



# Attachment to others and callous-unemotional traits in a sample of high school students

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## Abstract

Although several evidences suggested the importance to consider the quality of relationships with others as a key element for the understanding of callous-unemotional traits in youths, to date few studies investigated the specific role of youths' attachment. The aim of the present study was to explore the association between attachment styles and callous-unemotional traits within a community sample of 786 high school students (41.48% females,  $M$  age = 16.90 years,  $SD$  = 1.45 years). A linear hierarchical regression approach showed that, over and above gender, age, and levels of both internalizing and externalizing problems, unique variance in callous-unemotional traits was accounted for by low confidence, high discomfort with closeness, and low preoccupation with relationships. Moreover, focusing on specific subcomponents of callous-unemotional traits, it was found that high levels of perceiving relationships as secondary were related to the callous-lack of empathy component, while higher levels in discomfort with closeness were associated to the restricted affect component. Emerged results were discussed within the context of the Sensitivity to Threat and Affiliative Reward (STAR) Model, that was recently advanced to in-depth understand callous-unemotional traits in children and adolescents.

**Keywords** Callous-unemotional traits · Social relationships · Attachment · High school · Adolescence

## Introduction

The present paper was realized to investigate the associations between attachment styles to others and the affective feature of psychopathy in youth (also called callous-unemotional traits - or CU traits) within a sample of high school students. Psychopathy is a severe disorder characterized by an interpersonal dimension (i.e., narcissism and social manipulation), an affective dimension (i.e., low levels of empathy, lack of guilt for misdeeds, lack of motivation to perform well in important activities, shallow emotions), and a behavioral dimension (i.e., impulsivity and irresponsibility; Blair et al., 2005; Hare, 2003). In samples of children and adolescents, a specific interest has been pointed to the affective dimension - or CU traits - considering that it was proved to be the most important in order to designate a unique subgroup of antisocial youths with severe manifestations and high resistance to traditional treatments (Frick & Ray, 2015). The impact of CU traits has been recognized within the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (i.e., DSM-5; American Psychiatric Association, 2013), that included a specifier for youths

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with conduct disorder who also display significant levels of CU traits (i.e., the “With limited prosocial emotions” specifier). In the last two decades, a growing body of research has explored the socioemotional correlates to CU traits in clinical, referred, and community samples of youths, highlighting that children and adolescents high in CU traits present severe impairments in social relationships with others (e.g., Waller & Wagner, 2019). To date, there is evidence to suggest that parent-child relationships may influence the socialization of antisocial children high on CU traits (e.g., Hawes et al., 2011, Pasalich et al., 2011). The focus on youths’ quality of relationships with others in terms of attachment styles - that form mental representations (i.e., cognitive-affective schemas) of interpersonal relationships - is surprisingly still scarce. Moreover, the interest in the in-depth understanding of the “With limited prosocial emotions” specifier in the DSM-5 (American Psychiatric Association, 2013), along with recent progress on available measuring instruments in this regard (Kliem et al., 2020; Koutsogiorgi et al., 2021), has prompted us to conduct our investigation by considering both a general measure of CU traits as well as their specific facets in relations with attachment styles.

### Relationships with others and CU traits

A large amount of research established that both children and adolescents high in CU traits present impaired social relationships with others, and a recent theoretical approach (i.e., the Sensitivity to Threat and Affiliative Reward Model - or STAR Model) has highlighted that these impairments do not merely represent a final maladaptive outcome (Waller & Wagner, 2019). Specifically, they are part of a recursive mechanism that includes low affiliative reward (i.e., defined in terms of either low desire for or pleasure from closeness in social relationships) among its main components. In detail, low affiliative reward is theorized to developmentally result from temperament-based risk factors (i.e., reduced neural sensitivity to social cues) that are exacerbated by environmental risk factors experienced in close relationships (i.e., harsh, punitive, and threatening relationships, as well as decrement or absence of affiliative inputs from others; Waller & Wagner 2019). During the development, low levels of affiliative reward would result in the impairment of several relational processes (e.g., sensitivity, caring, and social proximity-seeking behaviors) that undermine empathy and conscience, and further favor the development of CU traits (Waller & Wagner, 2019; Waller et al., 2020). This model can be read in line with an early work of Bowlby (1944), according to which children who fail in bonding with primary caregivers are at risk for the development of a condition called “affectionless psychopathy”, characterized

by the hypoactivation of concern, empathy, and prosocial behaviors toward others.

The STAR Model has its theoretical foundation in studies on parent-child relationship that suggested an evocative gene-environment correlational mechanism (Plomin et al., 1977) between youths and their parents. Specifically, children’s genetic predispositions to develop CU traits would promote maladaptive parenting practices over time (e.g., inconsistency in discipline administration, harsh parenting, low parental monitoring, low parental involvement), further contributing to the development of CU traits in both childhood and adolescence (e.g., Hawes et al., 2011; Muñoz et al., 2011; Trentacosta et al., 2019). Similarly, recent studies on student-teacher relationship are contributing to trace an analogous picture: even if still limited in number, there are increasing evidences that suggest both the disrupting effect of CU traits on the relationship with teachers (Crum et al., 2016; Horan et al., 2016), as well as the protective effect of a positive student-teacher relationship for the development of CU traits (Baroncelli & Ciucci, 2020; Baroncelli et al., 2022; Fisher & Brown, 2018). Considering this, it seems important to better understand how individuals who are particularly detached and low affiliative represent relationships with others in terms of attachment styles.

As for relationships with peers, CU traits are associated to low empathic and prosocial behaviors, as well as to both reactive and proactive aggression (including bullying and cyberbullying behaviors; Ciucci et al., 2014; Roose et al., 2010; Waller et al., 2020). Importantly, these correlates are specific of CU traits, over and above the role of co-occurring conduct problems (Golmaryami et al., 2016; Viding et al., 2009). Moreover, in line with a low affiliative profile, youths high in CU traits are perceived by peers as mean, aloof, untrustworthy (Matlasz et al., 2020), and low sociable (Wagner et al., 2020). Nevertheless, they do not seem to be necessarily characterized by social rejection within peer group (Matlasz et al., 2020); they also have skills to make friends, with whom they are likely to involve in deviant activities (Kimonis et al., 2004; Muñoz et al., 2008) according to an active gene-environment correlation mechanism (Plomin et al., 1977). It therefore seems appropriate to in-depth explore the quality of these relationships: on the one hand they could be instrumental in carrying out deviant behaviors, on the other they could be characterized by emotional disengagement, since recent evidences have shown that higher levels of CU traits were associated to more loneliness, less intimate exchange, and less satisfaction with friends in 8-to-13 years old children (Haas et al., 2018), and to lower friendship quality within a sample of adjudicated adolescents (Miron et al., 2020).

## Attachment and CU traits

Attachment styles have been proposed within the context of the attachment theory originally developed by Bowlby (1969) and expanded in the following decades, and describe how people relate to others in the context of intimate relationships (VandenBos, 2015). Attachment theory (Bowlby, 1969) highlighted the importance of children's early relationships with primary caregivers: in stressful situations, children seek proximity to their caregivers to reach physical and emotional security; the adults, on their part, react to children's need of security with different degrees of sensitivity and responsiveness. The specific experiences with primary caregivers define specific attachment styles (Ainsworth et al., 1978), that are central in orienting future relationships and the development of personality. Main and colleagues (1985) expanded the investigation of attachment into later life periods, exploring adolescents' and adults' attachment with primary caregivers or with other social partners involved in emotionally pregnant relationships related to the search for security (e.g., romantic relationships; Bartholomew 1990; Hazan & Shavers, 1987). It would be out of the aim of the present paper to report decades of research on attachment (e.g., Ainsworth et al., 1978; Bartholomew, 1990; Hazan & Shavers, 1987; Main et al., 1985); we limit to briefly describe three attachment styles derived from the above-reported classic studies. The first style refers to the "secure attachment": it includes the perception of social partners as responsive and trustworthy, and the perception of the Self as worthy of love and confident in socializing with others. The "insecure-anxious attachment" - also called "resistant" in Ainsworth et al. (1978)'s model, or "preoccupied" in both Main et al. (1985)'s and Bartholomew (1990)'s models - includes social partners considered as inconsistent, insufficient, or unavailable, along with the Self considered as not worthy of love, even if in high search of proximity, approval, and confirmations. Lastly, the "insecure-avoidant attachment" involves the representation of close relationships as something to distance the Self from; according to Bartholomew (1990), this can be the result of either a hyperaccentuated self-sufficient Self that has not the need or the desire for close relationships ("dismissing-avoidant attachment"), or a conscious desire for relationships that is inhibited by the intense fear of being rejected ("fearful-avoidant attachment"). According to Baldwin (1992), attachment styles can be considered as relational schemas, i.e., cognitive structures that represent regularities in patterns of interpersonal relatedness and act as cognitive maps to navigate social world, contributing to the definition of the nature of the Self, other people and social relationships.

In the field of research on CU traits, there are only a few examples of studies focused on attachment. As for

children, Pasalich et al. (2012) used the Manchester Child Attachment Story Task (Green et al., 2000) finding that, in a clinical sample of 3-to-9 years old male children with early-onset conduct problems, subjects with higher levels of CU traits were more likely to show a disorganized attachment style to primary caregivers (i.e., a style characterized by the simultaneous activation of incompatible attachment styles). As for adolescents, Gambin et al. (2018) tested the relations between three distinct dimensions of psychopathic traits (i.e., CU traits, narcissism, and impulsivity) and the attachment style coming from the Child Attachment Interview (Shmueli-Goetz et al., 2008) in a clinical sample of adolescents with psychiatric diagnoses. While no significant results emerged for girls, parent-reported CU traits in boys were the only dimension among the three scales related to psychopathic traits that were negatively associated to the level of coherence in the production of attachment-related narratives. Specifically, CU traits in boys were characterized by low emotional openness (i.e., the ability to describe feelings of attachment figures, including the role of emotions in interactions with them), low balance of description (i.e., the ability to recognize and integrate both positive and negative aspects of attachment figures), and low resolution of conflict (i.e., the ability to describe constructive resolutions of conflicts). Moreover, boys classified with a dismissing attachment style to both mothers and fathers, as well as boys classified with a preoccupied attachment style to mothers, presented higher levels of CU traits compared to boys classified with a secure attachment style. In accordance with a model that considers the quality of relationships with multiple social partners - and therefore goes beyond experiences with primary caregivers, a study by Holmqvist (2008) that used the Attachment Scale Questionnaire (ASQ; Feeney et al., 1994) within a sample of 47 young male criminal offenders found a tendency of a positive correlation between the proneness to consider relationships with others as secondary and CU traits ( $r = .36, p = .06$ ). As a result, extant evidences are fragmentary, mainly focused on clinical samples, and therefore in want of further investigations.

## The present study

In the present study, we aimed to start from the above-reported literature and to focus on youths' quality of relationships with others in terms of attachment styles, to further investigate the associations between attachment and CU traits, by addressing specific points.

First, considering the importance of youths' intimate relationships with parents, teachers, and peers in the developmental pathways to CU traits, we aimed to assess attachment styles regardless of specific relational partners. To do so, we elected a specific tool (i.e., the Attachment Style

Questionnaire, ASQ by Feeney et al., 1994) that contains items referring in a general way to “other people”. Moreover, the ASQ refined the above-presented classic attachment styles, allowing to focus on five different attachment styles (Feeney et al., 1994; Fossati et al., 2003): “confidence” (in Self and others) refers to a secure attachment style, in which the Self is perceived as effective in social relationships, and others are perceived as responsive and trustworthy; “discomfort with closeness” and “relationships as secondary” reflect aspects of insecure-avoidant attachment: the former is in line with the conceptualization proposed by Hazan and Shavers (1987), in which the distrust of relationships is linked with a perceived inability to develop closeness with others, while the latter refers to the dismissing style proposed by Bartholomew (1990), in which a hyper-accentuated self-sufficient Self denies the need of others; “need for approval” and “preoccupation with relationships” tap the area of insecure-anxious attachment: the first one reflects the preoccupied attachment style proposed by Bartholomew (1990), in which an exacerbated need for acceptance and confirmation from others goes along with self-devaluation and the perception of not being worthy of esteem and love on the part of others, while the second one is in line with the proposal by Hazan and Shaver (1987), according to which the approach to relationships with others is defined by both the desire for intimacy and the fear of abandonment based on the perception that others are unresponsive or inconsistent.

Second, we adopted a widely used measure of CU traits (i.e., the Inventory of Callous-Unemotional Traits - ICU; Essau et al., 2006), that recently has been in-depth investigated about its factor structure (Kliem et al., 2020; Koutsogiorgi et al., 2021), providing support for the presence of a general total factor and four subfactors corresponding with the four specific symptoms of the “With limited prosocial emotions” specifier in the DSM-5: lack of remorse (i.e., lack of remorse and guilt for the negative consequences of own actions), limited concern for performance (i.e., lack of efforts or unconcern about performances at school or in other important activities), callous-lack of empathy (i.e., to be cold, uncaring for others’ wellbeing, or unconcerned for others’ feelings in pursuing own goals), and restricted affect (i.e., shallow, insincere, or superficial expression of own emotions to others). In so doing, we were able to refine results, testing associations with both the whole construct of CU traits, as well as with its specific subcomponents.

Third, while previous research considered clinical or criminal samples of youths, the present paper focused on a large community sample of adolescents with the aim of obtaining useful evidences to inform developmental pathways to CU traits in non-clinical youths. Nevertheless, we paid particular attention to consider the unique associations

between attachment styles and CU traits over and above the co-occurring role of both internalizing and externalizing problems, considering that both these conditions have been proven to be related to both attachment styles (Muris et al., 2003; Rönnlund & Karlsson, 2006) and CU traits (Fanti et al., 2013; Frick & Ray, 2015).

Fourth, we noted that the above-reported research on attachment and CU traits was either conducted on male samples (Holmqvist, 2008; Pasalich et al., 2012) or did not find significant results for girls (Gambin et al., 2018). Consequently, we were interested to in-depth investigate potential gender differences by considering gender as a moderator.

The study was guided by specific hypotheses. In line with empirical results by Holmqvist (2008), as well as with the assertion that impairments in either desire for or pleasure from closeness in social relationships are a key component of CU traits (see the STAR Model by Waller & Wagner, 2019), we predicted that aspects related to avoidant attachment (i.e., discomfort with closeness and relationships as secondary) presented unique and positive associations with CU traits, as well as we expected that higher levels of confidence in social relationships were uniquely and negatively related to CU traits; moreover, considering that anxious attachment reflects a cognitive and emotional hyper-focusing on others, we predicted that need for approval and preoccupation with relationships presented unique and negative associations with CU traits (Hypothesis 1). Focusing on the specific facets of CU traits, we predicted a negative relation between need for approval and both the lack of remorse and the limited concern for performance facets of CU traits; in other words, we hypothesized that an hyper activated seeking for acceptance from others does not fit well with the tendency to show irresponsiveness in terms of remorse and guilt for the negative consequences of own actions, or with the unconcern for results obtained at school or in other contexts (Hypotheses 2 and 3). Further, we expected that the attachment style characterized by considering relationships as secondary was uniquely and positively related to the callous-lack of empathy facet of CU traits, that taps an uncaring disposition toward others’ feelings (Hypothesis 4). Finally, we predicted that confidence (negatively) and both discomfort with closeness and relationships as secondary (positively) were uniquely related to the facet of CU traits concerning restricted affect, that pertains to the unavailability to share own emotional experience with others; in fact, the three above-mentioned attachment styles contain a disposition to confidently share (or not to share) one’s own internal experience with others, and we predicted that each of them added unique variance in the association with the restricted affect that characterizes CU traits (Hypothesis 5). The role of gender was tested in an exploratory manner, and no specific hypotheses were advanced.

## Materials and methods

### Participants and procedure

The present research was realized within a convenience sample of middle school students. The research program was presented to the deans and the school staff of five different public High School Institutions in central-southern Italy. In Italy, the vast majority of adolescents attend public High School Institutions, that provide different types of school careers (i.e., lyceums vs. technical or vocational schools) even if they are similar for the organization in terms of timing, and allow to achieve a final diploma that eventually consents the access to any university course. Each contacted High School Institution was asked to involve all students pertaining to the class groups of the five grades that constitute high school in Italy (i.e., from grade 9th to grade 13th). The research program was approved by the school boards; one Institution involved all class groups, while the others chose part of them according to their internal organizational aspects.

An initial sample of nearly 1,000 students was contacted and written informed consent was sent to both parents of students under the age of 18, or directly to students aged 18 or older. Data collection was conducted by trained assistants during school hours involving all students that returned the compiled informed consent, and students without the compiled informed consent were invited by teachers to realize alternative activities. Subsequently, data were coded excluding participants with difficulties in understanding the questionnaires (e.g., due to unfamiliarity with Italian language or intellectual disability) as per the indication of teachers or the ascertainment of trained assistants during data collection. Moreover, participants out of the normative range for attending high school in Italy (i.e., the end of school is expected within 19 years) were excluded. As a result, the present sample was made up by 786 adolescent high school students (41.48% females; 68.45% coming from lyceums and 31.55% coming from technical or vocational high schools), ranging in age from 14 to 19 years ( $M$  age = 16.90,  $SD$  = 1.45). More than 90.00% were from Italian background (i.e., raised and educated within Italy), and all were able to read and speak Italian.

### Measures

*Attachment Style Questionnaire - ASQ* (Feeney et al., 1994; Italian version by Fossati et al., 2003). This is a 40-item self-report questionnaire that assesses five attachment styles: confidence (8 items, e.g., “*I feel confident that other people will be there for me when I need them*”, Cronbach’s alpha in the present sample = .69), discomfort with closeness (10

items, e.g., “*I find it hard to trust other people*”, alpha in the present sample = .75), relationships as secondary (7 items, e.g., “*To ask for help is to admit that you’re a failure*”, alpha in the present sample = .73), need for approval (7 items, e.g., “*It’s important to me that others like me*”, alpha in the present sample = .68), preoccupation with relationships (8 items, e.g., “*I worry a lot about my relationships*”, alpha in the present sample = .74). Participants were invited to indicate their agreement with each item using a 6-point Likert-type scale from 1 (totally disagree) to 6 (totally agree), and a mean score was calculated for each of the five attachment dimensions.

*Inventory of Callous-Unemotional Traits - ICU* (Essau et al., 2006; Italian version by Ciucci et al., 2014). It is a 24-item self-report questionnaire that assesses CU traits in youths. Students were asked to indicate their agreement with each item using a 4-point Likert-type scale (from 0 = “not at all true” to 3 = “definitely true”). In line with past studies (e.g., Ciucci et al., 2014; Kimonis et al., 2008), items 2 and 10 were excluded. Even if past studies suggested the presence of a total score as well as three distinct callous, uncaring, and unemotional subdimensions, it was recommended to use only the total score, since the three subdimensions do have not a clear theoretical background, showed inconsistent correlates, and may reflect item wording (Frick & Ray, 2015); in the present sample the ICU total score showed an alpha score = .82. A very recent in-depth investigation of ICU factor structure that used an advanced technique to account for item wording direction has provided initial support for the consideration of four subfactors corresponding with the four specific symptoms of the “With limited prosocial emotions” specifier in the DSM-5 (Kliem et al., 2020; Koutsogiorgi et al., 2021): lack of remorse (5 items, e.g., “*I feel bad or guilty when I do something wrong*”, reversed score, alpha in the present sample = .59), limited concern for performance (6 items, e.g., “*I care about how well I do at school or work*”, reversed score, alpha in the present sample = .72), callous-lack of empathy (6 items, e.g., “*The feelings of others are unimportant to me*”, alpha in the present sample = .65), and restricted affect (5 items, e.g., “*I hide my feelings from others*”, alpha in the present sample = .73). A mean score was calculated for the ICU total score, as well as for each of the four specific dimensions.

*The Strengths and Difficulties Questionnaire - SDQ* (Goodman et al., 1998; Italian version by Riso et al., 2010). It is a 25-item self-report questionnaire widely used to assess adjustment difficulties and prosocial behaviors among youths. According to the factor structure provided by Di Riso and colleagues (2010), in the present study we adopted the subscales related to internalizing problems (8 items, e.g., “*I have many fears, I am easily scared*”, alpha in the present sample = .75) and to externalizing problems (9

items, e.g., “*I am often accused of lying or cheating*”, alpha in the present sample = .75). Participants had to rate each item using a 3-point Likert scale (from 0 = “not true” to 2 = “certainly true”), and a mean score was calculated for each dimension.

## Data analyses

Descriptive statistics and bivariate associations (i.e., Pearson’s  $r$ ) were analyzed for all study variables. Main hypotheses were tested using linear hierarchical regressions, in which gender, age, internalizing, and externalizing problems were regressed onto CU traits - either the total score or a specific facet - in step 1; when each specific CU facet was considered as dependent variable, the other three were inserted in step 1 as covariates, in order to control for their shared variance. The five specific ASQ scales were added in step 2: their simultaneous introduction allowed to control their shared variance and therefore to test their unique contribution in the association to CU traits, since previous studies (e.g., Fossati et al., 2003) showed that the subscales of the ASQ present significant correlations to each other. The five interactive effects between ASQ scales and gender were tested in step 3; since no significant results emerged, the report of these analyses was omitted. Considering the sizable sample size of the present study, following Gignac and Szodorai (2016) that indicated correlations of approximately .20 as typical (or medium), only associations that presented at least modest effect size (i.e.,  $r$  or  $\beta \geq .20$ , with  $p < .001$ ) were emphasized in the text to focus on the findings most likely to be meaningful and replicable. All analyses were conducted using the IBM SPSS Statistics 28 program (IBM Corp., 2019).

## Results

Descriptive statistics of study variables along with results of Pearson’s correlations were reported in Table 1; results for hierarchical regression analyses were reported in Table 2. First, we noted that internalizing problems ( $r$ s ranging from  $|.49|$  to  $|.54|$ ,  $p$ s  $< .001$ ) and externalizing problems ( $r$ s ranging from  $|.20|$  to  $|.28|$ ,  $p$ s  $< .001$ ) were significantly related to all scales derived from the ASQ, except for the weak positive association between internalizing problems and relationships as secondary ( $r = .13$ ,  $p < .001$ ). Moreover, externalizing problems were significantly related to all scales derived from the ICU ( $r$ s ranging from  $.22$  to  $.39$ ,  $p$ s  $< .001$ ), except for the weak positive association to restricted affect ( $r = .08$ ,  $p < .05$ ).

Over and above the role of gender, grade, and both internalizing and externalizing problems, the five scales related

to attachment styles added a 23% of explained variance: specifically, confidence ( $\beta = -.25$ ,  $p < .001$ ), discomfort for closeness ( $\beta = .23$ ,  $p < .001$ ), and preoccupation with relationships ( $\beta = -.33$ ,  $p < .001$ ) played a unique role in the association to CU traits. As for specific facets of CU traits, there was a positive association between relationships as secondary and callous-lack of empathy ( $\beta = .22$ ,  $p < .001$ ; 7% of explained variance added by step 2), as well as a positive association between discomfort with closeness and restricted affect ( $\beta = .33$ ,  $p < .001$ ; 15% of explained variance added by step 2); no remarkable associations emerged considering both lack of remorse and limited concern for performance.

## Discussion

The present study was realized to inform extant literature about the associations between attachment styles and CU traits within a large sample of adolescent high school students. Specifically, we adopted continuous measures related to attachment styles, and we used a continuous measure of CU traits that allows considering both a total score and four discreet facets related to the four symptoms of the “With limited prosocial emotions” specifier that is used in the DSM-5 (American Psychiatric Association, 2013) for youths with conduct disorder who also display significant levels of CU traits. Over and above the role of both internalizing and externalizing problems (i.e., important correlates of both attachment styles and CU traits; Fanti et al., 2013; Frick & Ray, 2015; Muris et al., 2003; Rönnlund & Karlsson, 2006), results partially confirmed our hypotheses.

Our first hypothesis was partially confirmed: the associations between the five specific attachment styles and CU traits were all in the expected direction, even if only three scales reached the magnitude of  $|\beta| \geq .20$ . Specifically, unique variance in CU traits was accounted for by low confidence, high discomfort with closeness, and low preoccupation with relationships. These results were not consistent with the only previous study by Holmqvist (2008), who adopted the same tool to assess attachment (i.e., the ASQ) and a different measure of CU traits (i.e., derived from the revised Hare’s Psychopathy Checklist - PCL; Hart et al., 1994): specifically, Holmqvist found only a near-significant correlation between relationships as secondary and CU traits within a sample of young male criminal offenders. The difference between Holmqvist’s and our results can be explained by considering both the different samples (respectively, male offenders versus high school students) and the different statistical approaches (respectively, zero-order correlations versus hierarchical regressions). Nevertheless, our results appear to be in line with the STAR Model proposed

**Table 1** Descriptive statistics and bivariate correlations (Pearson's *r*) between study variables

	M	SD	Possible Range	Observed Range	Skew.	Kurt.	1	2	3	4	5	6	7	8	9	10	11	12	13	
1- Age	16.90	1.45	-	14.00–19.00	-0.55	-0.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2- ASQ-Confidence	3.95	0.73	1.00–6.00	1.38–6.00	-0.21	0.05	.02	-	-	-	-	-	-	-	-	-	-	-	-	-
3- ASQ-Discomfort with Closeness	3.74	0.79	1.00–6.00	1.60–5.89	0.03	-0.21	.11**	-.50***	-	-	-	-	-	-	-	-	-	-	-	-
4- ASQ-Relationships as Secondary	2.32	0.79	1.00–6.00	1.00–5.00	0.56	0.13	.02	-.18***	.28***	-	-	-	-	-	-	-	-	-	-	-
5- ASQ-Need for Approval	3.15	0.91	1.00–6.00	1.00–6.00	0.25	-0.22	-.10**	-.34***	.32***	.16***	-	-	-	-	-	-	-	-	-	-
6- ASQ-Preoccupation with Relationships	3.71	0.86	1.00–6.00	1.13–5.88	-0.16	-0.15	.09**	-.33***	.38***	.08*	.52***	-	-	-	-	-	-	-	-	-
7- ICU-Total Score	0.90	0.38	0.00–3.00	0.05–2.27	0.55	0.25	-.01	-.29***	.28***	.31***	-.03	-.15***	-	-	-	-	-	-	-	-
8- ICU-Lack of Remorse	0.81	0.52	0.00–3.00	0.00–2.60	0.68	0.08	.01	-.10**	.10**	.21***	-.16***	-.20***	-	-	-	-	-	-	-	-
9- ICU-Limited Concern	0.63	0.48	0.00–3.00	0.00–2.17	0.68	-0.17	.01	-.14***	.07*	.10**	.02	-.08*	-	.42***	-	-	-	-	-	-
10- ICU-Callous-lack of Empathy	0.73	0.49	0.00–3.00	0.00–2.83	0.77	0.71	.002	-.22***	.20***	.35***	-.13***	-.15***	-	.57***	.39***	-	-	-	-	-
11- ICU-Restricted Affect	1.53	0.65	0.00–3.00	0.00–3.00	0.11	-0.34	-.04	-.35***	.40***	.23***	.14***	-.02	-	.27***	.19***	.33***	-	-	-	-
12- SDQ-Internalizing Problems	0.66	0.41	0.00–2.00	0.00–1.88	0.49	-0.48	.11**	-.49***	.51***	.13***	.50***	.54***	.07	-.05	.06	.02	.14***	-	-	-
13- SDQ-Externalizing Problems	0.60	0.32	0.00–2.00	0.00–1.56	0.30	-0.38	.07	-.24***	.22***	.21***	.20***	.28***	.33***	.22***	.39***	.26***	.08*	.38***	-	-

Notes. ASQ: Attachment Style Questionnaire; ICU: Inventory of Callous-Unemotional Traits; SDQ: Strengths and Difficulties Questionnaire. \*\*\**p* < .001, \*\**p* < .01, \**p* < .05.

**Table 2** Regression analyses (standardized  $\beta$ )

	ICU-Total Score	ICU-Lack of Remorse	ICU-Limited Concern	ICU-Callous-lack of Empathy	ICU-Restricted Affect
Step1	$F(4,785)=24.808^{***}$ $R^2=.11$	$F(7,785)=11.935^{***}$ $R^2=.38$	$F(7,785)=45.140^{***}$ $R^2=.28$	$F(7,785)=69.046^{***}$ $R^2=.38$	$F(7,785)=19.456^{***}$ $R^2=.14$
Gender	-.04	-.04	-.02	.01	.01
Age	-.02	.02	-.001	.001	-.06
SDQ-Internalizing Problems	-.08*	-.12***	-.06	-.03	.18***
SDQ-Externalizing Problems	.36***	.06	.31***	.11**	-.10
ICU-Lack of Remorse	-	-	.25***	.44***	.14***
ICU-Limited Concern	-	.22***	-	.13***	.06
ICU-Callous-lack of Empathy	-	.44***	.15***	-	.25***
ICU-Restricted Affect	-	.10***	.05	.18***	-
Step2	$F(9,785)=46.171^{***}$ $\Delta R^2=.23^{***}; R^2=.34$	$F(12,785)=43.277^{***}$ $\Delta R^2=.01^{**}; R^2=.39$	$F(12,785)=29.001^{***}$ $\Delta R^2=.02^{***}; R^2=.30$	$F(12,785)=54.427^{***}$ $\Delta R^2=.07^{***}; R^2=.45$	$F(12,785)=27.438^{***}$ $\Delta R^2=.15^{***}; R^2=.29$
Gender	-.07*	-.05	-.003	-.04	.01
Grade	-.01	.01	.03	-.01	-.04
SDQ-Internalizing Problems	-.13**	-.05	-.04	-.02	-.07
SDQ-Externalizing Problems	.33***	.08	.32***	.10**	-.07
ICU-Lack of Remorse	-	-	.25***	.36***	.12**
ICU-Limited Concern	-	.22***	-	.13	.05
ICU-Callous-lack of Empathy	-	.39***	.17***	-	.13***
ICU-Restricted Affect	-	.10**	.05	.10***	-
ASQ-Confidence	-.25***	.02	-.05	-.13***	-.19***
ASQ-Discomfort with Closeness	.23***	.03	-.05	.05	.33***
ASQ-Relationships as Secondary	.19***	.04	-.09**	.22***	.05
ASQ-Need for Approval	-.06*	-.09**	.11**	-.15***	.13***
ASQ-Preoccupation with Relationships	-.33***	-.08*	-.12**	-.09*	-.16***

Notes. ASQ: Attachment Style Questionnaire; ICU: Inventory of Callous-Unemotional Traits; SDQ: Strengths and Difficulties Questionnaire; \*\*\* $p < .001$ ,

\*\* $p < .01$ , \* $p < .05$ .

by Waller & Wagner (2019), that suggests impairments in either desire for or pleasure from closeness in social relationships as a key component of CU traits. In fact, high levels of discomfort with closeness are components of avoidant attachment, that refers to a relational schema characterized by the search for social distancing, while low levels of confidence in relationships and preoccupation with relationships reflect low esteem, consideration, and interest

in others. Moreover, our results appear consistent with the attachment styles related to the socioemotional correlates of CU traits. For instance, secure attachment in parent-child relationship is a key element in both the quality of parenting (Karavasilis et al., 2003) and the quality of friendship (Dwyer et al., 2010); additional, secure attachment to parents and to teachers was linked to school success (Bergin & Bergin, 2009). Further, security in attachment relationships



with both parents and peers was significantly related to indicators of socioemotional competence (e.g., high levels of sympathetic tendencies toward others and low levels of aggressive behaviors; Laible, 2007; Laible et al., 2000). On this regard, bullying behaviors were associated to low secure attachment to parents (Walden & Beran, 2010) or to parents and peers (Murphy et al., 2017). To summarize, our results seem to confirm the importance of considering the whole youths' relational experience to better understand the nature of CU traits.

Importantly, in the present study we tested whether attachment styles showed specific associations with specific facets of CU traits. On this regard, our second and third hypotheses were largely disconfirmed. Zero-order correlations showed hypothesized associations between attachment styles and both lack of remorse and limited concern for performance (albeit lower than the magnitude of  $r \geq |.20|$  for the most part); nevertheless, these two CU traits facets did not show noteworthy results when the regression approach was considered. Since the statistical approach we used involves controlling for the shared variance between the four CU traits facets, we can advance that lack of remorse and limited concern for performance contribute to tap specific aspects of CU traits that are task- rather than relationship- oriented. In fact, these two ICU subscales contain items that are mainly focused on goal-directed actions (e.g., “I feel bad or guilty when I do something wrong” and “I care about how well I do at school or work”, respectively) which can occur in contexts that do not necessarily imply a strong activation of the attachment system. With reference to the STAR Model (Waller & Wagner, 2019), we can hypothesize that fearlessness, instead of deficit in social bonding, could account for these two specific facets of CU traits. In fact, previous research demonstrated that fearlessness was negatively associated to guilt (Baker et al., 2012; Kochanska et al., 2002), and it was recently demonstrated that both fearlessness and low social affiliation were uniquely associated to increases in CU behaviors within a sample of 3-to-5 years old twin children, proposing that fearlessness could have a specific role in promote behaviors related to rule breaking (Waller et al., 2021). Consequently, it would be interesting to replicate such evidence also in samples of adolescents - when CU traits are more stable and solidified within the personality domain (Pardini et al., 2012) - by adopting the four-facets measure of CU traits. We could hypothesize that the facets related to lack of remorse and limited concern for performance may be those accounted for by fearlessness, while the other two facets (i.e., callous-lack of empathy and restricted affect) may be accounted for by measures of social affiliation.

In line with the just-above expressed thought, we found that our fourth and fifth hypotheses were partially confirmed.

Specifically, the style related to consider relationships as secondary was uniquely and positively associated to the callous-lack of empathy facet of CU traits. This evidence was particularly important to highlight that the callous-lack of empathy component could be defined by a mechanism related to the devaluation of others; in fact, our results highlighted that relationships as secondary, but not discomfort with closeness, added unique variance in this facet of CU traits: both these scales of the ASQ pertain to avoidant attachment style. Nevertheless, while the former implies a positive perception of the Self that is associated with a negative perception of others, the latter implies the recognition of difficulties and discomfort in staying with others. This could also be in line with previous evidences demonstrating that children with elevated levels of CU traits have a social self-concept that is not negatively impacted (Warren et al., 2015). Thus, future research could in-depth test whether the callous-lack of empathy facet of CU traits is the component that taps the positive and self-sufficient concept of the Self that characterizes high levels of these traits in youths. Further, our results indicated that discomfort with closeness, but not relationships as secondary, was positively associated to the restricted affect facet of CU traits. This could suggest that the deficient and shallow affect represented by this facet of CU traits captures a defensive approach through which the Self protects itself from previous relational failures experienced with others.

Another aim of the present study was to explore the possible moderator role of gender. The investigation of this aspect was important, considering that research on attachment and CU traits was either conducted with boys (Holmqvist, 2008; Pasalich et al., 2012) or did not find significant results for girls (Gambin et al., 2018). Moreover, as reported by Bird and colleagues, several gender differences were reported for youths high in CU traits, in terms of severity, correlates, and comorbid difficulties (Bird et al., 2019). Our results suggested that the links between attachment styles and CU traits are the same for both males and females: although further studies are needed to strengthen these initial evidences, we can advance the hypothesis that the mechanisms related to the role of attachment styles in youths' CU traits are the same for both genders.

All the above-reported results must be considered in light of some limitations. First, the cross-sectional nature of the present study prevented us to reach causal conclusions: the direction of the associations between attachment and CU traits can be theoretically sustained by referring to the STAR Model (Waller & Wagner, 2019), by considering the notion that impaired relationships with others are part of a mechanism related to low social affiliation that causally sustains the developmental pathways to CU traits. However, longitudinal studies are needed to corroborate our findings

within the framework of the STAR Model. In this regard, future longitudinal research could also test a cross-lagged panel model, that would allow examining the bidirectional associations between attachment styles and CU traits since the STAR Model leaves open the possibility of a recursive mechanism between attachment and CU traits. As for the subcomponents of CU traits, the present regression approach separately tested the four facets of the “With limited prosocial emotions” specifier as dependent variables: although it allowed focusing on one symptomatologic aspect at a time while controlling for their shared variance in order to test whether different aspects present specific correlates, future research could adopt a more comprehensive approach (e.g., by using a path analysis) in which they are simultaneously tested as part of the same model. Second, students came from a single cultural context, and generalizability of results to other countries and cultures should be tested. Specifically, the cultural background of our participants is quite homogeneous (i.e., more than 90.00% were from an Italian background), and this is typical of the Italian school contexts; consequently, while our results can describe Western Mediterranean contexts (to which Italy belongs), they could not be representative of other cultural contexts. Beyond the debate about the belonging of Italy to an individualistic or collectivistic culture (e.g., Burton et al., 2021), there is no doubt that the way to develop social relationships - including attachment relationships - and the value attributed to them present differences between the various cultures (e.g., Strand et al., 2019). For instance, since the early stages of development, North American culture promotes more individualistic childrearing based on high levels of parental investment within the parent-child dyad, whereas the Italian culture invests in socially-oriented interactions aimed at facilitating the participation in social groups and the attention to others’ requests (Bornstein et al., 2008; Cassibba et al., 2013). Cross-cultural research suggests a combination of universal trends and contextual determinants of attachment: while there are several similarities across cultures that are in favor of the universality hypothesis of attachment theory, there are also different distributions in both child and adult attachment classifications when different cultures are considered (Cassibba et al., 2013). As for CU traits, this construct has been largely studied in the last two decades, providing evidence for its usability and assessment in several cultural contexts (Ray & Frick, 2018). Although specific research is lacking in this regard, we can assume that cultures characterized by attributing great importance toward participation in social groups are particularly prone to stigmatize a cold and detached attitude toward others. As a result, it would be interesting to compare empirical evidence on the associations between attachment styles and CU traits coming from diverse cultural backgrounds. Further, future research could

focus on other aspects related to human diversity that have not been addressed in the present study; for instance, socioeconomic status is a variable that affects many aspects of the quality of parent-child attachment relationship - including attachment (e.g., Eckstein-Madry et al., 2021; Puckering, 2004), while its role in CU traits or psychopathic is still debated (e.g., Markowitz et al., 2015; Zwaanswijk et al., 2018). Once again, future research could consider to which extent students’ socioeconomic status moderates and/or mediates the associations between attachment styles and CU traits. Third, all variables in the present research were assessed using self-report questionnaires, thus results may be inflated due to shared method variance; for instance, future research should consider alternative informants to measure CU traits (e.g., parents or teachers).

Despite the above-reported limitations, we believe that our results were important for further understanding the role of attachment styles in CU traits among youths, advancing previous research that was mainly focused on limited and clinical samples. We also believe that our results can inform treatment strategies; a study by Dadds and colleagues (2016) conducted with a clinical sample of 4-to-14 years old children and early adolescents indicated that individuals high in CU traits may be capable of appropriate emotional responses to distressing and attachment-activating stimuli. Consequently, it is important to understand which specific aspect of attachment can be stimulated in order to promote engagement with others, prevent the development of CU traits in youth, or contrast their consolidation.

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**Data availability statement** Dataset is available on request.

## Compliance with ethical standards

**Conflict of interest** Authors declare that they have no conflict of interest.

**Ethical approval** all procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

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