asendorpf et al., 2014). The attrition could have led to a loss of power to detect effects and may also bias the findings to those participants who continued to be involved in the study if they differ on key characteristics from those who dropped out. We used a maximum likelihood approach to minimize the possibility of biased estimates. Fourth, the contrast analyses between the trajectories were performed using trajectory membership (i.e., assignment based on the posterior probabilities of each individual's most likely trajectory membership). Although this approach is clinically relevant, it is important to note that trajectories only approximate the developmental course of subgroups in the population (Nagin & Odgers, 2010). Fifth, our study was based on a population-based sample of youths from the United Kingdom. Replications are needed with youths from various backgrounds to examine the generalizability of the findings.

A number of implications for clinical practice should be noted. The findings suggest that youths with CU traits in childhood could benefit from specific bullying prevention programs; they are more likely to be the targets of physical victimization, potentially as bullies who then received retaliation. Early prevention programs may particularly be beneficial for youths at risk for developing increasing levels of CU traits over time. These youths, who may be characterized by secondary CU traits (i.e., CU traits that develop as a result of adverse social experiences, such as peer victimization), could be at particularly high risk for recurrent peer victimization given their emotional and behavioral profile (i.e., high levels of anxiety and aggressive behavior). In addition, because these youths may be overreactive to threat-related situations (Kimonis, Frick, Cauffman, Goldweber, & Skeem, 2012), they could also be at high risk for developing severe adjustment problems as a consequence of peer victimization and thus could be in need of psychological support.

Interventions could, for example, focus on the peer group of youths who have CU traits. Prior research suggests that youths with conduct problems and CU traits tend to associate with deviant peers (Kimonis, Frick, & Barry, 2004) and that deviant peers tend to act aggressively toward their friends, foster hostile intents and retaliation against their friends, and reinforce aggressive behavior within their peer group (Vitaro et al., 2011). Therefore, victimization in some youths with CU traits could be, at least in part, explained by their affiliation with deviant peers who act aggressively toward each other and who reinforce such behavior (Barker & Salekin, 2012). Interventions that foster affiliation with nondeviant peers may be effective to reduce peer victimization in youths with dispositions for CU traits (e.g., integrating prosocial peers in programs that target youths with CU traits and conduct problems; Feldman, 1992; Fontaine & Vitaro, 2006). Such programs should be closely monitored, and it should be ensured that the nondeviant peers are not adversely affected by them.

In sum, our study documented that trajectories of CU traits in childhood predicted different forms of peer victimization in adolescence. Youths on the stable high and decreasing trajectories were found to have higher levels of physical victimization, whereas youths on the increasing trajectory had higher levels of all forms of peer victimization, over and above conduct problems, emotional problems, family SES, and negative parental discipline. Further investigation is needed to gain a better understanding of the longitudinal mechanisms linking CU traits to peer victimization.

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#### REFERENCES

- Arseneault, L., Bowes, L., & Shakoor, S. (2010). Bullying victimization in youths and mental health problems: 'Much ado about nothing'? *Psychological Medicine, 40*, 717–729. doi:10.1017/S0033291709991383
- Asendorpf, J. B., van de Schoot, R., Denissen, J. J. A., & Hutteman, R. (2014). Reducing bias due to systematic attrition in longitudinal studies: The benefits of multiple imputation. *International Journal of Behavioral Developmental, 38*, 453–460. doi:10.1177/0165025414542713
- 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. doi:10.1097/CHI.0b013e31817eec98
- Barker, E. D., & Salekin, R. T. (2012). Irritable oppositional defiance and callous unemotional traits: Is the association partially explained by peer victimization? *Journal of Child Psychology and Psychiatry, 53*, 1167–1175. doi:10.1111/j.1469-7610.2012.02579.x
- Burk, L. R., Armstrong, J. M., Park, J.-H., Zahn-Waxler, C., Klein, M. H., & Essex, M. J. (2011). Stability of early identified aggressive victim status in elementary school and associations with later mental health problems and functional impairments. *Journal of Abnormal Child Psychology, 39*, 225–238. doi:10.1007/s10802-010-9454-6
- Ciucci, E., & Baroncelli, A. (2014). The emotional core of bullying: Further evidences of the role of callous-unemotional traits and empathy. *Personality and Individual Differences, 67*, 69–74. doi:10.1016/j.paid.2013.09.033
- Crapanzano, A. M., Frick, P. J., Childs, K., & Terranova, A. M. (2011). Gender differences in the assessment, stability, and correlates to bullying roles in middle school children. *Behavioral Sciences & the Law, 29*, 677–694. doi:10.1002/bsl.1000
- Deater-Deckard, K., Dodge, K. A., Bates, J. E., & Pettit, G. S. (1998). Multiple risk factors in the development of externalizing behavior problems: Group and individual differences. *Development and Psychopathology, 10*, 469–493. doi:10.1017/S0954579498001709
- Due, P., Merlo, J., Harel-Fisch, Y., Damsgaard, M. T., Holstein, B. E., Hetland, J., ... Lynch, J. (2009). Socioeconomic inequality in exposure to bullying during adolescence: A comparative, cross-sectional, multi-level study in 35 countries. *American Journal of Public Health, 99*, 907–914. doi:10.2105/AJPH.2008.139303
- Fanti, K. A., Demetriou, C. A., & Kimonis, E. R. (2013). Variants of callous-unemotional conduct problems in a community sample of adolescents. *Journal of Youth and Adolescence, 42*, 964–979. doi:10.1007/s10964-013-9958-9
- 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. doi:10.1007/s10862-008-9111-3

- Fanti, K. A., & Kimonis, E. R. (2012). Bullying and victimization: The role of conduct problems and psychopathic traits. *Journal of Research on Adolescence*, 22, 617–631. doi:10.1111/j.1532-7795.2012.00809.x
- Feldman, R. A. (1992). The St. Louis experiment: Effective treatment of antisocial youths in prosocial peer groups. In J. McCord, & R. E. Tremblay (Eds.), *Preventing antisocial behaviour: Interventions from birth through adolescence* (pp. 233–252). New York, NY: Guilford Press.
- Fontaine, N. M. G., McCrory, E. J. P., Boivin, M., Moffitt, T. E., & Viding, E. (2011). Predictors and outcomes of joint trajectories of callous-unemotional traits and conduct problems in childhood. *Journal of Abnormal Psychology*, 120, 730–742. doi:10.1037/a0022620
- Fontaine, N. M. G., Rijdsdijk, F. V., McCrory, E. J. P., & Viding, E. (2010). Etiology of different developmental trajectories of callous-unemotional traits. *Journal of the American Academy of Child and Adolescent Psychiatry*, 49, 656–664. doi:10.1016/j.jaac.2010.03.014
- Fontaine, N., & Vitaro, F. (2006). Use of prosocial peers in intervention programs targeting youths with adjustment problems. *Revue De Psychoéducation*, 35, 11–42.
- Frick, P. J., & Hare, R. D. (2001). *Antisocial process screening device (APSD)*. Toronto, Canada: Multi-Health Systems.
- Frick, P. J., & Viding, E. (2009). Antisocial behavior from a developmental psychopathology perspective. *Development and Psychopathology*, 21, 1111–1131. doi:10.1017/S0954579409990071
- Goodman, R. (1997). The strengths and difficulties questionnaire: A research note. *Journal of Child Psychology and Psychiatry*, 38, 581–586. doi:10.1111/jcpp.1997.38.issue-5
- Hodges, E. V. E., Malone, M. J., & Perry, D. G. (1997). Individual risk and social risk as interacting determinants of victimization in the peer group. *Developmental Psychology*, 33, 1032–1039. doi:10.1037/0012-1649.33.6.1032
- Kahn, R. E., Frick, P. J., Youngstrom, E. A., Youngstrom, J. K., Feeny, N. C., & Findling, R. L. (2013). Distinguishing primary and secondary variants of callous-unemotional traits among adolescents in a clinic-referred sample. *Psychological Assessment*, 25, 966–978. doi:10.1037/a0032880
- Kimonis, E. R., Frick, P. J., & Barry, C. T. (2004). Callous-unemotional traits and delinquent peer affiliation. *Journal of Consulting and Clinical Psychology*, 72, 956–966. doi:10.1037/0022-006X.72.6.956
- Kimonis, E. R., Frick, P. J., Cauffman, E., Goldweber, A., & Skeem, J. (2012). Primary and secondary variants of juvenile psychopathy differ in emotional processing. *Development and Psychopathology*, 24, 1091–1103. doi:10.1017/S0954579412000557
- Klingzell, I., Fanti, K. A., Colins, O. F., Frogner, L., Andershed, A.-K., & Andershed, H. (2015). Early childhood trajectories of conduct problems and callous-unemotional traits: The role of fearlessness and psychopathic personality dimensions. *Child Psychiatry and Human Development*, Online published. doi:10.1007/s10578-015-0560-0
- Knafo, A., & Plomin, R. (2006). Parental discipline and affection and children's prosocial behavior: Genetic and environmental links. *Journal of Personality and Social Psychology*, 90, 147–164. doi:10.1037/0022-3514.90.1.147
- Ladd, G. W., & Troop-Gordon, W. (2003). The role of chronic peer difficulties in the development of children's psychological adjustment problems. *Child Development*, 74, 1344–1367. doi:10.1111/cdev.2003.74.issue-5
- Muñoz, L. C., Qualter, P., & Padgett, G. (2011). Empathy and bullying: Exploring the influence of callous-unemotional traits. *Child Psychiatry & Human Development*, 42, 183–196. doi:10.1007/s10578-010-0206-1
- Muthén, L. K., & Muthén, B. O. (1998–2011). *Mplus user's guide* (6th ed.). Los Angeles, CA: Muthén & Muthén.
- Mynard, H., & Joseph, S. (2000). Development of the multidimensional peer-victimization scale. *Aggressive Behavior*, 26, 169–178. doi:10.1002/(SICI)1098-2337(2000)26:2<169::AID-AB3>3.0.CO;2-A
- Nagin, D. S., & Odgers, C. L. (2010). Group-based trajectory modeling in clinical research. *Annual Review of Clinical Psychology*, 6, 109–138. doi:10.1146/annurev.clinpsy.121208.131413
- Nansel, T. R., Craig, W., Overpeck, M. D., Saluja, G., Ruan, J., & Health Behaviour in School-aged Children Bullying Analyses. (2004). Cross-national consistency in the relationship between bullying behaviors and psychosocial adjustment. *Archives of Pediatrics & Adolescent Medicine*, 158, 730–736. doi:10.1001/archpedi.158.8.730
- Nansel, T. R., Overpeck, M., Pilla, R. S., Ruan, J., Simons-Morton, B., & Scheidt, P. (2001). Bullying behaviors among US youth: Prevalence and association with psychosocial adjustment. *Journal of the American Medical Association (JAMA)*, 285, 2094–2100. doi:10.1001/jama.285.16.2094
- Oliver, B. R., & Plomin, R. (2007). Twins' Early Development Study (TEDS): A multivariate, longitudinal genetic investigation of language, cognition and behavior problems from childhood through adolescence. *Twin Research and Human Genetics*, 10, 96–105. doi:10.1375/twin.10.1.96
- Olweus, D. (2013). School bullying: Development and some important challenges. *Annual Review of Clinical Psychology*, 9, 751–780. doi:10.1146/annurev-clinpsy-050212-185516
- 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. doi:10.1037/0022-0663.91.2.216
- Petrill, S. A., Pike, A., Price, T., & Plomin, R. (2004). Chaos in the home and socioeconomic status are associated with cognitive development in early childhood: Environmental mediators identified in a genetic design. *Intelligence*, 32, 445–460. doi:10.1016/j.intell.2004.06.010
- Scholte, R. H. J., Engels, R. C. M. E., Overbeek, G., de Kemp, R. A. T., & Haselager, G. T. (2007). Stability in bullying and victimization and its association with social adjustment in childhood and adolescence. *Journal of Abnormal Child Psychology*, 35, 217–228. doi:10.1007/s10802-006-9074-3
- Schwartz, D., Dodge, K. A., Pettit, G. S., & Bates, J. E. (1997). The early socialization of aggressive victims of bullying. *Child Development*, 68, 665–675. doi:10.2307/1132117
- Shakoor, S., Jaffee, S. R., Andreou, P., Bowes, L., Ambler, A. P., Caspi, A., ... Arseneault, L. (2011). Mothers and children as informants of bullying victimization: Results from an epidemiological cohort of children. *Journal of Abnormal Child Psychology*, 39, 379–387. doi:10.1007/s10802-010-9463-5
- Snyder, J., Brooker, M., Patrick, M. R., Snyder, A., Schrepferman, L., & Stoolmiller, M. (2003). Observed peer victimization during early elementary school: Continuity, growth, and relation to risk for child antisocial and depressive behavior. *Child Development*, 74, 1881–1898. doi:10.1046/j.1467-8624.2003.00644.x
- Stringaris, A., & Goodman, R. (2009). Three dimensions of oppositionality in youth. *Journal of Child Psychology and Psychiatry*, 50, 216–223. doi:10.1111/j.1469-7610.2008.01989.x
- Trouton, A., Spinath, F. M., & Plomin, R. (2002). Twins Early Development Study (TEDS): A multivariate, longitudinal genetic investigation of language, cognition and behavior problems in childhood. *Twin Research*, 5, 444–448. doi:10.1375/136905202320906255
- 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. doi:10.1111/j.1469-7610.2004.00393.x
- Viding, E., Fontaine, N. M. G., Oliver, B. R., & Plomin, R. (2009). Negative parental discipline, conduct problems and callous-unemotional traits: Monozygotic twin differences study. *The British Journal of Psychiatry*, 195, 414–419. doi:10.1192/bjp.bp.108.061192
- Viding, E., Simmonds, E., Petrides, K. V., & Frederickson, N. (2009). The contribution of callous-unemotional traits and conduct problems to bullying in early adolescence. *Journal of Child Psychology and Psychiatry*, 50, 471–481. doi:10.1111/j.1469-7610.2008.02012.x
- 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. doi:10.1111/j.1467-8624.2010.01570.x