

# The unique and interactive effects of callous-unemotional traits and internalizing emotion problems in the association to adolescents' generalized problematic Internet use.

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**Abstract.** The present study was realized to explore the unique and interactive effects of callous-unemotional traits (i.e., CU traits) and internalizing emotion problems in the association to generalized problematic Internet use (i.e., GPIU). 608 community sample adolescents (272 girls, mean age = 16.70 years, DS = 1.66 years) were recruited. Unique positive associations between CU traits and GPIU and between internalizing emotion problems and GPIU emerged. Moreover, these associations were qualified by a significant interaction term between CU traits and internalizing emotion problems: CU traits were positively associated to GPIU in adolescents high (vs. low) in internalizing emotion problems. In other terms, the likeability to have high levels of GPIU was quite low in adolescents low in internalizing emotion problems, irrespectively of their level of CU traits; in contrast, adolescent students high in internalizing emotion problems showed higher levels of GPIU if they were also high on CU traits. These preliminary results allow us to speculate that there may be different patterns to GPIU in adolescence, with individuals high in both CU traits and internalizing emotion problems (i.e., the so-called secondary variant of CU traits) presenting cumulative risk factors for the development of an unhealthy approach to the use of the Internet medium.

**Keywords:** Generalized Problematic Internet Use; Callous-Unemotional Traits; Internalizing Emotion Problems; Adolescence; Social Development

## 1 Introduction.

The present research was realized to explore the relation between two constructs that in the last decade have gained a central focus in developmental and clinical psychology: callous-unemotional traits (i.e., CU traits) and generalized problematic Internet use (i.e., GPIU). CU traits refer to a behavioural pattern characterized by lack of remorse and empathy, shallow/deficient affect, and callous use of others for personal gain [1].

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Youths high in CU traits present unique cognitive, emotional, and behavioural correlates (e.g., a fearlessness temperament along with low levels of activation in front of distressing stimuli, high levels of impulsivity, low emotion awareness, high levels of both reactive and proactive aggression along with lack of prosocial behaviours, relational problems in school settings with both peers and teachers) [1-5], and are at high risk for developing severe and chronic conduct problems [6]. As for CU traits and online activities, the few existing research found a positive relation between high levels of CU traits and cyberbullying (i.e., the use of technological means, including the Internet, in order to bully peers) [7], suggesting that the Internet may be used as a detached medium to obtain personal gain uncaring of others' pains. Moreover, it was found that adolescents high in CU traits or with low empathy are more prone to technology addiction [8]. Nevertheless, to date research has not in-depth investigated the associations between CU traits and problematic Internet use.

Several definitions of problematic Internet use have been advanced; one of the widely accepted is represented by the difficulty in regulating the time spent in online activities that leads to negative consequences in daily life [9]. In the present research, we adopted the Cognitive Behavioral Model of problematic Internet use proposed by Davis [10] and revised by Caplan [11]. According to this model, problematic Internet use can be divided into two distinct sub-categories: specific problematic Internet use (i.e., SPIU, the overuse of one or more content-specific functions of the Internet, such as gambling, shopping, sexual material, etc.) and generalized problematic Internet use (i.e., GPIU, the preference for online social interactions in which the social communicative aspects of the Internet are central) [9-11]. Focusing on GPIU, extant research suggests that internalizing emotion problems (e.g., loneliness, anxiety, depression) may lead youths to feel safer and more competent during online interactions rather than in face-to-face contacts [12], promoting biased cognitions related to the Internet [10], and strengthening the motivation to use the Internet as the best way to regulate their mood [13-15]. Over time, the overuse of the Internet leads these youths not to regulate time spent online and to incur serious consequences in offline life, such as damaged social relationships and lower school/work performances [11].

Whereas extant studies on GPIU have mainly stressed its emotion-related internalizing antecedents, there are arguments for investigating other possible socioemotional correlates, such as CU traits. For instance, some specific characteristics of CU traits, such as problems in mood regulation, deficits in recognition of specific emotions, detached social relationships, and poor school performance [16, 17], can constitute a fertile ground for the development of the cognitive, emotional and behavioural processes that define the GPIU. In other words, we argued that CU traits could play a unique role over and above the role played by internalizing emotion problems in the association to GPIU. Moreover, considering the field of research on the secondary variant of CU traits (i.e., a variant that define a specific subgroup of youths high in CU traits which present co-occurring high internalizing emotion problems [18]), we expected an interactive effect between these two variables in the association to GPIU. Specifically, considering that youths showing the secondary variant of CU traits combine two potential risk factors for the development of GPIU, we hypothesized that they had the highest likeability to score high in the generalized problematic use of the Internet medium.

## 2 Material and Methods

### 2.1 Participants and Procedures

Three scholastic Institutions in Central Italy were contacted to propose a research collaboration in the field of adolescence, psychological development, and the use of new technologies. Institutional Review Boards and School Deans approved all procedures, and about 800 students were contacted to obtain informed consent. Written informed consent was asked to parents of student under age 18 years (i.e., the legal adult age in Italy) and directly obtained from adult students (i.e., over the age of 18 years). Written informed consent was obtained for about 85% of the eligible students. After that, trained assistants individually administered study questionnaires in the classrooms during two school hours. Questionnaires were in written format and were administered in counterbalanced order. Exclusion criteria for the inclusion in data analyses were: inaccuracy in completing questionnaire, psychiatric diagnosis or mental injuries, unfamiliarity with Italian language, absence from school during data collection.

As a consequence, the final sample of the present study was made up by 608 community sample adolescents (272 girls, mean age = 16.70 years,  $DS = 1.66$  years); 94.74% of the students were from Italian backgrounds. 9.21% of the students attended Vocational Schools, 43.91% attended Technical Institutes, and 46.88% attended Lyceum High Schools. As for their family background, 58.22% of their mothers and 47.04% of their fathers had a high school or university degree.

### 2.2 Measures

**GPIU.** The Generalized Problematic Internet Use Scale 2 (GPIUS2 [11], Italian version by Fioravanti and colleagues [19]) is a 15-item self-report questionnaire that was chosen to assess cognition and behaviours related to GPIU (e.g., “*I prefer communicating with people online rather than face-to-face*”; “*I have used the Internet to make myself feel better when I was down*”). A general GPIU dimension (in the present study  $\alpha = .90$ ) captures individuals’ preference for online social interactions, internet use for mood regulation, deficient self-regulation of the Internet use, and negative outcomes. Students were asked to complete the scale using an 8-point Likert-type scale from 1 (*definitely disagree*) to 8 (*definitely agree*).

**Internalizing emotion problems.** The five-item Emotional Problems (EP) scale from the child version of the Strengths and Difficulties Questionnaire (SDQ [20], Italian version by Di Riso and colleagues [21]) was used. This scale encloses items related to internalizing problems (e.g., “*I have many fears, I am easily scared*”) that were found to be associated to depressive and anxiety diagnoses [20]. Students were asked to complete the scale using a 3-point Likert-type scale from 0 (*not true*) to 2 (*certainly true*). In this sample, the alpha was = .75.

**Callous-unemotional traits.** The Inventory of Callous-Unemotional Traits (ICU [22], Italian version by Ciucci and colleagues [23]) was employed to assess CU traits. This

is a 24 items self-report questionnaire (e.g., “*The feelings of others are unimportant to me*”; “*I try not to hurt others’ feelings*”- reversed) on a 4-point Likert-type scale, from 0 (*not at all true*) to 3 (*definitely true*). A general CU dimension (22 items in the Italian version, in the present study  $\alpha = .84$ ) captures individuals’ levels of callousness, uncaring and unemotional tendency toward others and significant activities (e.g., school performance).

### 3 Data Analyses

First of all, we inspected indices of skewness and kurtosis in order to examine the form of the distribution of each study variable. Subsequently, zero-order correlations were performed: Kendall’s *tau-b* was used for correlations involving “Gender” (i.e., a dichotomous variable), and Pearson’s *r* was used for pairs of continuous variables. Main analyses involved a hierarchical multiple linear regression. Gender and age were inserted as covariates (step 0); CU traits and internalizing emotion problems were added in step 1 to test their unique associations to GPIU; lastly, the interaction term between CU traits and internalizing emotion problems was added in step 2. Prior to perform regression analyses, scores of CU traits and internalizing emotion problems were mean-centered; the form of the interaction was explored using the post hoc probing procedures recommended by Holmbeck [24].

### 4 Results

Descriptive statistics and zero-order correlations were reported in table 1. All variables approached normal distribution (both skewness and kurtosis values were in the range [-1.00; +1.00]) with the exception of GPIU that presented a skewness value equal to 1.01. Correlation analyses showed that GPIU scores were positively associated to both CU traits ( $r = .15, p < .001$ ) and internalizing emotion problems ( $r = .29, p < .001$ ), whereas CU traits and internalizing emotion problems were not significantly associated ( $r = .08, p > .05$ ).

**Table 1.** Descriptive Statistics and Zero-order Correlations.

	M	SD	Skewness	Kurtosis	1	2	3	4	5
1 Gender	-	-	-	-	-				
2 Age	16.7	1.66	.14	-.61	.11**	-			
3 GPIU	2.34	1.17	1.01	.62	-.01	-.16***	-		
4 CU traits	.92	.39	.63	.36	.03	.07	.15***	-	
5 Internalizing emotion problems	.70	.52	.57	-.54	.36***	-.01	.29***	.08	-

Notes. \*\*  $p < .01$ ; \*\*\*  $p < .001$ . GPIU: Generalized Problematic Internet Use.

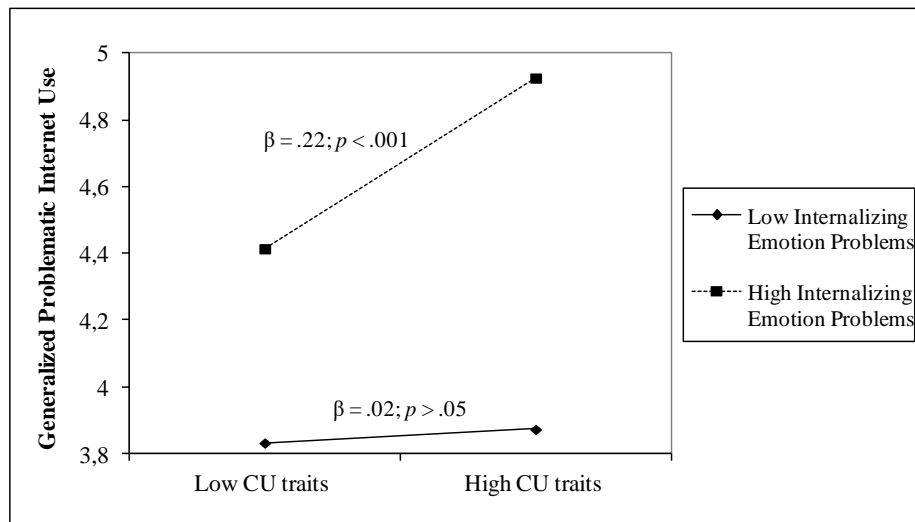
CU traits: Callous-unemotional Traits.

Results of linear regressions analyses (table 2) highlighted that, after controlling for gender and age, CU traits and internalizing emotion problems presented unique and positive associations to GPIU in step 1 ( $\beta$ s = .13 and .35 respectively,  $p < .001$ ). Step 2 showed a significant 2-way interaction term ( $\beta = .11$ ,  $p < .01$ ), along with the main effects that were still significant ( $\beta$ s = .12,  $p < .01$ , and .35,  $p < .001$ , respectively). The form of the interaction was investigated in figure 1. Specifically, CU traits were positively and significantly associated to GPIU in adolescents high in internalizing emotion problems ( $\beta = .22$ ,  $p < .001$ ) but not in those low in internalizing emotion problems ( $\beta = .02$ ,  $p > .05$ ).

**Table 2.** Regression analyses on Generalized Problematic Internet Use.

Covariates: Gender and Age	$\beta$	F	$\Delta R^2$	$R^2$
Step 1		(4,607) = 26.387***	.12***	.14
CU traits	.13***			
Internalizing emotion problems	.35***			
Step 2		(5,607) = 22.961***	.01**	.15
CU traits	.12**			
Internalizing emotion problems	.35***			
CU traits x Internalizing emotion problems	.11**			

Notes. \*\*  $p < .01$ ; \*\*\*  $p < .001$ .



**Fig. 1.** Regression lines for relation between Callous-unemotional Traits and Generalized Problematic Internet Use as moderated by Internalizing Emotion Problems.

## 5 Discussion

The present study was conducted in order to explore the unique and interactive effects of CU traits and internalizing emotion problems in their association to GPIU within a large community sample of adolescents. According to our hypotheses, both CU traits and internalizing emotion problems showed unique positive associations with GPIU. While the latter association is not surprising (e.g., Davis's and Caplan's models and subsequent studies asserted that high levels of anxiety and low social skills are associated to GPIU [10, 11, 25]), the role of CU traits is novel. It may indicate that adolescents high in CU traits are fascinated by the Internet medium because it provides a way to deal with their problems in emotion regulation and fits well with their detached and shallow way to experience relationships with others [1, 16, 17]. Even if the cross-sectional nature of the present study does not allow to test for causal processes, these results encourage future research to investigate differential developmental pathways to GPIU, assuming that some adolescents could develop this problem on the basis of their internalizing problems, while others on the basis of their callous and unemotional personality traits.

In our opinion, the most important finding is represented by the interaction term between CU traits and internalizing emotion problems in the association to GPIU. As reported in figure 1, CU traits were positively associated to GPIU in adolescents high (vs. low) in internalizing emotion problems. In other terms, the likeability to have high levels of GPIU was quite low in those with low internalizing emotion problems, irrespectively of the level of CU traits; in contrast, adolescents high in internalizing emotion problems showed higher levels of GPIU if they were also high in CU traits. This latter condition represents the so-called secondary variant of CU traits [18]. Adolescents high in CU traits are a heterogeneous group of individuals that, while sharing the core characteristics of the CU traits, differs in exposure to risk behaviours, in treatment needs, and in treatment responsiveness [26, 27]. For instance, secondary variant CU traits group shows the highest levels of aggressive and violent behaviour compared to groups of only-anxious or only-callous unemotional adolescents [27]. It could be hypothesized that the Internet medium simultaneously offers this group both an environment in which manipulate and attack others without wondering about others' suffering (according to the callous and uncaring personality tendency) as well as a detached space that protects against others and helps to regulate emotional experiences related to social interactions (according to the internalizing emotion problems). As a result, considering the developmental pathways to GPIU, adolescents showing the secondary variant of CU traits present two cumulative risk factors that amplify the likelihood to manifest this problem.

These results emerged within the context of some limitations. In addition to the already mentioned cross-sectional nature of the study, the variables were investigated using the same source of information (i.e., students); a future replication should include a multi informant approach to avoid the risks related to common shared variance. Moreover, in-depth information about the nature of the activities and the amount of time spent on the Internet is required in order to better understand how these activities are functional to adolescents' personality characteristics. Further, the sample was made up by Italian adolescent high school students, and generalization of our results have to be tested. Nevertheless, this study has the merit to have enriched the field of research on GPIU

with the construct of CU traits, proposing multiple developmental pathways to GPIU. As a consequence, existing intervention strategies in the field of GPIU should increasingly adapt to different profiles of adolescents that experience problems in the use of the Internet. For instance, it could be promising to integrate interventions focused on emotion regulation strategies with the targeted training of the field of CU traits, that have a specific focus on enhancing the emotion recognition abilities [28, 29].

## References

1. Frick, P.J., Ray, J.V.: Evaluating callous-unemotional traits as a personality construct. *Journal of Personality* 83:710-22(2014). DOI:10.1111/jopy.12114
2. Baroncelli A., Ciucci, E.: Bidirectional effects between callous-unemotional traits and student-teacher relationship quality among middle school students. *Journal of Abnormal Child Psychology* 48:277-288(2020). DOI:10.1007/s10802-019-00595-6
3. Baroncelli, A., Roti, B., Ciucci, E.: The associations between callous-unemotional traits and emotional awareness in youth. *Personality and Individual Differences* 120:247-252(2018). DOI:10.1016/j.paid.2017.07.036
4. Ciucci, E., Kimonis, E.R., Frick, P.J., Righi, S., Baroncelli, A., Tambasco, G., Facci, C.: Attentional orienting to emotional faces moderates the association between callous-unemotional traits and peer-nominated aggression in young adolescent school children. *Journal of Abnormal Child Psychology* 46: 1011-1019(2018). DOI:10.1037/a0033076
5. Wall, T. D., Frick, P. J., Fanti, K. A., Kimonis, E. R., Lordos, A.: Factors differentiating callous-unemotional children with and without conduct problems. *Journal of Child Psychology and Psychiatry and Allied Disciplines* 57(8): 976–983(2016). DOI:10.1111/jcpp.12569
6. Frick, P.J., Ray, J.V., Thornton, L.C., Kahn, R.E.: Can callous-unemotional traits enhance the understanding, diagnosis, and treatment of serious conduct problems in children and adolescents? A comprehensive review. *Psychological Bulletin* 140:1-57(2014). DOI:10.1037/a0033076
7. Ciucci, E., Baroncelli, A.: Emotion-related personality traits and peer social standing: unique and interactive effects in cyberbullying behaviors. *Cyberpsychology, Behavior, and Social Networking* 17:584-90(2014). DOI:10.1089/cyber.2014.0020
8. Trumello, C., Babore, A., Candelori, C., Morelli, M., Bianchi, D.: Relationship with parents, emotion regulation, and callous-unemotional traits in adolescents' internet addiction. *Biomed Research International* 7914261(2018). DOI:10.1155/2018/7914261
9. Spada, M.M.: An overview of problematic Internet use. *Addictive Behaviors* 39:3-6(2014). DOI:10.1016/j.addbeh.2013.09.007
10. Davis, R.A.: A cognitive-behavioural model of pathological Internet use. *Computers in Human Behaviour* 17:187-95(2001). DOI:10.1016/S0747-5632(00)00041-8
11. Caplan, S.E.: Theory and measurement of generalized problematic Internet use: A two-step approach. *Computers in Human Behavior* 26:1089-97(2010). DOI:10.1016/j.chb.2010.03.012
12. Lee, B.W., Stapinski, L.A.: Seeking safety on the internet: Relationship between social anxiety and problematic internet use. *Journal of Anxiety Disorders* 26:197-205(2012). DOI:10.1016/j.janxdis.2011.11.001
13. Caplan, S.E.: Problematic Internet use and psychosocial well-being: Development of a theory-based cognitive-behavioral measure. *Computers in Human Behavior* 18:533-75(2002). DOI:10.1016/S0747-5632(02)00004-3

14. Caplan, S.E.: Relations among loneliness, social anxiety, and problematic Internet use. *CyberPsychology & Behavior* 10:234-241(2007). DOI:10.1089/cpb.2006.9963
15. LaRose, R., Lin, C.A., Eastin, M.S.: Unregulated Internet usage: Addiction, habit, or deficient self-regulation? *Media Psychology*; 5:225-253(2003). DOI:10.1207/S1532785XMEP0503\_01
16. Ciucci, E., Baroncelli, A., Golmaryami, F.N., Frick, P.J.: The emotional correlates to callous-unemotional traits in children. *Journal of Child and Family Studies* 24:2374-87(2015). DOI: 10.1007/s10826-014-0040-3
17. Dadds, M.R., Kimonis, E.R., Schollar-Root, O., Moul, C., Hawes, D.J.: Are impairments in emotion recognition a core feature of callous-unemotional traits? Testing the primary versus secondary variants model in children. *Developmental Psychopathology* 30(1):67-77(2017). DOI:10.1017/S0954579417000475
18. Kimonis, E.R., Frick, P.J., Cauffman, E., Goldweber, A., Skeem, J.: Primary and secondary variants of juvenile psychopathy differ in emotional processing. *Development and Psychopathology* 24:1091-103(2012). DOI:10.1017/S0954579412000557
19. Fioravanti, G., Primi, C., Casale, S.: Psychometric evaluation of the Generalized Problematic Internet Use Scale 2 in an Italian sample. *Cyberpsychology, Behavior and Social Networking* 16:761-6(2013). DOI:10.1089/cyber.2012.0429
20. Goodman, R.: Psychometric properties of the Strengths and Difficulties Questionnaire. *Journal of the American Academy of Child and Adolescent Psychiatry* 40:1337-45(2001). DOI:10.1097/00004583-200111000-00015
21. Di Riso, D., Salcuni, S., Chessa, D., Raudino, A., Lis, A., Altoè, G.: The Strengths and Difficulties Questionnaire (SDQ). Early evidence of its reliability and validity in a community sample of Italian children. *Personality and Individual Differences* 49:570-5(2010). DOI:10.1016/j.paid.2010.05.005
22. Essau, C.A., Sasagawa, S., Frick, P.J.: Callous-unemotional traits in a community sample of adolescents. *Assessment* 13:454-69(2006). DOI:10.1177/1073191106287354
23. Ciucci, E., Baroncelli, A., Franchi, M., Golmaryami, F.N., Frick, P.J.: The association between callous-unemotional traits and behavioral and academic adjustment in children: further validation of the Inventory of Callous-Unemotional Traits. *Journal of Psychopathology and Behavioral Assessment* 36:189-200(2014). DOI:10.1007/s10862-013-9384-z
24. Holmbeck, G.N.: Post-hoc probing of significant moderational and mediational effects in studies of pediatric populations. *Journal of Pediatric Psychology* 27:87-96(2002). DOI:10.1093/jpepsy/27.1.87
25. Di Palma, T., Sica LS, Ciucci E, Baroncelli A, Carpenzano D, Facci C.: Relational identity in adolescence: Between loneliness and sense of personal uniqueness. In Miglino, O., & Ponticorvo, M. (eds.). *Proceedings of the First Symposium on Psychology-Based Technologies*. ISSN:16130073 (2019).
26. Cecil, C. A., Lysenko, L. J., Jaffee, S. R., Pingault, J. B., Smith, R. G., Relton, C. L., Woodward, G., McArdle, W., Mill, J., & Barker, E. D.: Environmental risk, Oxytocin Receptor Gene (OXTR) methylation and youth callous-unemotional traits: A 13-year longitudinal study. *Molecular Psychiatry* 19:1071-7(2014). DOI:10.1038/mp.2014.95
27. Docherty, M., Boxer, P., Huesmann, L.R., O'Brien, M., Bushman, B.J.: Exploring primary and secondary variants of psychopathy in adolescents in detention and in the community. *Journal of Clinical Child and Adolescent Psychology* 45: 564-78(2016). DOI:10.1080/15374416.2014.979934
28. Wartberg, L., Lindenberg, K.: Predictors of spontaneous remission of problematic Internet use in adolescence: A one-year follow-up study. *International Journal of Environmental Research and Public Health* 17: 448 (2020). DOI:10.3390/ijerph17020448



29. Dadds, Avril Jessica Cauchi, Subodha Wimalaweera, David John Hawes, John Brennan, Outcomes, moderators, and mediators of empathic-emotion recognition training for complex conduct problems in childhood. *Psychiatry Research* 199: 201-7 (2012). DOI: 10.1016/j.psychres.2012.04.033.